Validating the Structured Dynamic Assessment Case-Management 21-item (SDAC-21) in a Sample of Incarcerated Offenders

by

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Abstract

Given the importance of ensuring that offenders do not engage in offending behaviour while incarcerated and remain crime free once they are released, the field has devoted considerable effort to the development and validation of risk assessment tools. The purpose of this dissertation was to validate the Structured Dynamic Assessment Case-Management 21-Item (SDAC-21; Serin & Wilson, 2012). Importantly, this was the first empirical validation of the SDAC-21.The SDAC-21 is a new body of work that includes empirically derived and theoretically informed dynamic risk factors, responsivity factors, and protective factors. It is an institutional assessment tool that was developed based on the successful implementation of the Dynamic Risk Assessment for Offender Re-entry (DRAOR; Serin, 2007), which is a dynamic risk assessment tool used in the community. Using a sample of 4,217 incarcerated male offenders held in the Iowa Department of Corrections (IDOC), this study examined the psychometric properties and the accuracy of the SDAC-21 in predicting institutional misconducts. In addition, the incremental contribution of the SDAC-21 in predicting institutional misconducts over and above static risk was also evaluated. Lastly, an exploration of the relationship between risk and protective factors in relation to outcomes was also undertaken. The SDAC-21 demonstrated acceptable psychometric properties (e.g., internal consistency, inter-rater reliability). The SDAC-21 significantly predicted institutional misconducts (AUC's ranging from .60 -.75) and demonstrated incremental validity over and above static risk estimates. Further, the results from the moderation analyses indicated that the Protective domain showed independent effects in predicting institutional misconducts, regardless of static risk. These results showed that the SDAC-21 is a valid tool for predicting institutional misconducts. It is anticipated that the results

of this research endeavour will improve the overall ability to manage and supervise offenders more effectively within correctional institutions.

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In the last three decades, there has been a dramatic increase in incarceration rates (Iowa Department of Corrections (IDOC), 2018a; Public Safety, 2012); this presents increased challenges for managing prisons safely and effectively. One of the most important tasks for criminal justice professionals to meet this challenge is the creation and implementation of an individual case management plan, which involves assessing the offender in terms of their risks and needs. Such a plan would provide informed decisions regarding the type and intensity of treatment services as well enabling staff to monitor and respond to changes in their risk profile throughout their sentence.

Given the importance of ensuring that offenders do not engage in offending behaviour while incarcerated and remain crime free once they are released, the field has devoted considerable effort to the development and validation of risk assessment tools. Beginning with a focus on static historical variables and moving to an inclusion of dynamic changeable risk factors, risk assessment research has seen a gradual shift in attention from solely one of risk prediction efforts to an emphasis on risk prevention and management (Douglas & Kropp, 2002; Douglas & Skeem, 2005). The latter model is concerned with first identifying those offenders who are at risk to commit another offence and then developing intervention strategies to mitigate that risk (Andrews & Bonta, 2010; Bonta & Andrews, 2016; Douglas & Kropp, 2002).

The inclusion of dynamic risk factors, which are potentially changeable, is central to risk management and prevention efforts (Douglas & Kropp, 2002; Douglas & Skeem, 2005; Ullrich & Coid, 2011). Concomitantly, there has been an increased consideration of protective factors, which are those variables that may mitigate the probability of engaging in criminal behaviour

(Jones, Brown, & Robinson, 2015; Ullrich & Coid, 2011; Polaschek, 2016). Fraught with conceptual and operational difficulties, the research on protective factors has continued to lag (Serin, Chadwick, & Lloyd, 2016). However, understanding these positive attributes may help explain why some individuals do not go on to commit further crimes despite similar risk ratings; thus, changing the risk trajectory to a more adaptive one. In addition, focusing on protective assets underscores a strength-based approach, where greater emphasis is placed on helping offenders cultivate prosocial attitudes, skills, and behaviours, which may promote long-term changes and desistance from crime (Polaschek, 2016).

The assessment of responsivity factors is important to consider in order to identify issues that may impede an offender from effectively engaging in correctional programs. General responsivity outlines the techniques and modes of delivery of services (e.g. cognitive behavioural therapy) that would maximize effectiveness. Specific responsivity refers to variation in responsiveness to treatment based on the individual learning style of the offender. However, the area of specific responsivity has yet to be fully developed and remains largely unexplored (Andrews & Bonta, 2010; Bonta & Andrews, 2016; Jones, et al., 2015)

The Structured Dynamic Assessment Case-management 21-item (SDAC-21; Serin & Wilson, 2012) is a new body of work that includes empirically derived and theoretically informed dynamic risk factors, responsivity factors, and protective factors. The SDAC-21 is an institutional assessment tool that was developed based on the successful implementation of the Dynamic Risk Assessment for Offender Re-entry (DRAOR; Serin, 2007), which is a dynamic risk assessment tool used in the community. The SDAC-21 includes 21 items organized into three domains; the stable domain addresses criminal orientation and impulsivity concerns; the

responsivity domain addresses prison adjustment and potential barriers to change; the protective domain addresses social support and prosocial identity changes.

The SDAC-21 was designed to inform professional decision making around intervention and case management, which may result in a more focused and case-specific approach to case planning. The purpose of this research is to examine the psychometric properties and validity of the SDAC-21 in predicting institutional misconducts. Importantly, this will be the first empirical validation of the SDAC-21.

This study will first review the literature on risk assessment, focusing on the various approaches to conducting applied risk assessment. In addition, the conceptual and theoretical model of the SDAC-21will be reviewed. Finally, the literature on desistance will be examined, highlighting the importance of protective factors in the transition out of crime.

Approaches to Risk Assessments

The determination of offender risk for future criminal behaviour has important implications for decisions related to custody classification, resource allocation, early release and level of supervision while in the community (Andrews & Bonta, 2010; Bonta & Andrews, 2016). Risk assessment instruments should include a broad set of factors that tap multiple domains of criminal conduct and that are theoretically informed and empirically linked to criminal behaviour (Andrews & Bonta, 2010; Bonta & Andrews, 2016). Further, the goal of risk assessment should not only include an emphasis on risk prediction, but also an emphasis on risk management (Douglas & Kropp, 2002; Hanson, 2009; Olver, Wong, Nicholaichuk, & Gordon, 2007; Yang, Coid, & Wong, 2010).

Bonta (1996) described three generations of risk assessments, beginning with unstructured clinical judgements, where the assessment of risk and subsequent decisions are

based on the discretion of the assessor (Andrews & Bonta, 2010; Andrews, Bonta, & Wormith, 2006; Bonta, 2002; Douglas & Kropp, 2002). More specifically, the evaluation of risk is not based on any structured guidelines; instead, the assessor determines which factors to consider and how they should be combined to make a final decision about risk. Although unstructured clinical judgments offer flexibility and provide an idiographic approach to risk assessment, this approach has been criticized for being largely subjective and lacking reliability and validity (Andrews, Bonta, & Wormith, 2006; Douglas & Kropp, 2002).

The development of second-generation approaches to risk assessment was spurred to reconcile the shortcomings of clinical judgments. Actuarial risk assessments include items that are selected and weighed based on their empirical relationship to recidivism (Andrews & Bonta, 2010; Andrews, Bonta, & Wormith, 2006; Douglas & Kropp, 2002). They provide an explicit method for combining the risk factors, which are linked to probability estimates. Actuarial methods are useful for classifying offenders, gauging long-term risk, and assigning different supervision approaches based on their risk. Although actuarial risk assessment tools have been shown to outperform unstructured clinical judgments (Ægisdóttir et al, 2006; Grove, Zald, Lebow, Snitz, & Nelson, 2000; Hanson & Morton-Bourgon, 2009; Bonta, Law, & Hanson, 1998) and have demonstrated high predictive accuracy for general, violent and sexual recidivism, they have limited clinical utility. Furthermore, they do not provide treatment targets in order to mitigate risk. Because the items included are predominantly static factors and contain few or no dynamic items, determining change trajectories among offenders is not possible. Further, they have been criticized for being largely statistical and atheoretical; the items have simply demonstrated an empirical relationship to recidivism, but they do not explain why those factors

are related to criminal behaviour (Andrews & Bonta, 2006; Andrews et al., 2006; Bonta, 2002; Douglas & Kropp, 2002).

The movement towards third generation risk assessment approaches was stimulated more than 30 years ago to account for the limitations of second-generation tools (i.e., primarily include only static risk factors). Third generation tools are typically actuarial, but they include both static and dynamic risk variables (sometimes referred to as risk-need tools; Bonta, 1996). More specifically, this method identifies the level of risk based on static factors, but it also includes dynamic risk factors, which may increase the predictive accuracy when combined with static risk factors (Dempster & Hart, 2002).

More recently, a fourth generation of risk assessment has become increasingly common (Andrew et al., 2006). Fourth generation risk assessments include a broad list of risk and need factors as well as specific responsivity considerations (Andrews et al., 2006). While third generation tools identify the relevant criminogenic needs of an offender, fourth generation tools use an integrated model of risk assessment and case management approaches. That is, the assessment of risk are linked to intervention strategies, providing a comprehensive guide from intake to case closure (Andrews & Bonta, 2010; Andrews et al., 2006). Examples of fourth generation tools include the Correctional Offender Management Profiling for Alternative Sanctions (COMPAS; Brennan, Dieterich & Ehret, 2009), and the Level Service/Case Management Inventory (LS/CMI; Andrews, Bonta, & Wormith, 2004).

The COMPAS is a fourth generation risk and need assessment instrument that was designed to assess static risk, dynamic risk and protective factors (e.g. job/educational skills, family bonds and social and emotional support; Brennan et al., 2009). The COMPAS estimates four categories of risk including violent and general recidivism, non-compliance, and failure to

appear (Brennan et al., 2009). Scores based on information derived from official records, interviews, and self-report questionnaires from clients are used to arrive at an overall risk score for offenders (Blomberg, et al., 2010). Because the COMPAS was designed to be used at any point during an offender's sentence, the COMPAS has the advantage of tracking offenders from intake to case closure in order to review an offender's progress, which can be used to provide information related to overall case management decisions (Brennan et al., 2009). The COMPAS recidivism risk scale has demonstrated moderate predictive accuracy for any arrest within two years (AUC = .70), while the COMPAS violent recidivism risk scale moderately predicted violent recidivism within two years (AUC = .65; Farabee, Zhang, Roberts, & Yang).

The LS/CMI is a fourth generation risk assessment tool developed to assess risk for reoffending among probationers and parolees (Andrews et al., 2004). It was developed as a revised version of the Level of Service Inventory-Revised (LSI-R) to be a more gender-neutral tool by including gender-specific risk factors. The LSI/CM contains 43 items organized into eight scales: Criminal History, Education/Employment, Family/Marital, Leisure/Recreation, Companions, Substance Abuse, Procriminal Attitude/Orientation, and Antisocial Pattern. The items are summed to arrive at a total General Risk/Need score. The LS/CMI includes a built in case management plan, allowing users to track changes in risk and need over time. Further, it considers specific responsivity factors. Rettinger and Andrews (2010) found that the gender-neutral risk factors successfully predicted general recidivism (r = .63), violent recidivism (r = .45), and total number of new offences (r = .54) in a sample of adult female offenders (n=400).

Although not included in Bonta's generational descriptions, structured professional judgment (SPJ) methods include explicit guidelines for which factors should be considered, but the combination of those factors and the overall evaluation of risk are left up to the professional

judgment of the assessor (Andrews et al., 2006). Thus, SPJ approaches make a final decision based on the presence and severity of the items for an offender (Douglas & Kropp, 2002; Douglas, Hart, Webster, Belfrage, Guy, & Wilson, 2014).

Although SPJ approaches offer flexibility in terms of professional discretion, this element of subjectivity when determining the overall level of risk (i.e. summary risk ratings of low, moderate, or high) has been argued to reduce inter-rater reliability (Harris & Rice, 2015). Despite some research demonstrating poor levels of inter-rater reliability (Douglas, Yeomans, & Boer, 2005) and low levels of predictive accuracy for summary risk ratings (Vincent, Chapman, & Cook, 2011), the extant literature has generally demonstrated that evaluators are able to conduct overall evaluations of risk in a reliable and accurate manner, with accuracy comparable to other approaches (Yang, Coid & Wong, 2010). For instance, some have found good to excellent levels of inter-rater reliability (de Vries, de Vogel, & de Spa, 2011; de Vogel, Ruiter, Hildebrand, Bos & van de Ven, 2004; Douglas, Ogloff, & Hart, 2003; Kropp & Hart, 2000; Lodewijks, Doreleijers, De Ruiter, & Borum, 2008) and significant predictive ability for a variety of outcomes (de Vries et al., 2011; de Vogel et al., 2004; Douglas, Ogloff, & Hart, 2003; Gammelgård, Koivisto, Eronen, & Kaltiala-Heino, 2015; Lodeqijks et al., 2008; Meyers & Schmidt 2008). Further, they have incrementally predicted violent recidivism (Douglas et al., 2003) and incidents of physical violence during treatment (de Vogel & de Ruiter, 2006) over and above total numerical scores.

Other researchers have described different approaches to risk assessments; although there is some degree of overlap with Bonta's generational classifications. For instance, Hanson and Morton-Bourgon (2009) classified risk assessments into five categories. *Empirical actuarial* provides explicit guidelines for combining items into an overall score, and these scores are

linked to probability estimates (Hanson & Morton-Bourgon, 2009). *Mechanical scales* have rules for combining the items into an overall score, but these scores are not linked to probability estimates (Hanson & Morton-Bourgon, 2009). *Adjusted actuarial* allows for clinical override, where the assessor is able to incorporate additional information and adjust the actuarial score based on that information (Hanson & Morton-Bourgon, 2009). Hanson and Morton-Bourgon's (2009) meta- analytic review demonstrated that adjusted actuarial approaches decreased predictive accuracy compared to empirical actuarial and mechanical scales.

Structured Dynamic Assessment Case-management-21 item (SDAC-21)

The SDAC-21 uses an SPJ approach that considers stable dynamic risk factors, responsivity, and protective factors. Unlike a traditional SPJ instrument, the SDAC-21 aggregates scores and the total score is used in decision-making. The SDAC -21 was developed based on the successful development and implementation of the Dynamic Risk Assessment Offender Re-entry (DRAOR) measure (Serin et al., 2010), which was originally developed to assist parole officers in the supervision of offenders. It was developed to inform intervention level, individual case planning, and supervision strategies. The DRAOR is divided into three main domains, which include stable and acute dynamic risk and protective factors. Research conducted in New Zealand has demonstrated that the DRAOR is predictive among male (Hanby, 2013), female (Yesberg, Scanlan, Hanby, Serin, & Polaschek, 2015), Maori (indigenous) offenders (Hanby, 2013) and sex offenders (Smeth, Serin & Hanby, 2015). In the first large scale study on the DRAOR, using a sample of 3,498 parolees in New Zealand, AUC's ranged from .67 to .72 when predicting violation behaviour (Hanby, 2013). Further, research completed in Iowa has shown that the DRAOR is valid among male general offenders (Chadwick, 2014; Serin, Gobeil, Lloyd, Chadwick, Wardrop & Hanby, 2016) and sex offenders (Smeth, 2013).

The SDAC-21 was designed to inform case management decision making regarding intervention and management, where comprehensive assessment of the three domains ensures that an individualized case management plan is produced. Further, the use of the SDAC-21 may help ensure that there is a seamless continuity of dynamic assessment and intervention from the prison setting to the community by using similar items. It is a comprehensive assessment as it contains risk/need factors, responsivity factors, and protective factors. Additionally, including responsivity domains will assist staff in effectively working with those offenders with identified special needs by considering their individual learning styles and competencies.

In sum, both the DRAOR and SDAC-21 were designed to inform professional decision-making around case planning, intervention, and management based on changes in scores. Thus, the tools structure professional judgment at the case level such that offenders with similar crimes, sentences, and static risk scores could warrant differential case plans and risk management strategies based on total and subscale scores. They also help parole officers to structure offender contacts; ensuring assessments are focused on risk relevant factors, while balancing the need to review factors that are related to crime desistance.

Conceptual framework of the SDAC-21

The area of offender risk has been greatly influenced by Andrews and Bonta's seminal work on the Psychology of Criminal Conduct (PCC). Based on a general personality and cognitive social learning perspective, the PCC aims to explain variability in criminal behaviour (Andrews & Bonta, 2010; Bonta & Andrews, 2016). Under this broad theoretical umbrella, the PCC encompasses three core principles for effective assessment and intervention termed *risk*, *need*, and *responsivity* (RNR; Andrews & Bonta, 2010). Specifically, the risk principle states that an offender's risk can be reliably predicted and the level and intensity of treatment services

should match the risk level of the offender. That is, the most intensive intervention services should be reserved for the highest risk offenders, while low risk offenders require only minimal intervention. Assessing which offenders pose the greatest risk for institutional misconducts or escape forms part of the decision in the classification of offenders to increased -security institutions (Andrews & Bonta, 2010, Austin, 2003). Offender classification, therefore, has implications for case management strategies by ensuring that those offenders with higher security ratings receive more extensive and intensive treatment services.

The need principle states that intervention and treatment programs should target dynamic factors linked to criminal behaviour. More succinctly, intervention will be most effective when programs target dynamic attributes of the offender and their social circumstances (Aos, Miller, & Drake, 2006; Smith, Gendreau, & Swartz, 2009). Andrews and Bonta (2010) identified eight need factors related to criminal behaviour. These include antisocial associates, antisocial personality, antisocial attitudes, and a history of antisocial behaviour (referred to as the Big Four). Referred to as the moderate four, the next for factors include family/marital circumstances (e.g. poor quality relationships), school/work (e.g. low levels of performance or involvement), leisure/recreation (e.g. low levels of involvement and satisfactory anti-criminal pursuits), and substance abuse. The likelihood of engaging in criminal behaviour increases as the number and variety of these risk factors are present. However, current custody classification systems typically focus on static risk factors and cannot accurately capture offender change.

The responsivity principle states that services should employ cognitive behavioural therapies (general responsivity) and attend to those factors that influence their ability to successfully complete treatment (specific responsivity; Andrews & Bonta, 2010; Higley, Lloyd & Serin, in press; Lloyd, Hanby & Serin, 2014).

Risk factors can be divided into two main categories. Static risk factors include historical, unchanging factors, such as past criminal behaviour. In contrast, dynamic risk factors fluctuate over time and are amenable to change. Douglas and Skeem (2005) differentiated between *risk status* and *risk state.* Risk status reflects static factors used to examine inter-individual variations in risk; whereas, risk state highlights dynamic risk factors used in examining intra-individual change. Hanson and Harris (2000) further divided dynamic risk factors into *stable* and *acute* dynamic risk factors. Stable dynamic risk factors are enduring characteristics of the offender, with change occurring over months or even years. Stable risk factors should be the target of intervention. Examples include antisocial attitudes and antisocial personality. In contrast, acute risk factors are rapidly changing, such as days or even hours, and indicate when an offender is most likely to reoffend (e.g. substance abuse and victim access; (Lowenkamp, Johnson, Trevino, & Serin, 2016). However, depending on the setting in which dynamic factors are assessed (i.e. prison or community), the definition of dynamic risk factors may vary (Serin et al., 2016). That is, dynamic factors assessed in the institution would look at change in dynamic scores due to intervention, while the community would focus on the immediate antecedents that elicit reoffending (Serin et al., 2016).

Dynamic risk can augment static risk estimates and should be considered along side static risk (Brown, St. Amand, & Zamble, 2009; Douglas & Kropp, 2002; Flores, Lowenkamp, Smith, & Latessa, 2006). Particularly, static risk determines the level of risk and the intensity of intervention services (i.e. who to target; Douglas & Kropp, 2002), while ongoing assessments of dynamic factors can help track changes on key indicators. This can guide intervention strategies to mitigate risk and improve individual case planning (Douglas & Kropp, 2002; Douglas & Skeem, 2005). For example, Brown et al., (2009) found that the combination of static and

dynamic risk factors demonstrated higher levels of predictive accuracy than either static or dynamic models alone.

The SDAC-21 reflects several conceptual models related to the development and cessation of criminal behaviour. The personal, interpersonal, community-reinforcement theory of criminal behavior (PIC-R; Andrews & Bonta, 2010; Bonta & Andrews, 2016), offers a strong theoretical framework regarding offender behavior. Based on a general personality and cognitive social learning model (GPCSL; Andrew & Bonta, 2010; Bonta & Andrews, 2016), PIC-R is an amalgamation of aetiological theories of criminal behaviour and integrates a large number of explanatory variables. For instance, it emphasizes the role of socialization in developing antisocial attitudes; self-control in resisting temptations in the immediate situation; and classical and operant conditioning in shaping deviant and non-deviant behaviour through contingencies.

According to PIC-R, human behaviour is influenced by events that happen before the behaviour (i.e. antecedents) and events that follow the behaviour (i.e. consequences; Andrews & Bonta, 2010). These antecedents and consequences signal rewards and costs for a given behaviour (e.g. criminal or non-criminal behaviour; Andrews & Bonta, 2010). Criminal behavior is therefore the result of an interplay between personal, interpersonal, and community sources of rewards and costs. Based on cognitive social learning processes, these rewards and costs are learned through observational experiences (i.e. seeing others rewarded), direct experiences (e.g. being rewarded), and characteristics of the immediate situation (e.g. temptations, facilitators, stressors; Andrews & Bonta, 2010). This learning process is governed by expectations that one holds (i.e. crime pays) and the actual consequences of their behaviour. Thus, criminal behavior is more likely to occur with an increase of rewards for criminal behavior, whereas the cessation of criminal behavior is more likely to occur with an increase of costs of criminal behavior, as well

as an increase in rewards for prosocial behaviour. The SDAC-21 and DRAOR are also informed by a transition model of offender change that bridges crime acquisition and crime desistance (Serin & Lloyd, 2006). The model highlights both internal and external change factors to identify offenders who are successfully transitioning out of crime. Overall, the SDAC-21 contains items identified by current theory of criminal behaviour and crime desistance. For instance, the risk factors reflect personal (e.g., impulsivity and antisocial attitudes) and social variables (e.g., antisocial peers and attachment with others), which are also considered in the context of the immediate situation (e.g., stressors and facilitators commonly found in an institutional setting). In addition, the responsivity items reflect important treatment-relevant variables (e.g., health problems and learning difficulties) that may impede an offender from fully engaging and benefiting from treatment. Lastly, the protective items reflect key internal (e.g., prosocial identity and responsive to advice) and external (e.g., social supports and employability) factors theorized to bridge the gap between crime acquisition and crime desistance.

SDAC-21 Domains

Stable risk factors. Stable dynamic risk factors are those factors that are amenable to change through direct intervention efforts and are common targets in correctional programming. Although change is possible, it is a gradual process, typically occurring over months or even years (Hanson et al., 2016). In order to ensure the fidelity of risk prevention and risk management efforts, risk assessment tools should target dynamic risk factors that are related to criminal behaviour and amenable to change. Regularly assessing intra-individual change has important implications for decision-making at all levels of intervention. For instance, evaluators can determine whether treatment intensity, classification, and their level of community supervision should be modified based on the rate of change for an individual offender (Douglas

& Kropp, 2002; Douglas & Skeem, 2005). To date, research on static risk factors has been extensive and static risk factors are prominent in most risk assessment instruments. However, the research on dynamic risk factors related to intra-individual change has been less extensive (Serin et al., 2013). Dynamic risk factors must not only be able to change, but this change should be related to differential outcomes. However, research on the link between intra-individual change and differential outcomes has only recently begun to accumulate.

Using a three-wave prospectus study design, Brown et al., (2009) examined changes in dynamic risk factors (e.g. employment and negative affect) between recidivists and non-recidivists. More specifically, the variables were measured on three different occasions: 45 days prior to release, and one month and three months post-release. Results showed that the majority of the dynamic items were related to individual change, where the changes significantly predicted recidivism (Brown et al., 2009).

Using a sample of 3,489 offenders released on parole following a term of incarceration in New Zealand, Hanby (2013) examined changes in risk over time. More specifically, this study evaluated whether criminal reconvictions can be accurately predicted from dynamic risk and protective factors, as measured by the DRAOR. Using a two-year follow-up period, recidivists differed from non-recidivists in stable dynamic risk and protective factors in the month prior to follow-up end and in acute dynamic risk in the second month prior to follow-up end. Further, stable and acute dynamic risk scores decreased over time while protective factor scores increased; thus, highlighting that changes in dynamic factors are related to differential outcomes. Where Hanby (2013) demonstrated that scores on the DRAOR changed across time, Lloyd (2015) examined the proximity hypothesis, which evaluated whether observed change is relevant for prediction purposes; that is, whether re-assessments can enhance prediction over prior

assessments. The proximity hypothesis asserts that the most proximal assessment will be most strongly related to future recidivism, compared to prior assessments. Lloyd (2015) also examined whether the averages of multiple assessment occasions across time are more accurate predictors of recidivism compared to smaller combinations of assessments. Results demonstrated that re-assessment improved predictive validity; incremental prediction of re-assessment occurred over baseline scores and the most proximal assessment was more predictive compared to the averages of earlier scores.

SDAC-21 stable items. The items included in the stable domain reflect some of the central eight risk factors outline by Andrews and Bonta (2010). More specifically, the stable domain includes seven items: gang association, negative attitudes towards authority, impulse control, problem-solving, sense of entitlement, attachment to others, and substance abuse.

Gang association. This item measures the nature of peer support and group identification for criminal activity. The extant literature has consistently found that antisocial peers is one of the strongest predictors of recidivism and prison misconducts (Andrews and Bonta, 2010; Gendreau, Little, & Goggin, 1996). Criminal behavior is learned through interactions with other people, where antisocial peers share and support criminogenic values and beliefs, such as attitudes towards authority and beliefs about the utility of anti-social behaviour (Andrews & Bonta, 2010). According to the differential association theory, a person will tend to learn, accept and internalize criminal values and attitudes. Therefore, gangs may enhance criminal behaviour, as gang members already have a propensity towards antisocial orientation (Andrews & Bonta, 2010; Bonta & Andrews, 2016). In a recent meta-analytic review (Pyrooz, Turanovic, Decker, & Wu, 2016) found a significant relationship between gang membership and offending. In addition, previous research has also demonstrated that prison gang affiliation were predictive of violent

institutional misconduct (Cunningham & Sorensen, 2007) and drug related institutional misconducts (Gaes, Wallace, Gilman, Klein-Saffran, & Suppa, 2002).

Negative attitudes toward authority. Negative attitudes toward authority represent a specific attitude under the general category of antisocial cognitions and attitudes (i.e. procriminal attitudes). Meta-analytic reviews have shown that antisocial attitudes are significantly related to criminal behaviour (r = .18; Gendreau et al., 1996) and prison misconducts (r = .14; Gendreau, Goggin, & Law 1997). Relatedly, a close relationship between antisocial peers and antisocial attitudes has been demonstrated (Gendreau et al., 1997; Simourd & Andrews, 1994). Essentially, antisocial associates provide opportunities to learn crime techniques while also reinforcing antisocial attitudes.

Sense of Entitlement. The purpose of this item is to assess the extent to which an offender has an inflated sense of self-worth in comparison to a realistic recognition of their limitations. A high sense of entitlement reflects both an antisocial thinking style, where they may view themselves as superior compared to others, and antisocial behaviour, where they may display deceitful and manipulative interpersonal behaviour. A sense of entitlement is related to both general recidivism (r = .21; Mills, Kroner & Hemmati, 2004) and violent recidivism (r = .18; Mills et al., 2004).

Attachment with others. This item measures the extent to which an offender is connected and concerned about others and is able to form secure attachments with others. Callousness and lack of empathy towards others is a moderate risk for offending (Andrews & Bonta, 2010). The STABLE-2007 captures elements of this item (referred to as 'lack of concern for others') and it has significantly predicted sexual (AUC = .58), violent, (AUC = .60), and any recidivism (AUC = .62; Hanson, Harris, Scott, & Helmus, 2007).

Problem Solving. Those lacking problem-solving skills are unable to effectively generate alternative solutions and they are often inflexible. Antisocial personality pattern involves at least two relatively independent dimensions: weak self-control/lack of planning (impulsive, adventurous, pleasure-seeking behaviour and poor problem solving) and negative emotionality (aggressive, callous disregard for others, antagonistic, feeling mistreated). Hanson and Morton-Bourgon (2004), demonstrated that a lack of problem solving skills significantly predicted sexual recidivism (d =.14).

Impulse control. This item considers poor self-regulation, where the offender shows a lack of appropriate decision making by failing to consider the consequences of their behaviour or plan ahead. They are unable to delay gratification and they are often excited by crime. Antisocial personality constructs such as impulsivity, adventurous pleasure seeking and weak-self control, are all strongly related to reoffending. Gendreau et al. (1996), found a significant relationship between antisocial personality and recidivism (r =.18), where Hanson and Morton-Bourgon (2004, 2005), found a significant relationship between general self-regulation and sexual recidivism (d=.37).

Substance abuse. Although substance abuse has a moderate relationship to criminal behaviour, it is a prevalent problem among offender populations and can act as a barrier to engagement. Andrews and Bonta (2010) maintain that despite its modest correlation with criminal behaviour, substance abuse is interrelated with other criminogenic needs. For instance, it may draw one to antisocial others and exposure to antisocial attitudes. Substance abuse significantly predicted any recidivism (r = .10; Gendreau et al. 1996) and sexual recidivism (d =.12; Hanson and Morton-Bourgon). Based on a meta-analytic review of several substance abuse factors in predicting recidivism, Dowden & Brown (2002) demonstrated differences in predictive

accuracy based on the type of substance abuse and recidivism. For instance, a combined alcohol and/or drug problem demonstrated a mean effect size of .22, whereas alcohol abuse only demonstrated a mean effect size of .12.

Responsivity factors. Responsivity refers to factors that influence the way in which individuals respond to treatment. Responsivity can be general, where cognitive behavioural and cognitive social learning principles are employed. That is, treatment programs should employ a cognitive behavioural approach, as research has demonstrated that this is one of the most effective methods of intervention by teaching offenders' new cognitions and behaviours (Andrews & Bonta, 2010; Lipsey, 2009). However, accounting for individual differences is also important in order to identify areas that would prevent an offender from effectively engaging in and benefiting from treatment. Thus, the principle of specific responsivity recognizes offender heterogeneity by emphasizing the value of addressing their competencies, motivation, and individual learning styles, as well as attending to gender, race, and ethnicity considerations (Andrews & Bonta, 2010; Bonta & Andrews, 2016).

These individual characteristics can either interfere with or facilitate learning and impact the degree of attaining behavioural and cognitive changes (Andrews & Bonta, 2010). Therefore, these factors need to be addressed in order to help prepare the offender to learn new behaviours. However, the area of specific responsivity is a largely unexplored area, lacking empirical support (Andrews & Bonta, 2010).

SDAC-21 responsivity items. The items included in the responsivity domain include health problems, conduct issues, personal distress, unresponsive rehabilitation, hostility/interpersonal aggression, offence mirroring behaviour, and learning difficulties. The intention is to assess such factors to examine their impact on offender engagement and change.

Offence mirroring behaviours. The term offence mirroring behaviour (originally introduced as 'offence paralleling behaviour' by Jones, 2004) refers to a series of behaviours, including beliefs, emotions, and expectations that are functionally similar to behavioural sequences involved in previous criminal behaviour (Daffern, Jones, Howells, Shine, Mikton, & Tunbridge, 2007). In other words, although the prison environment may alter or mute certain antisocial behaviour such as violence, offender beliefs, attitudes, and goals may remain similar to and satisfy the same function (i.e. mirror) of behavioural patterns involved in past criminal behaviour (Daffern et al., 2007).

Health problems. Compared to the general population, offenders generally have more extensive and diverse health needs, such as higher rates of mental illness and chronic physical problems (De Viggiani, 2007; Stewart, Sapers, Nolan, & Power, 2014). These health issues can have a significant impact on an offenders' level of functioning and engagement while incarcerated, resulting in unique case management challenges. In particular, offenders with mental health difficulties are often overrepresented in the correctional system (Beaudette, Power, & Stewart, 2015; Fazel & Danesh, 2002; Skeem, Manchak, & Peterson, 2011). Stewart, Wilton, & Cousineau (2012) found that offenders with mental health problems had significantly more minor and major institutional charges than those offenders that did not.

Personal distress. Psychological maladjustment, such as negative mood and emotional distress, while not directly related to criminal behaviour, are important responsivity factors that may act as barriers to motivation, engagement and, ultimately, offender change (Andrews & Bonta, 2010; Bonta, 2002; Bonta & Andrews, 2016). This emotional distress may be exacerbated with in-group sessions or situations that are stressful, particularly when they have trouble coping (Hodge & Renwick, 2002). Furthermore, the presence of interpersonal anxiety or depression may

also hinder therapeutic alliance, which is an important factor in predicting therapeutic success (Hodge & Renwick, 2002).

Conduct issues. Institutional misconducts reflect the degree of prison adjustment (i.e. the extent to which offenders are able to positively adapt to life in prison). Poor institutional adjustment has also been linked to higher rates of general and violent recidivism in offenders with mental disorders (Bonta et al., 1998). Because conduct issues can be viewed as a proxy for criminal behaviour in the community (French & Gendreau, 2006; Gendreau et al., 1997), identifying potentially disruptive offenders can lead to better intervention services; thereby, increasing institutional adjustment and ensuring safety for both inmates and correctional staff (Gendreau & Keyes, 2001; Helmus, 2015).

Unresponsive rehabilitation. This item captures the offenders' level of motivation and also considers past treatment failures. Motivation is an important responsivity factor as it reflects a desire and willingness to change. Those offenders who are ready and motivated for treatment are more likely to be engaged and successfully complete treatment (McMurran & Ward, 2010; Olver, Wormith & Stockdale, 2011; Wormith & Olver, 2002), and typically have lower reoffending rates (McMurran & Theodosi, 2007). In contrast, non-completers are generally lower in motivation (Nunes, Cortoni, & Serin, 2010) and have higher rates of recidivism (Cortoni, Nunes, & Latendresse, 2006; Nunes et al., 2010; Wormith & Olver, 2002).

Hostility and interpersonal aggression. Hostility reflects feelings of resentment and antagonism towards others, representing a cognitive component of behaviour. Interpersonal aggression is a behaviour that is intended to cause harm to others (Buss & Perry, 1992). Hostility and aggression, also referred to as negative emotionality (Andrews & Bonta, 2010), is linked to one of the Big Four predictors of criminal behaviour: Antisocial Personality. Not only is negative

emotionality predictive of criminal behaviour, it is also an important responsivity factor as this may cause disruptive behaviour while in treatment; thereby, increasing the likelihood of drop-out or expulsion (Wormith & Olver, 2002).

Learning difficulties. Learning difficulties, such as verbal intelligence, literacy, and specific learning difficulties (e.g. dyslexia) have been identified as critical responsivity factors (Andrews & Bonta, 2010). Learning difficulties can affect an individual's ability to engage in and cope with the demands of treatment (Keeling, Beech, & Rose, 2007), impeding their ability to successfully complete treatment (Olver, et al., 2011). For instance, learning difficulties can have an impact on their level of comprehension of the material, ability to complete homework, as well as their level of group participation (Olver et al., 2011).

Protective factors. Protective factors are those assets and skills that may act as a buffer against risk factors and may mitigate the probability of engaging in criminal behaviour. They consist of internal assets, such as motivation and prosocial identity, and external factors, including social support and employment. Much of our knowledge on protective factors comes from desistance and positive psychology literature (Serin, et al., 2016). The inclusion of strengths in any risk assessment scheme provides a more comprehensive and balanced approach, possibly guarding against the over-prediction of risk. This over-prediction may lead to poor treatment planning and overly restrictive risk management approaches (Rogers, 2000). In addition, protective factors may be useful for examining variations in criminal behaviour and may increase the predictive accuracy beyond that achieved by assessments of risk alone (Andrews and Bonta, 2010; Jones, Brown, & Robinson, 2015; Rogers, 2000; Serin, et al. 2016; Serin & Lloyd, 2009). For example, Lodewijks and colleagues (2008) found that the protective domain in the Structured Assessment of Violence in Youth (SAVRY) incrementally predicted

physical aggression over and above total risk scores. Similarly, Jones et al, (2015) found that protective factors accounted for unique variance in predicting recidivism while controlling for risk.

While much of the current research has focused on the transition into crime, there remains a gap in our understanding regarding the different processes and pathways out of crime (i.e. desistance; Maruna, 2001; Lösel & Bender, 2003). Desistance from crime is a gradual, complex process involving multiple internal and external factors that align in such a way that offenders with a history of crime may eventually cease antisocial behaviour (Serin & Lloyd, 2009). By including protective factors within a structured risk assessment instrument, it may be possible to examine the mechanisms by which offenders eventually desisted from crime. This can lead to improved case-management strategies and rehabilitative services.

The research surrounding protective factors and resiliency has predominantly been done with children and adolescents focusing on those who experienced stressful life events, such as divorce, and exposure to high risk circumstances (e.g. poverty and abuse and neglect) but grew up to be well-adjusted adults. Rutter (1987) defined resiliency as the outcome of the buffering process, which enables an individual to effectively cope with a high-risk situation. In one of the most well-known longitudinal studies, Werner and Smith (2001) followed all children born in 1955 from the prenatal period to adulthood. They compared the behaviour of the resilient children to those that developed serious coping problems later in life. Some of the buffering factors that contributed to the resilient group's success were social support, self-efficacy, an internal locus of control, and problem solving (where these positive attributes were also observed in adulthood).

Despite the preponderance of empirical literature on protective factors among children and adolescence, the research on protective factors among adult offenders is still in its infancy. This gap in our knowledge base is likely due to a lack of consensus regarding the conceptualization and measurement of protective factors (Polaschek, 2016). On the one hand, protective factors have been described as merely the obverse of risk (Harris & Rice, 2015; Hawkins, Catalano, & Miller, 1992), or the absence of risk factors; therefore, they should not be assessed separately from risk (Harris & Rice, 2015; Tharp et al., 2012). Others maintain that protective factors are not merely the absence or inverse of risk; but rather, they are unique factors that may inhibit behaviour that can exist without a corresponding risk factor (Costa, Jessor, & Turbin, 1999; Farrington, 2003; Jones et al., 2015). For instance, having high but realistic expectations about the future is a protective factor, but having low or unrealistic expectations is not a risk factor for criminal behaviour.

Similar to risk factors, it is not expected that any one protective factor may successfully inhibit criminal behaviour. Rather, it is the accumulation of protective factors related to multiple life areas that is important in promoting resiliency when faced with high risk situations (Serin & Lloyd, 2009; Turner, Hartman, Exum, & Cullen, 2007). Specifically, it is the number and variety of protective factors that may have a greater impact than any one alone. Turner and colleagues (2007) found that three or more protective factors were related to increased resiliency and this accumulation of protective factors resulted in a lower rate of delinquency and drug use. Further, Stouthamer-Loeber and colleagues (2002) found that those offenders with more strengths than risk factors had lower rates of persistent and serious delinquency compared to those that had disproportionately more risk factors than strengths.

Models of protective factors. The relationship between risk, protective factors, and criminal behaviour is a complex process and how they interact still remains somewhat ambiguous with several cogent hypotheses being advanced in the scientific literature regarding their relationship. Within a developmental psychopathology framework, Garmezy, Masten and Tellegen (1984) tested three models describing the impact of stress (e.g. divorce) and personal attributes (i.e. protective factors) on the quality of adaptation- using level of competence as their index of adaptation. *The compensatory model* is essentially an additive model where both stress and protective factors are combined to predict an outcome, such as criminal behaviour. More specifically, protective factors may compensate for the effects of risk and reduce the probability of criminal behaviour. Thus, they have both a direct and independent impact on the outcome. *The challenge model* asserts that stress can potentially enhance competency, provided it is not too excessive, demonstrating a curvilinear relationship. Rutter (1987) maintains that stress enhances the effects of protective factors resulting in "adaptive changes that follow successful coping". In the *immunity model*, there is a conditional relationship between risk and protective factors. Protective factors moderate the relationship between risk and reoffending when risk is high, but have little to no impact when risk is low.

Fitzpatrick (1997) described a mediation and buffering model. Under the *mediation model*, protective factors mediate the relationship between risk and problem behaviours. More specifically, risk factors weaken the protective mechanisms. Therefore, risk factors have a direct, positive effect on the outcome and a direct, negative effect on protective factors. In the *buffering model* risk factors have an impact on the outcome only under certain conditions, such as in the absence of protective factors. Fitzpatrick (1997) found support for the buffering model, where with the absence of protective factors, risk factors had an increased effect in predicting fighting.

For instance, attitudinal risk factors and protective factors demonstrated a significant interaction, where those with negative attitudes were more likely to report fighting when they had low reporting or absence of attachment to either a parent or teacher.

Recently, Jones et al (2015) offered an interesting framework for resolving the definitional issues related to protective factors. The authors' labeled *strength* as an umbrella term used to represent a positive attribute or adaptive aspect that has the potential to mitigate future criminal behaviour. *Promotive* factors denote those variables that have an independent effect on reoffending, irrespective of risk (Farrington, 2003; Jones et al, 2015). *Protective factors* interact with risk and have an impact on the outcome only among higher risk groups and a lesser impact on lower risk groups. There is support in the literature for both promotive and protective effects. Using a sample of 800 adult male offenders, Ullrich and Coid (2011) found that protective factors significantly predicted future violence, irrespective of risk level (i.e. promotive effect). Lodewijks, de Ruiter, & Doreleijers, (2010) found support for a buffering model, while Jones et al. (2015) found evidence for both promotive and protective effects.

Measuring protective factors. Recently, there has been an increase in risk assessment instruments that assess protective factors; although, there still remain differences in the way in which they are measured. These will be discussed below.

Historical-Clinical-Risk Management-20, Version3 (HCR-20 ^{V3}; Douglas et al., 2014). The HCR-20 ^{V3} is one of the most widely used and validated SPJ tools that was designed to assess risk for violent recidivism. It includes 20 items organized into three scales: historical scale, clinical scale, and risk management scale. The historical scale includes static items reflecting criminal history, childhood adjustment, and psychiatric diagnoses. The clinical scale includes dynamic items related to violence and the risk management scale includes factors that

may aggravate or mitigate risk, which also taps into protective factors. The final risk rating of low, moderate, or high is based on the professional discretion of the assessor and it is used to inform intervention strategies to prevent future violence (Douglas & Kropp, 2002). The HCR-20 has shown to predict violence among forensic psychiatric (de Vogel & De Ruiter, 2006; de Vogel et al., 2004) and correctional samples (Douglas et al., 2003). Using a sample of 127 forensic psychiatric patients, the HCR-20 subscale scores, total score and summary risk ratings all significantly predicted incidents of in-treatment physical violence (AUC ranging from .77 to .86; de Vogel, V., & De Ruiter, C. 2006). Taken these results, the risk ratings seem to be more predictive.

The Structured Assessment of Violence in Youth (SAVRY; Borum et al., 2006). The SAVRY is a structured professional tool used to assess risk of future violence among adolescents between the ages of 12 and 18. It contains 24 static and dynamic risk items organized into three domains (10 historical items, 6 social/contextual items and 8 individual-clinical items). The SAVRY also includes a protective domain, which contains six items (e.g., prosocial involvement and strong social support). Based on the professional discretion of the assessor, the SAVRY produces a final risk rating of low, moderate, or high. Using a sample of male adolescents residing in a correctional and treatment facility, Lodeqijks and colleagues (2008) found that the SAVRY dynamic risk domains and the protective domain significantly predicted physical aggression towards persons, with AUCs ranging from .66-.88. However, the historical domain failed to significantly predict physical aggression (Lodeqijks et al., 2008). The SAVRY risk total significantly predicted violence against objects, verbal threats, and rule violations, and the protective domain incrementally predicted physical aggression over and above the risk total scores (Lodeqijks et al., 2008).

Lodewijks et al., (2010) looked at the extent to which the protective domain moderated the relationship between dynamic risk and violent recidivism among three samples of high- risk adolescent offenders. The results demonstrated that in the absence of protective factors, violent recidivism was significantly higher compared to when they were present among the higher risk group. A more recent study (Gammelgård, Koivisto, Eronen, & Kaltiala-Heino, 2015) demonstrated that all of the SAVRY domains, as well as the total score and summary risk ratings significantly predicted violent crimes among adolescents with mental disorders released from psychiatric, forensic, and correctional settings. The SAVRY total scores have also demonstrated moderate predictive accuracy for general reoffending (AUC = .74) and violent reoffending (AUC = .74) among young violent offenders (Catchpole & Gretton, 2003). Therefore, the SAVY has demonstrated moderate to high levels of predictive accuracy among mentally disordered young offenders and violent young offenders in predicting institutional misconducts and post-release recidivism, and has predictive ability across race

The Structured Assessment of Protective Factors for violence risk (SAPROF; de Vogel, de Ruiter, Bouman, & de Vries, 2007). The SAPROF is a SPJ instrument developed to assess protective factors for both violent and sexual behaviour among adult forensic psychiatric patients. This assessment scheme consists of 17 protective items organized into three domains: Internal factors (e.g. self-control, intelligence); Motivational Factors (e.g. life goals, employment); and External Factors (e.g. social network, living circumstances; de Vogel, de Vries de Ruiter, & Bouman, 2011). The SAPROF yields a Final Protection Judgement coded as low, moderate or high (de Vogel et al., 2011). Further, the SAPROF is intended to be used in conjunction with other SPJ risk assessment tools such as the HCR-20, resulting in an Integrative Risk Judgment of low, moderate, or high risk for future violent (sexual) behaviour (de Vogel et

al., 2011). The SAPROF ratings are also intended to provide guidelines for treatment interventions and risk management strategies. Initial validation of the SAPROF was based on retrospectively assessing 126 forensic psychiatric patients (de Vries, de Vogel, & de Spa, 2011). Results demonstrated that the total scores (AUC = .80 for a two-year follow-up period) and the Final Protection Judgement (AUC = .77) significantly predicted non-recidivism for violence and when used in conjunction with the HCR-20, the Integrated Final Risk Judgement significantly predicted violent recidivism (AUC = .72; de Vries et al., 2011). These results were replicated with a sample of male sex offenders where the SAPROF demonstrated significant predictive ability for sexual recidivism, and the total score made an independent contribution to recidivism while controlling for the HCR-20 and SVR-20 (de Vries, de Vogel, Koster, & Bogaerts, 2015).

The Inventory of Offender Risk, Needs, & Strengths (IRONS; Miller, 2006). The IORNS is a 130- item self-report measure organized into three domains: Static risk Index, Dynamic Need Index, and the Protective Strength Index. The overall Risk Index is based on summing the two risk indexes and subtracting the protective score index. Miller (2006) examined the initial predictive validity of the IORNS using a sample of 162 general male offenders. Results demonstrated that those offenders who violated rules twice or more scored significantly higher on the overall risk and dynamic need domains than those offenders that did not violate or only violated once. Those that reoffended also had significantly lower Protective scores. However, there was no significant difference between the two groups on their static risk index scores.

The Short-Term Assessment of Risk and Treatability (START; Webster, Martin, Brink, Nicholls, & Middleton, 2004). The START is a SPJ tool that includes 20 dynamic items, which are coded in terms of both vulnerability and strength. START is intended for use with both

inpatient and outpatient populations in civil, psychiatric, forensic psychiatric, and correctional settings. Specifically, it was designed to assess their short-term risk of violence, suicide, self-harm, self-neglect, substance abuse, unauthorized leave, and victimization. Using a sample of 119 psychiatric patients in a high secure unit in Norway, Strength scores demonstrated high predictive accuracy in predicting severe violence against staff (i.e., an inverse relationship). Further, Nicholls and colleagues (2006) found that START scores were related with aggressive behaviour against others. Despite these promising results, future prospective research is needed to establish reliability and validity as much of the current research is based on retrospective research designs.

SDAC-21 protective items. The items included in the protective domain include responsive to advice, prosocial identity, high expectation, cost/benefits, social supports, social control and employability.

Responsive to advice. Offenders who conscientiously follow direction from positive influences, such as prosocial prison peers, prison staff, program providers, and prison volunteers, are considered to have a definite asset. Moreover, offenders that are able to seek and respond to advice from prosocial supports may display a readiness to change.

Prosocial identity. This item measures the degree to which an offender has legitimately shifted their identity from criminal to prosocial. This shift in identity involves establishing a new self-narrative where they recreate themselves as a new prosocial person (Maruna, 2001; Ward & Laws, 2010). This reformed identity may, therefore, impact their outlook of the future and attenuate the probability of criminal behaviour. Importantly, this shift in identity must also be supported by evidence of behavioural change, such as leaving a gang or supporting their family or community.

Realistic expectations. This item reflects the extent to which the offender has high, but realistic, expectations about remaining crime free. This has been identified as an important intrapersonal moderator driving the transition from an active criminal career to crime desistance (Lloyd & Serin, 2012). In addition, these outcome expectancies may signal a sense of agency, which is a belief that one is capable of changing and this change is under their control (Serin & Lloyd, 2012). Thus, these desistance beliefs (i.e. agency and outcome expectancies) may maintain and even enhance their motivation to change when faced with high-risk situations (Serin & Lloyd, 2012).

Cost/benefits. This item considers whether the offender demonstrates an understanding of the costs and benefits of crime as well as the short- and long-term consequences of changing their behaviour (Serin & Lloyd, 2009). Behavioural examples include an offender who no longer wants to socialize with criminal peers because they do not want to jeopardize their new job or prosocial relationship, or an offender who demonstrates saving towards the purchase of a valued item or goal. Thus, those offenders that view prosocial behaviour as more rewarding than criminal behaviour, may be more likely to successfully desist from crime than those that still maintain offence supportive beliefs (Andrews & Bonta, 2010).

Social supports. This item measures that extent to which an offender has meaningful and accessible prosocial supports, such as intimate partners, family, external employment contact and community visitors. Prosocial supports, which may promote learning and reinforcement of prosocial attitudes, values, and behaviours, has emerged as one of the most significant protective factors for both adolescents and adults (Andrews & Bonta, 2010; Haggard, Gumpert, & Grann 2001; Laub, Nagin, & Sampson, 1998; Miller, 2006; Rogers, 2000; Ullrich & Coid, 2011). For

instance, in a qualitative study conducted by Haggard et al., (2001), those offenders that remained crime free for five years indicated increased support from family.

Social control. This item captures whether an offender has internalized bonds with prosocial models and demonstrates conformity and compliance with these prosocial others (i.e. the degree to which they are willing to seek out or accept guidance). Social control theory emphasizes the importance of social influences and the extent to which they function as a source of control (Andrews & Bonta, 2010). This can take the form of social bonds with prosocial others or spiritual and cultural engagement as another source of control. Thus, the strength of bonding to society may inhibit future offending (Sampson & Laub, 1993). The more an individual is invested in these social bonds and as the strength of this informal source of control grows, the cost of crime increases as they have more to lose (Laub et al., 1998).

Employability. This item measures whether the offender has the ability to gain stable employment. Employment and job satisfaction has been identified as an important correlate of crime desistance (Farrington, 2003; Maruna, 2001; Sampson & Laub, 1993). However, it is not simply having a job that acts as a protective asset, but whether it matches their skill level and expectations related to status and income (Serin & Lloyd, 2009). It is the psychological meaning attached to the job that is also important; therefore, employment may be an observable manifestation reflecting internal change mechanisms (e.g. cognitions and attitudes) related to desistance (de Vries, Mann, Maruna, & Thornton, 2015; Serin & Lloyd, 2009).

Current Study

The SDAC-21 is a dynamic risk assessment tool designed to inform professional decision-making around level of risk and overall offender management. It includes (a) stable risk factors, which are criminogenic needs that are linked to risk of reoffending; (b) responsivity factors, which are those factors that may impede an offender's ability to effectively engage in intervention; and (c) protective factors, which are those offender characteristics (internal) and assets (external) that may help reduce or manage the likelihood of future criminal behaviour.

Despite the considerable strides achieved in the risk assessment literature, the principle of specific responsivity has yet to be fully developed and remains a largely unexplored area of research. Further, there is a lag in implementation in strength-based assessment in an institutional setting. Although the SDAC-21 is fully implemented in Iowa, it has yet to be validated among their offender population. This study will assess the SDAC-21 through an examination of its structure and psychometric properties. This study will also look at the ability of the SDAC-21 to accurately predict institutional misconducts. The relationship between risk and protective factors will also be explored.

This study will add to the growing body of literature related to desistance and help close the knowledge gap with regards to specific responsivity and protective factors. Further, this study will be the first empirical examination of the SDAC-21. It is anticipated that the results of this research endeavour will improve the overall ability to manage and supervise offenders more effectively within correctional institutions.

Research Questions and Hypotheses

Research Question 1. Will the nested structure of the data account for variability in the outcomes?

Hypothesis 1. Evaluating whether institutional level data will contribute to institutional misconducts is exploratory. Therefore, no predictions will be made.

Research Question 2. Does the SDAC-21 demonstrate adequate psychometric properties?

Hypothesis 2. The SDAC-21 will demonstrate adequate psychometric properties (e.g. factor structure, Cronbach's alpha, inter-rater reliability).

Research Question 3. Will offenders that have an institutional misconduct have higher Stable, Responsivity and total SDAC-21 scores?

Hypothesis 3. It is hypothesized that those offenders with an institutional misconduct will have higher Stable, Responsivity, and total SDAC-21 scores and lower Protective scores compared to those that do not have an institutional misconduct. It is anticipated that offenders without an institutional misconduct will have lower risk scores and higher Protective scores.

Research Question 4a. Will institutional misconducts be accurately predicted from Stable, Responsivity, and total SDAC-21 scores?

Hypothesis 4a. It is proposed that institutional misconducts will be accurately predicted from Stable, Responsivity, and total SDAC-21 scores.

Research Question 4b. Will the absence of institutional misconducts be accurately predicted by Protective scores?

Hypothesis 4b. It is anticipated that those with no institutional misconducts will be accurately predicted from Protective Scores.

Research Question 5. Will the SDAC-21 subscales and total scores incrementally predict misconducts over and above static risk?

Hypothesis 5. It is predicted that the SDAC-21 subscales and total scores will incrementally predict misconducts over and above static risk.

Research Question 6. Will the SDAC-21 protective subscale moderate the effects of risk on institutional misconducts?

Hypothesis 6. Due to the conflicting results in the empirical literature (i.e., whether protective factors interact with risk or whether they have an independent effect irrespective of risk), this question remains exploratory.

Method

Participants

Sample selection and demographics. The sample included 4,217 male offenders with at least one SDAC-21 assessment that were maintained in the Iowa Department of Corrections (IDOC) database. Descriptive statistics are displayed in Table 1. The race composition was primarily White, with a smaller minority being Black. Most offenders had never been married and the majority had a GED. In terms of security level, the majority of the offenders were currently being held in medium security (64.8%) while only a small portion were being held in maximum security (4.3%). In addition, there were differences in mean scores on the SDAC-21 subscales and total scores across security levels (see Appendix A). For instance, compared to minimum security, offenders held in a maximum-security facility had higher mean scores on the SDAC-21 risk domains and lower mean scores on the Protective domain, whereas those offenders placed in minimum security had lower mean scores on the SDAC-21 risk domains and higher scores on the Protective domain.

It is important to note that the sample included in this study was drawn from the larger population of incarcerated male offenders being held in IDOC. There are currently 7,744 incarcerated male offenders where the majority are being held in a medium security facility (approximately 60%; IDOC, 2018a). The race composition is primarily White (approximately 67%), with the majority possessing a GED (approximately 45%). In terms of age, approximately 48% fell into the 31 to 50 age range (IDOC, 2018a). Therefore, the sample in the current study appears to be representative of the larger incarcerated male offender population.

Procedure

A Memorandum of Agreement exists with the Iowa Department of Corrections (IDOC) to collect and share data with researchers in the Criminal Justice Decision Making laboratory at

Carleton University. Ethics approval was obtained from Carleton University and IDOC. All data collection and coding of the SDAC-21 were completed by staff from the IDOC. Prior to receiving the data, the data was stripped of identifiers and cases were assigned a unique identification number.

The SDAC-21 is currently implemented state wide and across eight different institutions and security levels. Based on the IDOC policy and procedures (IDOC, 2015) the SDAC-21 is used as part of the intake process to identify treatment goals and strategies to manage potential risk. In addition, the reassessment of the SDAC-21 is event driven (e.g., completion of programming, prior to transfers, pre-release; IDOC, 2015).

Orientation training was provided to treatment directors and wardens regarding risk assessment in general, dynamic risk assessment and the use of the SDAC-21 in June 2015. Train

Table 1

Sample Demographics

Variable	*N*	%
Age *M (SD)*	33.27 (9.89)	
Ethnicity		
White	2749	65.2
Black	1361	32.3
Indigenous	81	1.9
Asian or Pacific Islander	26	0.6
Marital Status		
Single	3013	71.4
Married/common law	619	14.7
Separated/divorced	527	12.5
Widowed	23	0.5
Not specified/unknown	35	0.8
Highest Education Level		
GED	1942	47.0
High School Diploma	1118	26.5
Associate's Degree	43	1.0
Bachelor's Degree	12	0.3
Other	1024	24.3
Unknown	78	1.8
Security Level		
Minimum	841	19.9
Medium	2732	64.8
Multi-level	463	11.0
Maximum	181	4.3

the trainers sessions were conducted in late July 2015 and it was fully implemented in Iowa by November 2015.

Materials

Structured Dynamic Assessment Case-management-21 items (SDAC-21; Serin & Wilson, 2012). The SDAC-21 is 21-item risk assessment instrument organized into 3 domains: stable risk indicators (gang association, negative attitudes towards authority, impulse control,

problem-solving, sense of entitlement, attachment to others and substance abuse), responsivity indicators (health problems, conduct issues, personal distress, unresponsive rehabilitation, hostility/interpersonal aggression, offence mirroring behaviour and learning difficulties), and protective factors (responsive to advice, prosocial identity, high expectation, cost/benefits, social supports, social control and employability). The stable, responsivity and protective domains are scored on a 3-point scale. For the stable and responsivity factors, a score of 0 represents no problem, 1 represents a slight or possible problem, and a score of 2 represents a definite problem. Regarding protective factors, 0 indicates the item is not a protective factor, a score of 1 indicates it is a slight or possible asset, and a score of 2 indicates the item is a definite asset. The SDAC-21 also includes risk scenarios that provide case management officers with information about the most likely reoffending scenario (i.e. 'what may go wrong'). See Appendix B for the scoring guide.

Iowa Violence and Victimization Instrument (IVVI; Prell, 2013). The IVVI instruments are included as part of the intake process upon admission to a correctional institution (IDOC, 2015). It includes nine items focusing on current and prior offenses, security threat group membership, and current age. The scoring results in separate violence risk and victimization risk scales. See Appendix C for the scoring guide. The violence risk scale is intended to predict the likelihood of conviction for any new violent crime within three years of release. Previous research (Prell, 2013) has demonstrated that the violence risk scale significantly predicted drug offences (AUC = .56), property offences (AUC = .64), victimization offences (AUC = .69), violent offences (AUC = .71), and any offences (AUC = .63). The victimization risk scale is intended to predict the likelihood of return to prison for a new violent or property offense within three years of release. Victimization refers to violent and property offenses—crimes with

quantifiable economic costs in which victims feel personally. Victimization offences include burglary, identity theft, unauthorized use of credit cards, and other property crime. Previous research has also demonstrated that the victimization risk scale significantly predicted drug offences (AUC = .54), property offences (AUC = .71), victimization offences (AUC = .70), violent offences (AUC = .70), and any offences (AUC = .65).

Institutional misconducts. Outcome criterion included four types of institutional misconducts: Predatory, management, non-compliance misconducts, and any-misconducts. Predatory is the most serious misconduct and included offences such as assault and escapes; management included misconducts such as possession of dangerous contraband and theft; non-compliance included refusal to work and disobeying a lawful order/direction. Any misconducts included any of the above misconduct categories, whichever came first.

Data Analysis

Cronbach's alpha. The reliability of the SDAC-21 was estimated using the Cronbach's alpha reliability coefficient. Reliability, as measured by Cronbach's alpha, refers to the internal consistency of a scale. More specifically, it is based on the average covariance among items in a scale. Cronbach's alpha ranges between 0 and 1. Coefficients closer to 1 indicate greater internal consistency. Although there is some debate regarding an acceptable value for Cronbach's alpha, a reliability coefficient of at least .70 has been recommended for demonstrating sufficient reliability (Field, 1999). However, values below .70 can be expected with items related to psychological constructs due to the diversity of constructs being measured (Field, 2005).

Exploratory factor analysis (EFA). An EFA was performed to estimate the underlying latent factor structure of the SDAC-21. Typically employed in the early stages of research, EFA is used to summarize data by grouping correlated variables and to determine the number and

nature of a set of latent factors. EFA was employed rather than principle components analysis (PCA). PCA is a purely variable reduction technique, with no a priori hypotheses regarding how the variables are related (Costello & Osborne, 2005). In addition, PCA does not differentiate between shared and unique variance of a variable. In contrast, the shared variance, the unique variance, and the error variance of a variable are partitioned out when performing EFA; thus, only shared variance is analyzed.

EFA uses correlation matrices to estimate the underlying latent factor structure of a measure, typically with Pearson Product-Moment correlation matrices (Flora & Curran, 2004). However, due to the ordinal nature of the items within the SDAC-21, estimating latent factors using polychoric correlations matrices is the recommended approach (Flora & Curran, 2004; Holgado-Tello, Chacón– Moscoso, Barbero–García, & Vila-Abad, 2010). Polychoric correlations estimate the linear relationship between two unobserved (latent) continuous variables based on observed ordinal data (Flora & Curran, 2004). Thus, polychoric correlations produce a factor solution more in line with the original measurement model (Holgado-Tello et al., 2010). In contrast, using Pearson Product-Moment correlations with ordinal data may lead to biased estimates and reduced factor loadings, particularly when normality is not met (Flora & Curran, 2004; Holgado-Tello et al., 2010).

Factors were extracted using weighted least squares (WLS), which has been recommended with ordinal data and polychoric correlations (Flora & Curran, 2004; Holgado-Tello et al., 2010). Typically, the most common estimation technique is maximum likelihood (ML); however, ML assumes normality and continuously distributed variables (Flora & Curran,

2004). Factors were rotated using oblique rotation method (direct oblimin)[1], as it was expected that the factors would correlate to some degree.

Determining the number of factors to be retained were based on (a) Kaiser's criterion, which retains the number of factors with eigenvalues greater than 1.00 (b) scree plot, (c) parallel analysis, and (d) Velicer's minimum average partial test (MAP test; Velicer, 1976). Parallel analysis is one of the more accurate methods for determining the number of factors to retain, where eigenvalues from the original data set are compared against eigenvalues from many randomly generated data sets that have the same characteristics as the data being analyzed (Fabrigar, Wegener, MacCallum & Stahan, 1999; Hayton, Allen & Scarpello, 2002). Factors are retained if its eigenvalue exceeds the 95th percentile of the simulated values (i.e., the number of factors that account for more variance than the factors derived from the simulated data; O'Connor, 2000). The MAP test evaluates the relative amounts of systematic and unsystematic variance by separating the common and unique variance and retaining only those factors that consist of primarily common variance (O'Connor, 2000). Of the four retention methods, however, parallel analysis and the MAP test are the least subjective, and were given the most weight in decision-making. Analyses were conducted using the psych package (Revelle, 2018) in R version 3.6.0 (R Core Team, 2019).

Confirmatory factor analysis (CFA). A CFA was conducted to verify the factor structure produced from the EFA. Thus, the CFA was able to test which observed variables are related to the specified latent factors. Given the large sample size, the data was randomly split,

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[1] In contrast to oblique methods, which allow the factors to correlate, orthogonal rotation methods produce factors that are uncorrelated (Osborne & Costello, 2009).

where the EFA were performed on one-half of the data. This can provide a basis for specifying a CFA model, which can be fit to the other half of the data.

Model testing process. There are five steps necessary for complete model testing in CFA: model specification, identification, estimation, evaluation, and modification.

Model specification. This process involves specifying the relationship between the factors and the corresponding observed variables. This was based on the factor structure produced from the EFA.

Model identification. In order to estimate the CFA solution, the model must be identified. A model is identified when there is a unique numerical solution for each of the parameters in the model (Tabachnick & Fidell, 2013). A model can be: (a) under-identified, where there are more unknowns (i.e. freely estimated model parameters) than knowns (i.e. elements in the sample variance-covariance matrix); (b) just-identified, where there are equal known and unknown information; and (c) over-identified, where there are more knowns than unknowns. An over-identified model permits hypothesis testing. [2]

Model estimation. Diagonally weighted least squares (DWLS) was used. The DWLS approach uses the weighted least squares estimator with polychoric correlations. More specifically, DWLS does not assume normality and is appropriate with ordinal data (Li, 2016)

Model evaluation. Various fit indices were used to determine the adequacy of the model fit. These included:

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[2] To determine model identification, the number of degrees of freedom (*df*) must be determined by calculating the number of known elements in the model using the equation $p(p+1)/2$ where p is the number of observed items. The difference in the number of knowns and the number of unknowns constitutes the model's *df.* Over-identified solutions will have a positive *df.*

Chi-square goodness of fit test. The chi-square is an absolute fit index that directly assesses how well a model fits the observed data (Tabachnick & Fidell, 2013; Weston & Gore, 2006). A nonsignificant chi-square indicates that the model fits the data, whereas a significant chi-square indicates that the null hypothesis of perfect fit is reject (Tabachnick & Fidell, 2013; Weston & Gore, 2006). However, chi-square values are sensitive to sample size. For instance, with large sample sizes, there is enough power to detect even minor levels of misfit. Related to the chi-square value, is that a good-fitting model may be implied when the ratio of the chi-square to the degrees of freedom is less than 2 (Tabachnick & Fidell, 2013).

Comparative fit index (CFI). CFI is an incremental fit index that compares the hypothesized model to a restrictive baseline or *null model* (i.e., a model in which all measured variables are uncorrelated). CFI ranges between 0 and 1.0, with values closer to 1.0 indicating better fit. A cutoff of .95 or above will be used to determine whether the model fit is acceptable (Hu & Bentler, 1999).

Root mean square error of approximation (RMSEA). The RMSEA is an absolute fit index that provides a measure of the discrepancy of fit between the sample variances and covariances and the estimated variances and covariances. Smaller values are indicative of good-fitting models, where values less than .06 are preferred (Hu & Bentler, 1999, Tabachnick & Fidell, 2013).

Standardized root mean square residual (SRMS). The SRMS is based on the covariance residuals, which also measures the difference between the observed data and the model (Tabachnick & Fidell, 2013). Smaller values also indicate better fit, where values less than .08 are preferred (Hu & Bentler, 1999, Tabachnick & Fidell, 2013).

Model modification. If the initial model does not have an adequate fit based on the above indices, modification indices indicate what changes need to be made to improve the fit of the model. However, there needs to be a strong theoretical justification in making the changes.

Analyses were conducted using lavaan package (Rosseel, 2012) in R version 3.6.0 (R Core Team, 2019).

Receiver operating characteristics (ROC). This analysis was used to examine the predictive accuracy of the SDAC-21. ROC analyses are one of the most commonly employed statistical techniques to assess how accurate risk assessment instruments are at predicting recidivism. The ROC analyses generate the Area Under the (ROC) Curve (AUC). ROC analyses assess both sensitivity and specificity of a measure (Rice & Harris, 2005). Sensitivity of a measure refers to the ability to correctly predict recidivism (hit rate), whereas specificity refers to a measures ability to correctly identify a non-recidivist (Harris & Rice, 2003). Thus, ROC curves plot the sensitivity (hit rate) against false alarms (1-specificity; Craig & Beech, 2009; Harris & Rice, 2003). AUC's are only applied to dichotomous outcomes (recidivist vs. non-recidivist) and cannot be applied to continuous scales reflecting the severity or the rate of occurrence (i.e. speed and frequency of reoffending; Brown et al., 2009; Craig & Beech, 2009; Harris & Rice, 2003).

The AUC statistic is interpreted as the probability that a randomly selected recidivist would have a higher risk score than a randomly selected non-recidivist (Rice & Harris, 2005). AUC values range from 0 to 1.0, with an AUC value of .50 indicating predictive accuracy no better than chance level and an AUC value of 1.0 indicates perfect prediction (Rice & Harris, 2005). Typically, AUCs of .55 to .63 are considered a small effect; AUCs of .64 to .70 values are considered a medium effect; and AUC values of .71 and higher are indicative of a large effect

(Rice & Harris, 2005). AUC analyses were generated using the pRoc package (Xavier et al., 2011) in R version 3.6.0 (R Core Team, 2019).

Cox regression survival analysis. Cox regression survival analysis was performed to assess the unique contribution of the SDAC-21 and its subscales in the prediction of all four outcomes. Survival analyses are statistical procedures used for measuring the length of time until an event occurs (Tabachnick & Fidell, 2013). Time was defined as the time between an SDAC-21 assessment and institutional misconducts or the end of the follow-up period. Cox regression is a function of survival analyses, which applies regression methodology to survival data (Tabachnick & Fidell, 2013). Thus, this approach allows multiple predictors to be measured simultaneously in order to determine their independent and unique contributions to the outcome variable (Tabachnick & Fidell, 2013). This analytic strategy was chosen over logistic regression, as Cox regression survival analysis is able to incorporate variable follow-up times and sample censoring (Brown et al., 2009; Harris et al., 2002).

Cox regression estimates relative risk ratios (hazard rate; Exp[B], which provide an indication of the likelihood of an event (Tabachnick & Fidell, 2013). For instance, and Exp[B] of 1.70 would mean that a unit increase in SDAC-21 total score would yield a 70% increase in the likelihood of a misconduct. Analyses were conducted using SPSS v.25.

Moderated cox regression survival analysis. Cox regression survival analysis was used to examine if the SDAC-21 protective domain moderated the relationship between risk and misconducts. The focal independent variable was the total risk score (IVVI violence and victimization total scores); whereas the SDAC-21 Protective domain was the moderator. First, the independent effects of risk and protective factors (i.e. main effects) were simultaneously entered in the first block, while the interaction term of Total Risk x Total Protective score was

entered in the second block. This analysis was undertaken to determine if higher scores on the protective domain would mitigate the risk for future misconducts. The two predictors are said to interact (i.e. have a joint effect) in their accounting for variance in the outcome when it is significant over and above any additive combination of their separate effects (i.e. main effects; Cohen et al., 2003). Analyses were conducted using SPSS v.25.

Multilevel modelling. An exploratory multilevel modeling technique (MLM) was conducted in order to examine the nested structure of the data and to evaluate the impact of offender and institutional-level variables on an offender's likelihood of incurring an institutional misconduct. This is important to examine as contextual variables (i.e., institutional-level) introduce dependency in the data, which means that the residuals will be correlated (Tabachnick & Fidell, 2013). Many methods of statistical analyses assume that cases are independent. However, when individuals are sampled from similar contexts (e.g., from the same institution), this independence might not be true. For example, offenders may be more similar in one institution compared to those offenders from another institution. Prior to the model building process, an examination of the intra-class correlation (ICC) was conducted. The ICC is a measure of dependency between scores, where it represents the proportion of variability in the outcome that is attributed to the level-2 institutional groupings (Tabachnick & Fidell, 2013). Large ICC values indicate that the variability in the institutions is small (i.e., the variability in the outcome within institutions is small) but the variability in the outcome between institutions is large (Field, 2005; Tabachnick & Fidell, 2013). Therefore, large ICC values indicate that the independence of errors assumption is violated and a MLM should be performed. It has been suggested that ICC values between 0-.20 are considered low, .21-.40 are considered fair, .41-.60 are moderate, .61-.80 are substantial and .81-1.00 reflects a near perfect relationship (Landis &

Koch, 1977). If the results of the ICC indicate that a MLM should be conducted, a two-level hierarchal model will be built. More specifically, offender-level variables (e.g., SDAC-21 assessments and static risk) will be included in level-1 and institutional level variables (e.g., security level) will be included in level-2. Analyses were conducted using SAS v.9.4

Results

Data Screening

Missing Values. Prior to analyses, all variables were examined for accuracy of data entry and the presence of missing values. With the exception of 91 offenders for which no data was available regarding their IVVI (both violence and victimization) scores, there were no other missing data in the variables of interest. Descriptive information for IVVI scores and SDAC-21 items are displayed in Table 2.

Distribution. All variables were examined for outliers (defined by a z-score of ±3.29 and above) normality, linearity, and homoscedasticity. An examination of box plots and standardized z-scores revealed that there were three univariate outliers for the IVVI victimization score. However, with such a large sample size, a few standardized scores in excess of 3.29 are expected (Tabachnick & Fidell, 2013). As such, these cases were retained. Normality was screened through an examination of probability plots and histograms, which revealed no visible departure from normality. However, the standardized values of skewness exceeded 3.29 (two-tailed) using an alpha level of .001 for the Stable, Responsivity, Protective, and both IVVI measures. In addition, the standardized values of kurtosis exceeded 3.29 for the Responsivity domain. According to Tabachnick and Fidell (2013), when the sample size is large, examining the shape of the distribution instead of using formal inference tests may be more informative. More specifically, the significance level is not as important as the visual appearance of the distribution.

Homoscedasticity and linearity were examined among the variables through visual examination of bivariate scatterplots and residual plots (plots standardized predicted values against standardized residuals). Results demonstrated that all variable pairs tested in regression were linearly related. Further, no variables visibly showed clear departures from

homoscedasticity, as the variance of one variable was the same at all values of the other variables.

Multivariate outliers were examined among all predictors by using Mahalonibis distances, which measures the distance of cases from the means of the predictor variables (Tabachnick & Fidell, 2013).[3] Mahalanobis' distances identified five multivariate outliers. Three cases were rated to simultaneously have high IVVI-violence, moderate-high IVVI-victimization scores, and high Stable, Responsivity and Protective DRAOR scores. Two cases were rated to simultaneously have moderate IVVI-violence, low-moderate IVVI scores, while having low Stable but high Responsivity and Protective DRAOR scores. In addition, none of these individuals incurred an institutional misconduct during the study period. The cases were retained, as their removal did not alter the overall statistical significance of the results.

In survival analysis, the DFBeta statistic can also be examined to determine if any cases had an influence on the parameters of the regression model. That is, this diagnostic statistic is calculated for every case, which indicates how much individual regression coefficients would change if the case were not included in the sample. Values larger than one indicate that a case may have a large influence on the parameters of the regression model; however, all of the DFBeta values were below one, indicating no undue influence on the model.

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[3] Using $p < .001$ and a *df* of 5, the chi-square critical value was 20.515

Table 2

Descriptive Information of Risk Measures

Variable	Range	*M*	*SD*
IVVI-Violence	-1-16	5.71	2.82
IVVI-Victim	-1-17	6.23	3.11
SDAC-21 Total	-14-28	6.76	6.95
Stable Total	0-14	7.59	2.79
Gang Association	0-2	0.51	0.78
Attitudes Towards Authority	0-2	1.01	0.72
Impulse Control	0-2	1.40	0.65
Problem Solving	0-2	1.39	0.62
Sense of Entitlement	0-2	0.88	0.73
Attachment with Others	0-2	0.96	0.67
Substance Abuse	0-2	1.46	0.71
Responsivity Total	0-14	5.16	2.90
Health Problems	0-2	0.56	0.72
Conduct Issues	0-2	0.92	0.77
Negative Mood	0-2	0.73	0.70
Unresponsive Rehabilitation	0-2	0.90	0.72
Anger	0-2	0.95	0.74
Offence Mirroring Behaviour	0-2	0.63	0.73
Learning Difficulties	0-2	0.46	0.68
Protective Total	0-14	5.98	2.97
Response to Advice	0-2	0.85	0.61
Prosocial Identity	0-2	0.83	0.58
High Expectations	0-2	0.92	0.61
Costs Benefits	0-2	0.86	0.63
Social Support	0-2	0.96	0.62
Social Control	0-2	0.68	0.62
Employability	0-2	0.89	0.69

All the variables were evaluated for multicollinearity and singularity using bivariate correlations and tolerance values. With the exception of the IVVI measures, there were no perfect or near perfect correlations among the variables, the largest correlation being between Stable and Responsivity ($r = .58$, $p < .01$). Inter-correlations among subscales and the IVVI risk measures are displayed in Table 3.

Table 3

Correlation Matrix

Measures	IVVI-Violence	Stable	Responsivity	Protective
IVVI-Victimization	.88	.24	.17	-.14
IVVI-Violence		.25	.17	-.12
Stable			.58	-.44
Responsivity				-.39

Note. All correlations significant at $p < .01$

Proportional hazards assumption. The proportionality of hazards is specific to Cox regression. It assumes that the shape of the survival function over time is the same for all cases (Tabachnick & Fidell, 2013). If this assumption is violated, it implies there is an interaction between covariates and time (Tabachnick & Fidell, 2013). This assumption was tested using the log minus log plots of the hazard function. This assumption was not violated as the lines were parallel and did not cross each other.

Institutional misconducts

Of the 4,217 offenders, 20.3% ($n = 857$) incurred a non-compliance misconduct, 3.8 % ($n = 161$) had a predatory misconduct, 12.2% ($n = 567$) had a management misconduct and 21.5% ($n = 906$) had any misconduct. The maximum follow-up period was 616 days ($M = 229.97$, $SD = 199.143$). The mean time to first non-compliance misconduct was 230 days ($SD = 199.14$), 242.87 days ($SD = 200.64$) for management, 245.53 days ($SD = 202.89$) for predatory, and 229.69 days ($SD = 198.66$) for any misconducts.

Part 1. Nested Structure

Hypothesis 1. Evaluating whether institutional level data will contribute to institutional misconducts was exploratory. Therefore, no predictions were made.

Multilevel modeling. An exploratory MLM was conducted to examine the nested structure of the data. Prior to the model building process, the ICC was calculated to determine if MLM was justified. An unconditional model (i.e., intercept only model) was used to calculate the ICC. As indicated earlier, the ICC is the proportion of the total variability in the outcome that is attributed to the level-2 institutional groupings. The unconditional models for non-compliance, any misconducts, and predatory misconducts all yielded an ICC of .05, where the unconditional model for management misconducts produced an ICC of .04. This means that only 5% of the variability for non-compliance, any misconducts, and predatory misconducts were associated with differences between institutions. In addition, 4% of the variability in management misconducts was associated with differences between institutions. Based on the criteria outlined by Landis & Koch (1977), these ICC's are considered low. As such, further model building was not conducted.

Part 2. Psychometric Properties

Hypothesis 2. The SDAC-21 will demonstrate adequate psychometric properties (e.g., inter-rater reliability, factor structure, Cronbach's alpha).

Inter-rater reliability. Inter-rater reliability (IRR) was assessed using 20 randomly selected audiotaped interviews between officers and clients. A state level trainer independently reviewed offenders' files, listened to the audiotapes, and rated the offender on the SDAC-21. IRR was then determined by comparing these ratings with the officers' ratings. Intra-class

correlation coefficients (ICC)[4] were used to compute IRR for each of the SDAC-21 items (see Table 4). IRR for the Stable subscale ranged from fair to excellent (ICCs = .54 to .96); Responsivity ranged from good to excellent (ICCs = .64 to .97); and Protective ranged from good to excellent (ICCs = .70 to .80).

[4] ICC vary between -1 and +1, with 0 indicating chance agreement and higher values indicating better agreement. Typically, ICC values less than .40 indicate poor IRR, ICCs between .40 and .59 indicate fair IRR, .60 to .74 demonstrate good IRR, and ICC values between .75 and 1.0 are considered excellent (Hallgren, 2012). The ICC's were based on a one-way random effects model and absolute agreement.

Table 4

Inter-Rater Reliability for the SDAC-21

SDAC-21 items	ICC
Stable	
Gang Associations	.96
Attitude toward Authority	.86
Impulse Control	.62
Problem Solving	.66
Sense of Entitlement	.74
Attachment with Others	.85
Substance Abuse	.54
Responsivity	
Health Problems	.97
Conduct Issues	.87
Negative Mood	.82
Unresponsive Rehabilitation	.89
Anger/Hostility	.64
OMB	.87
Learning Difficulties	.85
Protective	
Responsive to Advice	.69
Prosocial Identity	.75
High Expectations	.80
Costs/Benefits	.73
Social Supports	.72
Social Control	.67
Employability	.74
Average ICC[a]	.77

Note. ICC = intra-class correlation coefficient; [a] Average ICC across 20 assessments.

Exploratory factory analysis. An exploratory factor analysis (EFA) was performed to examine the latent factor structure of the SDAC-21 and to determine if the items loaded as predicted on the three subscales of Stable, Responsivity and Protective. The sample was randomly split in half in order to conduct an EFA on one portion of the sample and then conduct a confirmatory factor analysis on the other half. The sample size for the EFA included 2,099 offenders, which was ideal for generating reliable and replicable factors. Polychoric correlations were used due to the ordinal nature of the items, which produced a factor solution more in line with the original measurement model (Flora & Curran, 2004; Holgado-Tello et al., 2010). Factors were extracted using weighted least squares (WLS), which is recommended with ordinal data (Flora & Curran, 2004; Holgado-Tello et al., 2010). Because the factors were expected to correlate, they were rotated using oblique rotation method (direct oblimin).

The Kaiser-Meyer-Olkin measure of sampling adequacy (KMO = .89) suggested the present data were adequate for conducting factor analysis. The correlation matrix is presented in Appendix D, with correlations ranging from -.44 to .76. In addition, Bartlett's test of sphericity was significant ($\chi^2(210) = 10661.36$, $p < .001$), which indicated that correlations between items were sufficiently large.[5]

The four procedures used to determine the number of factors yielded somewhat different results. The solution identified five factors with eigenvalues greater than 1.0. Kaiser's criterion, which indicates retaining eigenvalues greater than 1.0, is generally accurate when there are less than 30 variables and communalities after extraction are greater than .7 or when the sample size exceeds 250 and the average communality is greater than .6 (Field, 2005). Communalities ranged

[5] Bartlett's test examines whether correlations (overall) are too small for factor analysis (Field, 2005).

from .10 to .63 (*M* = .37). These results suggested that Kaiser's criterion may not be accurate. The scree plot's point of inflexion suggested three to four components should be retained. However, both the results of the parallel analysis and the MAP test suggested a two-factor solution. Given that these two approaches are the least subjective, it was decided that the first two factors would be retained. This factor structure accounted for 35.4% of the prerotation variance. Table 5 displays the factor loadings for the two factors. As can been seen, 17 of the 21 items exceeded the loading criterion of .32 (Tabachnick & Fidell, 2013), with no cross-loadings between the factors.

A mix of Stable and Responsivity subscale items loaded onto Factor 1. The gang associations and substance abuse items, from the Stable subscale, and the health problems and learning difficulties, from the Responsivity subscale, did not load onto any factor. As such, they were removed. The remainder of the items that loaded onto Factor 1 could potentially be viewed as risk items; therefore, it was referred to as *Risk.* The seven SDAC-21 Protective subscale items loaded exclusively onto Factor 2, which was named *Protective.* The identified factors were moderately correlated and in the expected direction (*r* = -.51).

Table 5

Oblique Rotated Factor Loadings

Subscales	Factor 1	Factor 2
Gang Association	.25	-.01
Attitudes Towards Authority	**.73**	-.04
Impulse Control	**.71**	.03
Problem Solving	**.71**	-.03
Sense of Entitlement	**.57**	-.04
Attachment with Others	**.36**	-.28
Substance Abuse	.20	-.06
Health Problems	.23	-.09
Conduct Issues	**.74**	.08
Negative Mood	**.47**	-.01
Unresponsive Rehabilitation	**.46**	-.11
Anger	**.63**	.01
Offence Mirroring Behaviour	**.58**	.02
Learning Difficulties	.25	-.11
Response to Advice	-.24	**.54**
Prosocial Identity	-.11	**.73**
High Expectations	.07	**.77**
Costs Benefits	-.04	**.71**
Social Support	.10	**.74**
Social Control	.01	**.78**
Employability	-.04	**.47**

Note. Bold denotes factor loadings greater than .32.

Confirmatory factor analysis. A confirmatory factor analysis (CFA) was used to examine whether the factors extracted based on the EFA were maintained. A sample of 2,118 offenders, which was derived from randomly splitting the data, were used for these analyses. In addition, the original SDAC-21 was also tested to determine if the hypothesized model fit the data and provide a basis of comparison to the two-factor model.

Model specification. The models describing the relationship between the latent variables and the observed variables are presented in Figure 1 for Model 1 (Original SDAC subscales) and Figure 2 for Model 2 (Two-factor model). The circles represent the latent variables and the rectangles represent the measured variables. Model 1 included 21 observed variables and three latent variables (i.e., Stable Risk, Responsivity, and Protective Factors). Model 2 included 17 observed variables and two latent variables (i.e., Risk and Protective Factors). The latent variables were scaled using the standardization approach. Specifically, the means were fixed to 0 and the variances were fixed to 1.[6] This allowed free estimation of all factor loadings for both models. For each of the models, the latent variables were specified to be correlated with each other. In addition, for both models, the paths (i.e., factor loadings) between the observed variables and the latent variables were estimated as well as the error variances.

Model identification. In order to proceed with the analyses, there must be more knowns than unknowns (i.e., parameters to be estimated). Model 1 was overidentified as there were more known information in the sample compared to estimates of unknown parameters. More specifically, this model had 21 observed variables, which indicates that it had 231 known

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[6] This was done so that each latent variable would have an assigned scale. Alternatively, one factor loading for each latent variable could have been set to 1.0; however, the option chosen would not have an impact on model fit (Weston & Gore, 2006).

Figure 1. Confirmatory Factor Analysis of Model 1

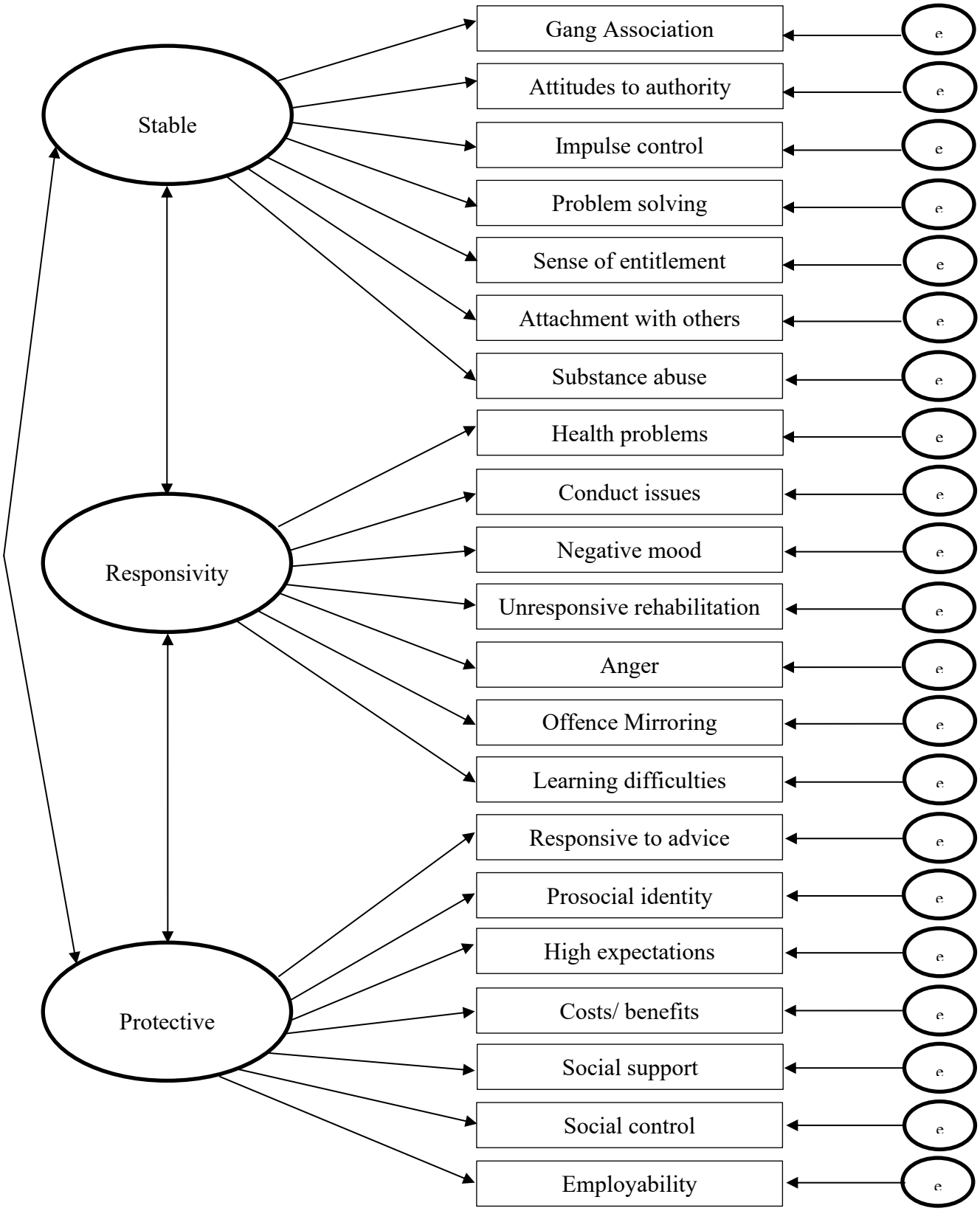
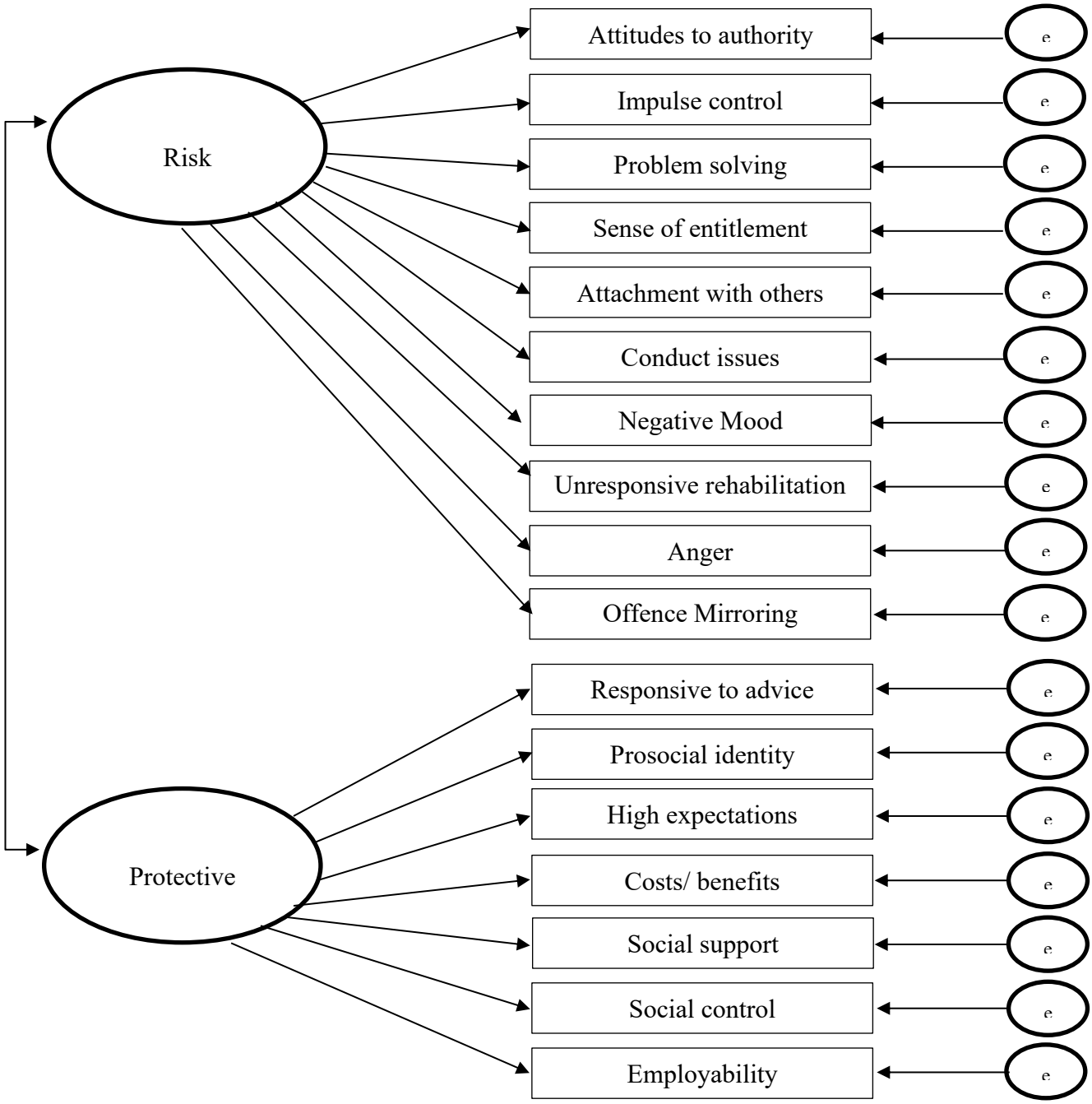


Figure 2. Confirmatory Factor Analysis of Model 2



elements. There were 45 parameters that needed to be estimated, which included 21 error variances, 21 factor loadings, and 3 inter-correlations between the factors. Subtracting the 43 unknown parameters from the 231 known elements demonstrated the model had 186 degrees of freedom. When the degrees of freedom are larger than zero, the model is overidentified (Tabachnick & Fidell, 2013; Weston & Gore, 2006). Model 2 had 17 observed variables, which indicated that it had 153 known elements. There were 35 unknown elements (i.e., 17 error variances, 17 factor loadings, and 1 inter-correlation between the factors). This left the model with 118 degrees of freedom, demonstrating that Model 2 was also overidentified.

Model estimation. Diagonally weighted least squares (DWLS) was used, which is appropriate with ordinal data.

Model evaluation. Various fit indices were used to assess whether the associations among the measured and latent variables in the estimated model adequately reflected the observed associations in the data. These included: (a) Chi-square goodness of fit test, (b) Comparative Fit Index (CFI; Cut-off criterion of .90 or higher), (c) Root Mean Square Error of Approximation (RMSEA; Cut-off criterion less than .06), and (d) the Standardized Root Mean Square Residuals (SRMR; Cut-off criterion less than .08). The results of the fit indices are displayed in Table 6. As can be seen, the chi-square was significant for both models, indicating poorly fitting models. In addition, the ratio of the chi-square to the degrees of freedom for both models exceeded the recommended two, also indicating poorly fitting models (Tabachnick & Fidell, 2013). However, this is not surprising given the large sample size. In contrast, the CFI, SRMR and the RMSEA suggested that both models may be acceptable.

Table 6

Goodness- of-Fit Indices for the Two Models

	Model	
	1	2
χ^2	1134.04	710.55
df	186	118
p	<.001	<.001
χ^2/ *df*	6.10	6.02
CFI	.96	.97
RMSEA	.05	.05
90% CI	[.046, .052]	[.045, .052]
SRMS	.05	.05

Note. df = degrees of freedom; CI = confidence interval.

With the exception of the chi-square, the criteria used to determine model fit were met, demonstrating that modifications were not necessary. Factor scores for Model 2 were computed directly from the items rather than the standardized factor scores. This was done by summing scores on the items that loaded highly on each factor and ensuring that items that were removed (i.e., gang associations, substance abuse, health problems, and learning difficulties) were not included in the calculation. More specifically, for the two-factor model, only the *Risk* factor score was recalculated as the *Protective* factor scores were the same as the original Protective subscales scores. However, a revised SDAC-21 Total score was calculated by summing all the *Risk* items and then subtracting the *Protective* items. The original SDAC-21 and the two factor-model were used in the subsequent analyses. The internal consistency of the identified factors using Cronbach's alpha are displayed in Table 7 for Model 1 and Table 8 for Model 2. Results demonstrated that the Protective Factor and the Risk Factor demonstrated acceptable internal

consistency, whereas the Stable and Responsivity subscales approached sufficient internal consistency.

Table 7

Internal Consistency and Descriptive Statistics for Model 1 SDAC-21 Subscales

SDAC-21 Subscales	α	*M*	*SD*	Range
Stable	.67	7.59	2.79	0-14
Responsivity	.66	5.16	2.90	0-14
Protective	.81	5.98	2.97	0-14

Table 8

Internal Consistency and Descriptive Statistics for Model 2 SDAC-21 Factors

SDAC-21 Factor	α	*M*	*SD*	Range
Risk	.81	9.76	4.27	0-20
Protective	.81	5.98	2.97	0-14

Summary. Overall, the SDAC-21 demonstrated adequate psychometric properties, which provided support for Hypothesis 2. With the exception of the substance abuse item, which demonstrated fair IRR, the remainder of the items revealed good to excellent IRR. These results are encouraging as they highlight that the raters exhibited sufficient agreement and consistency in rating the SDAC-21. Results from the EFA revealed a two-factor model. The emerging factors, *Risk* and *Protective*, were conceptually appealing factors and were retained for further analyses. Although some of the items contained in the original Responsivity loaded onto the *Risk* factor, these items have also demonstrated a relationship with criminal behaviour (e.g., conduct issues, hostility). The gang association item, which revealed excellent IRR, failed to load onto

any of the factors. This may be partially explained by the fact that this item demonstrated weak correlations with the other items. The fact that the substance abuse item also failed to load onto either of the factors may be related to the low IRR and weak inter-item correlations.

A CFA was conducted to confirm model fit of the two-factor model. In addition, a CFA was also performed on the original SDAC-21 so both models could be compared. Using various fit indices, results demonstrated adequate model fit for both the two-factor and original SDAC-21. With respect to internal consistency, the Protective and *Risk* Factor exceeded the recommended cut-off of .70 for Cronbach's alpha, whereas the original Responsivity and Stable subscales approached acceptable levels of internal consistency. As previously mentioned, values below .70 may be expected with psychological constructs due to the diversity of the constructs being measured.

Part 3. Between-offender Analyses

Hypothesis 3. Offenders with an institutional misconduct will have higher Stable, Responsivity, and total SDAC-21scores and lower Protective scores compared to those that do not have an institutional misconduct.

Comparisons were made between those who incurred an institutional misconduct and those who did not for all four types of institutional misconducts (i.e., any misconduct, non-compliance, management, and predatory). A series of independents samples t-tests were used to compare scores on the original SDAC-21 subscales and total score, the factor scores based on the 2-factor model, and both IVVI assessments. In addition, Cohen's *d*, which is an effect size used

to indicate the standardized difference between two means, is also presented.[7] Cohen (1988) suggested that a *d* of .2 is a small effect, .5 is moderate, and .8 is large.

As can be seen in Table 9, those who incurred a non-compliance or any misconduct had higher levels of static risk (i.e., IVVI violence and victimization scores). In addition, offenders who incurred a non-compliance or any misconduct during the study period had significantly higher mean scores on the original SDAC-21 total scores, the Stable and Responsivity subscales, lower levels of Protective factors, and higher scores on the revised Risk and Total factors. Cohen's *d* was comparable for the original SDAC-21 Responsivity subscale and total score and the revised SDAC-21 factor scores for both non-compliance and any misconduct, which demonstrated moderate effects. In contrast, the IVVI risk scores and the SDAC-21 Stable and Protective subscales produced small effect sizes for both outcomes.

[7] Cohen's *d* is determined by calculating the mean difference between two groups and then dividing this difference by their pooled standard deviation (Cohen, 1988)

Table 9

Between-Offender Analysis: Non- compliance and Any Misconducts

Variable	Misconduct *M (SD)*	No-misconduct *M (SD)*	*t*	*df*	*d*
			Non-compliance		
IVVI-Violence	6.30 (2.76)	5.56 (2.82)	6.87***	4124	.29
IVVI-Victimization	6.81 (3.05)	6.08 (3.11)	6.17***	4124	.25
Original SDAC-21					
Stable	8.54 (2.63)	7.35 (2.78)	11.35***	4215	.43
Responsivity	6.52 (2.98)	4.81 (2.78)	15.90***	4215	.58
Protective	5.19 (2.84)	6.18 (2.97)	-8.80***	4215	.36
Total	9.87 (6.71)	5.97 (6.79)	15.06***	4215	.58
Revised SDAC-21					
Risk Total	11.74 (4.11)	9.26 (4.16)	15.06***	4215	.58
Revised Total	6.55 (5.90)	3.07 (6.08)	15.06***	4215	.58
			Any Misconducts		
IVVI-Violence	6.31 (2.77)	5.55 (2.82)	7.19***	4124	.32
IVVI-Victimization	6.82 (3.08)	6.06 (3.10)	6.44***	4124	.29
Original SDAC-21					
Stable	8.51 (2.65)	7.34 (2.78)	11.36***	4215	.43
Responsivity	6.48 (2.99)	4.79 (2.77)	15.90***	4215	.58
Protective	5.21 (2.85)	6.19 (2.97)	-8.89***	4215	.32
Total	9.77 (6.756)	5.94 (6.77)	15.10***	4215	.58
Revised SDAC-21					
Risk Total	11.67 (4.13)	9.24 (4.16)	15.56***	4215	.58
Revised Total	6.45 (5.4)	3.05 (6.07)	15.03***	4215	.58

Note. * $p < .05$; ** $p < .01$; *** $p < .001$

As demonstrated in Table 10, offenders who incurred a management or predatory misconduct also had higher levels of static risk and significantly higher mean scores on the SDAC-21 Stable, Responsivity and total scores as well as higher scores on the revised Risk and Total scores. Moreover, offenders who did not incur a management or predatory misconduct had significantly higher mean scores on the Protective subscales**.**

The IVVI risk scores and SDAC-21 Protective scores produced small effect sizes for management misconducts, with Cohen's *d* ranging from .25 to .36. The Stable, Responsivity, the original SDAC-21 total scores and the revised factor scores all demonstrated moderate effect sizes, with a Cohen's *d* of .58. With regards to predatory misconducts, there was a range in the magnitude of effect sizes, where the IVVI risk scores produced small effect sizes, the Stable and Protective subscales produced moderate effect sizes, and the Responsivity, original SDAC-21 total scores, and the revised factor scores demonstrated large effects.

Summary. The results demonstrated that offenders who incurred a misconduct had significantly higher Stable, Responsivity, and SDAC-21 total scores and lower Protective scores. They also had significantly higher mean scores on the revised Risk and Total scores. These findings were consistent across all four outcomes. Although the pattern of effect sizes increased in magnitude from the less serious misconducts to the more serious misconducts (i.e., management and predatory), the base rates decreased as the seriousness increased, particularly with predatory misconducts. Due to the low prevalence rates for predatory misconducts, the results for this outcome need to be considered cautiously. Overall, these findings provide support for Hypothesis 3.

Table 10

Between-Offender Analysis: Management and Predatory Misconducts

Variable	Misconduct *M (SD)*	No-misconduct *M (SD)*	*t*	*df*	*d*
			Management		
IVVI-Violence	6.53 (2.95)	5.60 (2.79)	6.89***	4124	.36
IVVI-Victimization	7.09 (3.21)	6.11(3.08)	6.52***	4124	.32
Original SDAC-21					
Stable	8.87 (2.59)	7.42 (2.77)	10.98***	4215	.54
Responsivity	6.87 (2.98)	4.93 (2.82)	14.34***	4215	.66
Protective T	5.03 (2.90)	6.11 (2.96)	-7.60***	4215	.36
Total	10.71 (6.73)	6.24 (6.81)	13.72***	4215	.66
Revised SDAC-21					
Risk Total	12.28 (4.07)	9.43 (4.19)	14.25***	4215	.70
Revised Total	7.24 (5.96)	3.32 (6.09)	13.49***	4215	.66
			Predatory		
IVVI-Violence	7.06 (3.19)	5.66 (2.79)	6.17***	4124	.47
IVVI-Victimization	7.47 (3.47)	6.18 (3.08)	5.13***	4124	.40
Original SDAC-21					
Stable Total	9.40 (2.54)	7.52 (2.78)	8.45***	4215	.70
Responsivity Total	7.69 (2.66)	5.05 (2.87)	11.46***	4215	.95
Protective Total	4.58 (2.98)	6.04 (2.96)	-6.14***	4215	.51
Total	12.51 (6.44)	6.54 (6.87)	10.84***	4215	.91
Revised SDAC-21					
Risk Total	13.26 (3.82)	9.62 (4.23)	10.74***	4215	.91
Revised Total	8.68 (5.79)	3.59 (6.14)	10.36***	4215	.91

Note. * $p < .05$; ** $p < .01$; *** $p < .001$

Part 4. Predictive Validity

Hypothesis 4a. Institutional misconducts will be accurately predicted from Stable, Responsivity and total scores.

Hypothesis 4b. Offenders with no institutional misconducts will be accurately predicted from Protective Scores.

Predictive Accuracy. AUC analyses were conducted to examine whether the SDAC-21 subscales and total scores, static risk scores (i.e., IVVI violence and IVVI victimization) and the Risk and Revised total scores could discriminate between those who incurred a misconduct (status = 1) and those who did not (status = 0).[8] The results for non-compliance and any misconducts are displayed in Table 11 and the results for management and predatory are shown in Table 12. The results demonstrated that the IVVI risk measures and the SDAC-21 subscales and total scores as well as the factor scores significantly predicted non-compliance and any misconducts; however, with varying degrees of accuracy. The IVVI risk measures and the Stable and Protective subscales consistently revealed small effects for non-compliance (AUC values ranging from .57 to .62) and small effects for any misconducts (AUC values ranging from .58 to .62). Conversely, the Responsivity subscale, SDAC-21 total score and the revised factor scores produced medium effect sizes for both outcomes.

The absence of overlap in confidence intervals between some of the variables, particularly between the variables demonstrating small and medium effects, indicated potential differences in predictive accuracy for both outcomes. To test the extent to which the different scales differed in their level of discrimination, differences between AUC's were analyzed using bootstrapping methods and the Delong method for computing the standard error of the difference

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[8] This was done separately for any misconduct, non-compliance, management and predatory outcomes.

(Delong, Delong & Clarke-Pearson, 1998).[9] The Delong test found that the SDAC-21 total score, the Responsivity subscale, and the revised factor scores had greater discrimination in predicting any misconduct and non-compliance compared to the IVVI risk measures and the Stable and Protective subscales. Results of the Delong and bootstrapping tests are displayed in Appendix E, Tables E1 and E2.

[9] Using the Delong method for comparing ROC curves with scales with different directions (e.g., protective and risk subscales) was not supported in R. Instead, bootstrapping methods were used when comparing the Protective subscales with the risk subscales. Pairwise comparisons between variables with identical AUC values were not conducted.

Table 11

Predictive Accuracy: Non-compliance and Any Misconducts

		Asymptotic 95% CI		
Variable	AUC	SE	Lower	Upper
		Non-Compliance		
IVVI-Violence	.58	.01	.56	.61
IVVI-Victimization	.57	.01	.55	.60
SDAC-21 Subscales				
Stable	.62	.01	.60	.64
Responsivity	.66	.01	.64	.68
Protective	.60	.01	.58	.62
Total	.66	.01	.64	.68
SDAC-21 Factors				
Risk Total	.66	.01	.64	.68
Revised Total	.66	.01	.64	.68
		.		
		Any Misconduct		
IVVI-Violence	.59	.01	.57	.61
IVVI-Victimization	.58	.01	.55	.60
SDAC-21 Subscales				
Stable	.62	.01	.60	.64
Responsivity	.66	.01	.64	.68
Protective	.59	.01	.57	.62
Total	.66	.01	.64	.78
SDAC-21 Factors				
Risk Total	.66	.01	.64	.68
Revised Total	.66	.01	.64	.68

Note. AUC = area under the curve; SE = standard error; CI = confidence interval. All predictive accuracy statistics significant at $p < .001$.

With respect to management misconducts, the results demonstrated that all of the variables significantly predicted this outcome; although, the IVVI risk measures and the Protective subscale produced small effect sizes (AUC values ranging from .59 to .60) and the Stable subscale, SDAC-21 total score and the revised factor scores produced medium effect sizes (AUC values ranging from .65 to .69). Effect sizes for predatory misconducts ranged from small to large, with the SDAC-21 total score, Responsivity subscale and the revised factor scores demonstrating the best predictive accuracy. Comparisons of the AUC values using the Delong method and bootstrapping method confirmed these differences, where the SDAC-21 total score, Responsivity subscale and the revised factor scores showed greater discrimination in predicting management and predatory misconducts compared to the IVVI risk measures, the Stable and Protective subscales. Results of the Delong and bootstrapping tests in Appendix E, Tables E3 and E4.

However, it is important to make note of the confidence intervals for this outcome, as the wide intervals suggest less precision in prediction across the different variables. Although AUC's are considered largely unaffected by base rates, the prevalence rate of predatory misconducts is markedly lower compared to any, non-compliance and management misconducts. It appears that as the base rates decrease, the confidence intervals become wider, resulting in less precision and stability across outcomes.

AUC analyses were also conducted at the item for the SDAC-21 for each of the outcomes (see Appendix F Tables F1 to F4). AUCs ranged from .51 to .69 for non-compliance, .52 to .69 for any misconducts, .52 to .71 for management misconducts, and .50 to .74 for predatory misconducts. For each of the outcomes, the substance abuse item failed to reach statistical significance. The health problems item was only significantly related to predatory misconducts.

Summary. In support of Hypothesis 4a, results from the AUC analyses showed that institutional misconducts were accurately predicted from the Stable, Responsivity, and SDAC-21 total scores as well as from the IVVI risk measures and revised Risk and Total Factor scores. In addition, the SDAC-21 total score, Responsivity subscale and the revised factor scores demonstrated greater discrimination in predicting all four outcomes compared to the IVVI risk measures and the Stable and Protective domains. Lastly, offenders with no institution misconducts were accurately predicted from the Protective scores, which provided support for Hypothesis 4b.

Table 12

Predictive Accuracy: Management and Predatory Misconducts

			Asymptotic 95% CI	
Variable	AUC	SE	Lower	Upper
			Management	
IVVI-Violence	.60	.01	.57	.62
IVVI-Victimization	.59	.01	.56	.62
SDAC-21 Subscales				
Stable	.65	.01	.62	.67
Responsivity	.68	.01	.66	.71
Protective	.60	.01	.58	.63
Total	.68	.01	.66	.70
SDAC-21 Factors				
Risk Total	.69	.01	.66	.71
Revised Total	.68	.01	.65	.70
			Predatory	
IVVI-Violence	.63	.02	.58	.67
IVVI-Victimization	.61	.02	.56	.65
SDAC-21 Subscales				
Stable	.69	.02	.65	.73
Responsivity	.75	.02	.72	.79
Protective	.64	.02	.60	.69
Total	.74	.02	.70	.78
SDAC-21 Factors				
Risk Total	.74	.02	.70	.78
Revised Total	.73	.02	.69	.77

Note. AUC = area under the curve; SE = standard error; CI = confidence interval. All predictive accuracy statistics significant at $p < .001$.

Hypothesis 5. The SDAC-21 subscales and total scores will incrementally predict misconducts over and above static risk.

Incremental validity. A series of Cox regression analyses were conducted at both the univariate and multivariate level to examine the association between static and dynamic variables and misconducts while accounting for the time until the event. More specifically, analyses were conducted at the univariate level to determine which variables were related to survival time. Those variables that were individually related to survival time were entered into a series of hierarchal cox regression survival analyses to examine the incremental validity of the dynamic variables over and above static risk. When examining predictive validity in applied risk assessment, demonstrating incremental validity is important as this form of validity is concerned with determining whether a measure can add to the prediction of an outcome over and above what can be predicted by other sources (Babchishin, Hanson, & Helmus, 2011).

Harrell's *c* statistics (Harrell, Califf, Pryor, Lee, & Rosati, 1982) were also computed for each of the survival models, both at the univariate and multivariate level of analyses. The Harrell's *c* index is an overall effect size of the Cox regression model, which has the advantage of allowing for varying follow-up time. The Harrell's *c* index is similar to AUCs where it estimates the probability that of two randomly chosen offenders, the one with the higher risk score will reoffend before the other (Helmus & Babchishin, 2017). Similar interpretations of effect size magnitude as AUC statistic can be applied (e.g., effects of .56, .64, and .71 would be considered small, moderate, and large, respectively; Helmus & Babchishin, 2017; Rice & Harris, 2005).

Univariate Results. As seen in Table 13, the IVVI risk measures, SDAC-21 subscales and total scores, as well as the revised Risk and Total scores all significantly predicted time until

non-compliance. More specifically, these variables demonstrated that for each one-point increase in risk scores, the likelihood of a non-compliance misconduct also increased. For instance, for each one-point increase in the SDAC-21 total score, the risk of a non-compliance misconduct increased by 6%. In contrast, the likelihood of incurring a non-compliance was decreased by approximately 10% with every one-point increase in Protective scores. The Harrell's *c* index showed there were differences in the magnitude of the effect sizes between the variables. For example, the IVVI risk measures, and the Stable and Protective subscales resulted in small effect sizes, whereas the Responsivity, SDAC-21 total scores and the revised factor scores demonstrated a medium effect.

Table 13

Cox Regression Survival Analysis Predicting Non-Compliance Misconducts: Univariate Analyses

				95% CI for *Exp(B)*		
Variables	*B(SE)*	*Wald*	*Exp(B)*	Lower Bound	Upper Bound	*C (SE)*
IVVI-Violence	.08 (.01)	41.96	1.08**	1.05	1.10	.57 (.01)
IVVI-Victimization	.06 (.01)	33.84	1.06	1.04	1.09	.56 (.01)
SDAC-21 Subscales						
Stable	.14 (.01)	123.22	1.15***	1.12	1.18	.61 (.01)
Responsivity	.16 (.01)	203.11	1.17***	1.15	1.20	.65 (.01)
Protective	-.11(.01)	80.73	.90**	.88	.92	.59 (.01)
Total	.11 (.01)	206.14	1.07***	1.06	1.08	.64 (.01)
SDAC-21 Factors						.
Risk Factor	.12 (.01)	214.72	1.13***	1.11	1.14	.65 (.01)
Revised Total	.08 (.01)	210.67	1.06***	1.07	1.10	.64 (.01)

Note. CI = confidence interval; SE = standard error; Exp(B) = hazard ratio; C = Harrell's *c*.
* $p < .05$; ** $p < .01$; *** $p < .001$.

The results for the prediction of any misconducts are displayed in Table 14, which also showed that the IVVI risk measures and the SDAC-21 (excluding the Protective domain) and the revised factor scores significantly predicted time until any misconduct, where an increase in scores yielded an increase in the likelihood of a misconduct. In addition, the likelihood of incurring any misconduct was decreased by approximately 10% with every one-point increase in Protective scores. The effect sizes for the predictors also ranged from small (i.e., IVVI risk, Stable and Protective subscales) to medium (i.e., Responsivity subscale, SDAC-21 total score and the revised factor scores).

Table 14

Cox Regression Survival Analysis Predicting Any Misconducts: Univariate Analyses

				95% CI for *Exp(B)*		
Variables	*B(SE)*	*Wald*	*Exp(B)*	Lower Bound	Upper Bound	*C(SE)*
IVVI-Violence	.08 (.01)	44.29	1.08**	1.05	1.10	.57 (.01)
IVVI-Victimization	.06 (.01)	35.24	1.06**	1.04	1.08	.56 (.01)
SDAC-21 Subscales						
Stable	.14 (.01)	122.85	1.15***	1.12	1.17	.61 (.01)
Responsivity	.15 (.01)	200.94	1.17***	1.14	1.19	.64 (.01)
Protective	-.11(.01)	82.71	.90**	.88	.92	.59 (.01)
Total	.07 (.01)	207.04	1.07***	1.06	1.08	.64 (.01)
SDAC-21 Factors						
Risk Factor	.12 (.02)	210.85	1.12***	1.10	1.14	.64 (.01)
Revised Total	.08 (.01)	209.89	1.08***	1.07	1.10	.64 (.01)

Note. CI = confidence interval; SE = standard error; Exp(B) = hazard ratio; C = Harrell's *c*.
* $p < .05$; ** $p < .01$; *** $p < .001$.

The results for management misconducts (see Table 15) demonstrated a similar pattern of results as the earlier outcomes, where there was an elevated risk of a management misconduct for every one-point increase in the risk scores. Moreover, for each one-point increase in Protective scores, the risk of a misconduct decreased by approximately 12%. The effect sizes also ranged from small to medium; however, the Stable subscale yielded a medium effect, compared to a small effect with the previous outcomes.

Table 15

Cox Regression Survival Analysis Predicting Management Misconducts: Univariate Analyses

				95% CI for *Exp(B)*		
Variables	*B(SE)*	*Wald*	*Exp(B)*	Lower Bound	Upper Bound	*C (SE)*
IVVI-Violence	.10 (.02)	43.45	1.10**	1.07	1.14	.58 (.01)
IVVI-Victimization	.12 (.01)	25.99	1.13**	1.08	1.89	.57 (.01)
SDAC-21 Subscales						
Stable	.18 (.02)	114.08	1.20***	1.16	1.24	.64 (.01)
Responsivity	.18 (.02)	159.12	1.20***	1.17	1.24	.66 (.01)
Protective	-.13(.02)	61.72	.88**	.86	.91	.60 (.01)
Total	.09 (.01)	217.07	1.09***	1.09	1.10	.66 (.01)
SDAC-21 Factors						.
Risk Factor	.14 (.01)	173.53	1.15***	1.13	1.18	.65 (.01)
Revised Total	.10 (.02)	168.92	1.10***	1.08	1.12	.67 (.01)

Note. CI = confidence interval; SE = standard error; Exp(B) = hazard ratio; C = Harrell's *c*.
* $p < .05$; ** $p < .01$; *** $p < .001$.

Lastly, results for predatory misconducts are displayed in Table 16. All of the variables significantly predicted predatory misconducts, where higher scores on the risk variables increased the likelihood of misconducts and higher scores on the Protective domain resulted in a decrease in risk by approximately 17%. There were varying degrees in effect sizes, with IVVI risk measures demonstrating a small effect, the Stable and Protective subscales producing medium effects, and the Responsivity subscale, SDAC-21 total scores and the factor scores all producing large effect sizes.

Table 16

Cox Regression Survival Analysis Predicting Predatory Misconducts: Univariate Analyses

				95% CI for *Exp(B)*		
Variables	*B(SE)*	*Wald*	*Exp(B)*	Lower Bound	Upper Bound	*C(SE)*
IVVI-Violence	.15 (.03)	36.53	1.12**	1.11	1.23	.62 (.02)
IVVI-Victimization	.15 (.03)	36.53	1.12**	1.11	1.23	.60 (.02)
SDAC-21 Subscales						
Stable	.26 (.03)	70.40	1.29***	1.22	1.37	.68 (.02)
Responsivity	.26 (.03)	70.40	1.30***	1.24	1.37	.75 (.02)
Protective	-.18 (.03)	40.61	.83**	.79	.88	.64 (.02)
Total	.12 (.01)	110.66	1.13***	1.10	1.15	.73 (.02)
SDAC-21 Factors						
Risk Factor	.20 (.02)	102.29	1.22***	1.17	1.26	.73 (.02)
Revised Total	.14 (.01)	103.11	1.14***	1.12	1.17	.72 (.02)

Note. CI = confidence interval; SE = standard error; Exp(B) = hazard ratio; C = Harrell's *c*.
* $p < .05$; ** $p < .01$; *** $p < .001$.

Multivariate Results. Since all of the variables significantly predicted each of the outcomes, they were retained to assess the incremental validity of the static risk measures and the SDAC-21 subscales and total scores. Only the results for the original SDAC-21 are presented in the following tables as the pattern of findings based on the revised Risk and Total score were similar (see Appendix G for the multivariate results for the revised factor scores). To examine the incremental validity of the dynamic variables over and above static risk, a series of hierarchal Cox regression analyses were computed for each outcome. In each of the models, the static risk measures (i.e., IVVI risk scores) were entered separately in the first block, with each dynamic variable entered in the second block to determine if the SDAC-21 subscales and total scores contributed unique variance in the outcome while controlling for static risk. For instance, as displayed in Table 17, the first model examined the incremental contribution of the IVVI-

violence and the Stable subscale score in predicting non-compliance misconducts. In a final model (Model 5), the IVVI-violence was entered in the first block, with each of the SDAC-21 domains entered together in the second block. This was repeated for examining the incremental validity between the IVVI-victimization measure and the SDAC-21 subscales and total scores. Of note, only the second block of the hierarchal analyses are presented in the following tables. Lastly, Harrell's *c* was computed for each model across each outcome.

For non-compliance misconducts (see Table 17 and Models 1-4), the IVVI-violence and the SDAC-21 subscales and total scores emerged as significant predictors, with each adding incrementally to one another. For instance, when the IVVI-violence and the SDAC-21 total score were entered together (see Model 4), the results demonstrated that for each one-point increase on the SDAC-21 total score, the risk of a non-compliance misconduct increased by 7%, after controlling for the IVVI-violence score. Similarly, for each one-point increase in IVVI-violence scores, the risk of a non-compliance misconduct increased by 4%, after controlling for the SDAC-21 total score. When all the predictors were entered in the same block (see Model 5), only the Stable subscale failed to reach statistical significance, despite demonstrating incremental validity in Model 1. The same pattern of results were found when examining the IVVI-victimization and the SDAC-subscales and total score (see Models 6-10). Again, when all the variables were entered in the same block (see Model 10), the Stable subscale did not emerge as a significant predictor. The Harrell's *c* statistic for each of the models varied from small effects (Models 1, 3, 6, and 8) to medium effects (Models 2, 4, 5, 7, 9, and 10).

Table 17

Cox Regression Survival Analysis Predicting Non-compliance Misconducts: Multivariate Analyses

					95% CI for *Exp(B)*		
Model	Covariates	*B (SE)*	*Wald*	*Exp(B)*	Lower Bound	Upper Bound	*C(SE)*
1	IVVI-Violence	.05 (.01)	15.20	1.05***	1.02	1.07	.62 (.01)
	Stable Risk	.13 (.01)	94.92	1.14***	1.11	1.17	
2	IVVI-Violence	.05 (.01)	19.41	1.05***	1.02	1.08	.65 (.01)
	Responsivity Factors	.15 (.01)	176.63	1.16***	1.14	1.19	
3	IVVI-Violence	.06 (.01)	30.22	1.07***	1.04	1.09	.60 (.01)
	Protective Factors	-.10 (.01)	67.35	.91***	.88	.93	
4	IVVI-Violence	.04 (.01)	12.81	1.04***	1.02	1.07	.65 (.01)
	Total Score	.07 (.01)	172.93	1.07***	1.06	1.08	
5	IVVI-Violence	.04 (.01)	13.98	1.05***	1.02	1.07	.65 (.01)
	Stable Risk	.03 (.02)	3.86	1.03[ns]	1.00	1.07	
	Responsivity Factors	.12 (.01)	70.72	1.13***	1.20	1.16	
	Protective Factors	-.04 (.01)	9.74	.96**	.94	.99	
6	IVVI-Victimization	.04 (.01)	10.66	1.04**	1.01	1.06	.61 (.01)
	Stable Risk	.13 (.01)	98.19	1.14***	1.10	1.17	
7	IVVI-Victimization	.04 (.01)	13.90	1.04***	1.02	1.06	.65 (.01)
	Responsivity Factors	.15 (.01)	178.92	1.16***	1.14	1.19	
8	IVVI-Victimization	.05 (.01)	22.69	1.05***	1.03	1.07	.60 (.01)
	Protective Factors	-.10 (.01)	67.84	.90***	.88	.93	
9	IVVI-Victimization	.03 (.01)	8.25	1.03**	1.01	1.05	.65 (.01)
	Total Score	.07 (.01)	176.22	1.07***	1.06	1.08	
10	IVVI-Victimization	.03 (.01)	9.16	1.03**	1.01	1.06	.65 (.01)
	Stable Risk	.04 (.02)	4.43	1.04*	1.00	1.07	
	Responsivity Factors	.12 (.01)	70.70	1.13***	1.10	1.16	
	Protective Factors	-.04 (.01)	9.58	.96**	.94	.99	

Note. CI = confidence interval; SE = standard error; Exp(B) = hazard ratio; C = Harrell's *c*.
[ns]Nonsignificant. * $p < .05$; ** $p < .01$; *** $p < .001$.

Table 18 displays the results for any misconducts. As can be seen, these results are almost identical to those for non-compliance. More specifically, both the static risk measures and the SDAC-21 subscales and total scores emerged as significant predictors, with each adding incrementally to one another. However, when all the variables were entered in the same block (see Models 5), the Stable subscale was not significant. Based on the Harrells *c* index, effect sizes varied from small (Models 1, 3, 6, and 8) to medium (Models 2, 4, 5, 7, 9, and 10).

When examining management outcomes (see Table 19), the pattern of results were similar to the previous outcomes, where each of the variables added incrementally to each other; however, when the Stable subscale was entered in Model 5 and 10, it still emerged as a significant predictor. With the exception of Model 3 and 8, which yielded small effect sizes, the rest of the models demonstrated medium effects.

Lastly, the Predatory misconducts are displayed in Table 20. Again, each of the variables added incrementally to each other. However, when the variables were entered in Model 5 and 10, both the Stable and Protective subscales failed to reach statistical significance. The Harrell's *c* statistics for each of the models varied between medium effects (Models 1, 3, 6, and 8) and large effects (Models 2, 4, 5, 7, 9, and 10). Similar to the other analyses, results for Predatory misconducts need to be considered cautiously as the base rate was quite low.

Table 18

Cox Regression Survival Analysis Predicting Any Misconducts: Multivariate Analyses

					95% CI for *Exp(B)*		
Model	Covariates	*B (SE)*	*Wald*	*Exp(B)*	Lower Bound	Upper Bound	*C(SE)*
1	IVVI-Violence	.05 (.01)	16.57	1.05***	1.02	1.07	.61 (.01)
	Stable Risk	.12 (.01)	93.65	1.14***	1.11	1.17	
2	IVVI-Violence	.05 (.01)	21.08	1.05***	1.03	1.08	.65 (.01)
	Responsivity Factors	.15 (.01)	174.98	1.16***	1.13	1.18	
3	IVVI-Violence	.06 (.01)	31.99	1.07***	1.04	1.09	.60 (.01)
	Protective Factors	-.10 (.01)	68.36	.91***	.87	.93	
4	IVVI-Violence	.04 (.01)	13.87	1.04***	1.04	1.07	.64 (.01)
	Total Score	.07 (.01)	172.81	1.07***	1.06	1.08	
5	IVVI-Violence	.05 (.01)	15.24	1.05***	1.02	1.07	.65 (.01)
	Stable Risk	.03 (.02)	3.68	1.03[ns]	1.00	1.06	
	Responsivity Factors	.12 (.01)	70.61	1.12***	1.09	1.15	
	Protective Factors	-.04 (.01)	10.83	.96**	.94	.98	
6	IVVI-Victimization	.04 (.01)	11.40	1.04**	1.02	1.06	.62 (.01)
	Stable Risk	.13 (.01)	97.18	1.13***	1.11	1.16	
7	IVVI-Victimization	.04 (.01)	14.82	1.04***	1.02	1.06	.65 (.01)
	Responsivity Factors	.15 (.01)	177.45	1.16***	1.13	1.19	
8	IVVI-Victimization	.05 (.01)	23.65	1.05***	1.03	1.07	.60 (.01)
	Protective Factors	-.10 (.01)	68.95	.91***	.89	.93	
9	IVVI-Victimization	.03 (.01)	8.72	1.03**	1.01	1.05	.64 (.01)
	Total Score	.07 (.01)	176.39	1.07***	1.06	1.08	
10	IVVI-Victimization	.03 (.01)	9.75	1.03**	1.01	1.06	.65 (.01)
	Stable Risk	.03 (.02)	4.31	1.03*	1.00	1.07	
	Responsivity Factors	.12 (.01)	70.55	1.12***	1.09	1.15	
	Protective Factors	-.04 (.01)	10.67	.96**	.94	.98	

Note. CI = confidence interval; SE = standard error; Exp(B) = hazard ratio; C = Harrell's *c*.
[ns]Nonsignificant. * $p < .05$; ** $p < .01$; *** $p < .001$.

Table 19

Cox Regression Survival Analysis Predicting Management Misconducts: Multivariate Analyses

					95% CI for *Exp(B)*		
Model	Covariates	*B (SE)*	*Wald*	*Exp(B)*	Lower Bound	Upper Bound	*C (SE)*
1	IVVI-Violence	.06 (.02)	16.69	1.07***	1.03	1.10	.64 (.01)
	Stable Risk	.16 (.02)	85.18	1.18***	1.14	1.22	
2	IVVI-Violence	.07 (.02)	23.31	1.08***	1.04	1.11	.67 (.01)
	Responsivity Factors	.17 (.02)	122.95	1.19***	1.16	1.23	
3	IVVI-Violence	.09 (.02)	32.96	1.09***	1.06	1.12	.63 (.01)
	Protective Factors	-.12 (.02)	51.23	.89***	.86	.92	
4	IVVI-Violence	.06 (.02)	15.82	1.06***	1.03	1.09	.67 (.01)
	Total Score	.08 (.01)	138.76	1.08***	1.07	1.10	
5	IVVI-Violence	.06 (.02)	16.01	1.06***	1.03	1.10	.68 (.01)
	Stable Risk	.06 (.02)	7.24	1.06**	1.02	1.10	
	Responsivity Factors	.13 (.02)	46.57	1.14***	1.10	1.18	
	Protective Factors	-.05 (.02)	6.56	.96*	.92	.99	
6	IVVI-Victimization	.05 (.01)	14.19	1.06***	1.03	1.08	.64 (.01)
	Stable Risk	.16 (.02)	86.93	1.18***	1.14	1.22	
7	IVVI-Victimization	.06 (.01)	19.94	1.06***	1.04	1.09	.67 (.01)
	Responsivity Factors	.17 (.02)	134.78	1.19***	1.16	1.23	
8	IVVI-Victimization	.07 (.01)	28.08	1.08***	1.05	1.11	.62 (.01)
	Protective Factors	-.12 (.02)	50.78	.89***	.86	.92	
9	IVVI-Victimization	.05 (.01)	12.71	1.05***	1.02	1.08	.67 (.01)
	Total Score	.08 (.01)	139.92	1.08***	1.07	1.10	
10	IVVI-Victimization	.05 (.01)	12.98	1.05***	1.02	1.08	.68 (.01)
	Stable Risk	.06 (.02)	7.73	1.06**	1.02	1.11	
	Responsivity Factors	.13 (.02)	46.48	1.14***	1.10	1.18	
	Protective Factors	-.04 (.02)	6.32	.96*	.93	.99	

Note. CI = confidence interval; SE = standard error; Exp(B) = hazard ratio; C = Harrell's *c*.
* $p < .05$; ** $p < .01$; *** $p < .001$.

Table 20

Cox Regression Survival Analysis Predicting Predatory Misconducts: Multivariate Analyses

					95% CI for *Exp(B)*		
Model	Covariates	*B (SE)*	*Wald*	*Exp(B)*	Lower Bound	Upper Bound	*C (SE)*
1	IVVI-Violence	.10 (.03)	15.78	1.11***	1.05	1.17	.70 (.02)
	Stable Risk	.23 (.03)	51.80	1.23***	1.18	1.34	
2	IVVI-Violence	.12 (.03)	21.39	1.13***	1.07	1.18	.76 (.02)
	Responsivity Factors	.26 (.03)	95.98	1.30***	1.23	1.37	
3	IVVI-Violence	.14 (.03)	29.49	1.15***	1.09	1.21	.68 (.02)
	Protective Factors	-.17 (.03)	33.37	.85***	.80	.90	
4	IVVI-Violence	.10 (.03)	15.79	1.11***	1.05	1.17	.74 (.02)
	Total Score	.12 (.01)	92.08	1.12***	1.10	1.15	
5	IVVI-Violence	.11 (.03)	16.53	1.11***	1.06	1.17	.76 (.02)
	Stable Risk	.06 (.04)	2.34	1.06^{ns}	.98	1.15	
	Responsivity Factors	.21 (.03)	38.50	1.23***	1.15	1.31	
	Protective Factors	-.06 (.03)	3.64	.94^{ns}	.89	1.00	
6	IVVI-Victimization	.08 (.02)	9.64	1.08**	1.03	1.13	.69 (.02)
	Stable Risk	.24 (.03)	55.54	1.27***	1.19	1.34	
7	IVVI-Victimization	.09 (.02)	13.53	1.09***	1.04	1.14	.75 (.02)
	Responsivity Factors	.26 (.03)	98.31	1.30***	1.23	1.37	
8	IVVI-Victimization	.11 (.02)	19.68	1.11***	1.06	1.16	.67 (.02)
	Protective Factors	-.17 (.03)	33.90	.84***	.80	.89	
9	IVVI-Victimization	.07 (.02)	9.23	1.08**	1.03	1.13	.74 (.02)
	Total Score	.12 (.01)	95.50	1.12***	1.10	1.15	
10	IVVI-Victimization	.08 (.02)	9.65	1.08**	1.03	1.13	.75 (.02)
	Stable Risk	.07 (.04)	3.06	1.07^{ns}	.99	1.16	
	Responsivity Factors	.21 (.03)	38.09	1.23***	1.15	1.31	
	Protective Factors	-.06 (.03)	3.53	.94^{ns}	.89	1.00	

Note. CI = confidence interval; SE = standard error; Exp(B) = hazard ratio; C = Harrell's *c*.
^{ns}Nonsignificant. * $p < .05$; ** $p < .01$; *** $p < .001$.

Summary. Results from the Cox Regression Survival analyses revealed that the IVVI risk measures, the original SDAC-21 subscales and total scores and the revised factor scores significantly predicted all four outcomes at the univariate level. In particular, for each one-point increase in risk scores, the likelihood of misconducts also increased, whereas there likelihood of misconducts decreased with an increase in protective scores. Results from the multivariate analyses showed that the original SDAC-21 and revised Risk and Total scores all incrementally predicted misconducts over and above the static risk measures. Overall, these demonstrated support for Hypothesis 5.

Hypothesis 6. Due to the conflicting results in the empirical literature (i.e., whether protective factors interact with risk or whether they have an effect independent of risk), this hypothesis remained exploratory.

Moderated cox regression survival analysis. A series of Cox regression survival analyses were conducted to determine if the SDAC-21 Protective domain moderated the relationship between static risk and misconducts. More specifically, these analyses were undertaken to determine if higher scores on the Protective domain would buffer the impact of risk on misconducts. To test the independent effects of risk and protective factors (i.e. main effects) both factors were entered simultaneously in the first block, while the interaction term of Total Risk x Total Protective score was entered in the second block. This was repeated for both the IVVI-violence and IVVI- victimization and each of the outcomes.

As Tables 21-24 illustrates, when the main effects were entered in the first block, the IVVI-violence and IVVI-victimization and SDAC-21 Protective domain were significant. However, in the second block no significant interactions emerged between the Protective domain and overall static risk in predicting each of the outcomes. These results demonstrated that the

Protective subscale has a promotive effect (Jones et al., 2015). That is, the protective domain revealed independent effects regardless of static risk.

Table 21

Moderated Cox Regression: Non-compliance Misconducts

Variable	*B(SE)*	*Wald*	*Exp(B)*	95% CI for *Exp(B)* Lower Bound	95% CI for *Exp(B)* Upper Bound	*C (SE)*
Block 1						.60 (.01)
IVVI-Violence	.06 (.01)	30.22	1.07***	1.04	1.09	
Total Protective Score	-.10 (.01)	67.35	.91***	.88	.93	
Block 2						.60 (.01)
IVVI-Violence	.06 (.02)	7.19	1.07**	1.02	1.12	
Total Protective Score	-.10 (.03)	12.93	.91***	.86	.96	
Total Risk x Protective	.00 (.00)	.01	1.00^{ns}	.98	1.01	
Block 1						.60 (.01)
IVVI-Victimization	.05 (.01)	22.69	1.05***	1.03	1.07	
Total Protective Score	-.10 (.01)	67.84	.90***	.88	.93	
Block 2						.59 (.01)
IVVI-Victimization	.06 (.02)	7.19	1.07**	1.02	1.12	
Total Protective Score	-.10 (.03)	13.69	.91***	.86	.96	
Total Risk x Protective	.00 (.00)	.01	1.00^{ns}	.99	1.01	

Note. CI = confidence interval; SE = standard error; Exp(B) = hazard ratio; C = Harrell's *c*.
^{ns}Nonsignificant. * $p < .05$; ** $p < .01$; *** $p < .001$.

Table 22

Moderated Cox Regression: Any Misconducts

Variable	*B(SE)*	*Wald*	*Exp(B)*	95% CI for *Exp(B)* Lower Bound	95% CI for *Exp(B)* Upper Bound	*C (SE)*
Block 1						.60 (.01)
IVVI-Violence	.06 (.01)	31.99	1.07***	1.04	1.09	
Total Protective Score	-.10 (.01)	68.36	.91***	.87	.93	
Block 2						.60 (.01)
IVVI-Violence	.07 (.02)	8.83	1.07*	1.02	1.12	
Total Protective Score	-.09 (.03)	11.63	.91**	.87	.96	
Total Risk x Protective	-.00 (.00)	.08	.99^{ns}	.98	1.01	
Block 1						.60 (.01)
IVVI-Victimization	.05 (.01)	23.65	1.05***	1.03	1.07	
Total Protective Score	-.10 (.01)	68.95	.91***	.86	.93	
Block 2						.60 (.01)
IVVI-Victimization	.06 (.02)	6.92	1.06**	1.01	1.10	
Total Protective Score	-.09 (.03)	11.87	.91**	.87	.96	
Total Risk x Protective	-.00 (.00)	.08	.99^{ns}	.98	1.01	

Note. CI = confidence interval; SE = standard error; Exp(B) = hazard ratio; C = Harrell's *c*.
^{ns}Nonsignificant. * $p < .05$; ** $p < .01$; *** $p < .001$.

Table 23

Moderated Cox Regression: Management Misconducts

Variable	*B(SE)*	*Wald*	*Exp(B)*	95% CI for *Exp(B)* Lower Bound	95% CI for *Exp(B)* Upper Bound	*C (SE)*
Block 1						.63 (.01)
IVVI-Violence	.09 (.02)	32.96	1.09***	1.06	1.12	
Total Protective Score	-.12 (.02)	52.23	.89***	.86	.92	
Block 2						.63 (.01)
IVVI-Violence	.10 (.03)	10.23	1.10**	1.04	1.17	
Total Protective Score	-.10 (.04)	7.32	.90*	.84	.97	
Total Risk x Protective	-.00 (.01)	.21	.99^{ns}	.98	1.01	
Block 1						.62 (.01)
IVVI-Victimization	.07 (.01)	28.08	1.08***	1.05	1.11	
Total Protective Score	-.12 (.02)	50.78	.89***	.86	.92	
Block 2						.62 (.01)
IVVI-Victimization	.09 (.03)	9.28	1.09**	1.03	1.15	
Total Protective Score	-.10 (.04)	7.26	.91**	.84	.97	
Total Risk x Protective	-.00 (.01)	.23	.99^{ns}	.98	1.01	

Note. CI = confidence interval; SE = standard error; Exp(B) = hazard ratio; C = Harrell's *c*.
^{ns}Nonsignificant. * $p < .05$; ** $p < .01$; *** $p < .001$.

Table 24

Moderated Cox Regression: Predatory Misconducts

Variable	*B(SE)*	*Wald*	*Exp(B)*	95% CI for *Exp(B)* Lower Bound	Upper Bound	*C (SE)*
Block 1						.68 (.02)
IVVI-Violence	.14 (.03)	29.49	1.15***	1.09	1.21	
Total Protective Score	-.17 (.03)	33.37	.85***	.80	.90	
Block 2						.68 (.02)
IVVI-Violence	.18 (.05)	13.51	1.20**	1.09	1.32	
Total Protective Score	-.11 (.07)	2.49	.90 [ns]	.79	1.03	
Total Risk x Protective	-.01 (.01)	.98	.99[ns]	.97	1.01	
Block 1						.67 (.02)
IVVI-Victimization	.11 (.02)	19.68	1.11***	1.06	1.16	
Total Protective Score	-.17 (.03)	33.90	.84***	.80	.89	
Block 2						.67 (.02)
IVVI-Victimization	.15 (.05)	10.27	1.16**	1.06	1.26	
Total Protective Score	-.11(.07)	2.62	.90 [ns]	.79	1.02	
Total Risk x Protective	-.01 (.01)	1.08	.99[ns]	.98	1.01	

Note. CI = confidence interval; SE = standard error; Exp(B) = hazard ratio; C = Harrell's *c*.
[ns]Nonsignificant. * $p < .05$; ** $p < .01$; *** $p < .001$.

Discussion

This study was the first empirical examination of the SDAC-21. Despite being fully implemented in the Iowa Department of Corrections, the psychometric properties and predictive accuracy have yet been fully evaluated. First, this study explored the psychometric properties of the SDAC-21, which included inter-rater reliability and internal consistency. In addition, the factor structure was examined by conducting an Exploratory Factor Analysis and then testing the stability of the model by conducting a Confirmatory Factor Analysis. Lastly, the predictive accuracy of the original SDAC-21 and the two-factor model generated from the factor analysis was also examined. Using the IVVI-violence and IVVI-victimization as measures of static risk, this study more specifically tested whether there were meaningful differences among static and dynamic risk assessment instruments in their level of predictive accuracy for institutional misconducts. Relatedly, the incremental contribution of the dynamic measures in predicting institutional misconducts was evaluated. Lastly, an exploration of the relationship between risk and protective factors in relation to institutional misconducts was also undertaken.

Summary of Findings

Inter-rater reliability. A strength of this project was the ability to assess inter-rater reliability, which is often not evaluated on risk assessment tools used in correctional practice. For example, in a recent review of 53 studies examining the performance of instruments designed to assess risk of recidivism in the United States, inter-rater was evaluated in only two of the studies (Desmarais Johnson, & Singh, 2016); although in both cases, the inter-rater was excellent. The results of this current study demonstrated that inter-rater ranged from fair to excellent for the Stable subscale, good to excellent for the Responsivity subscale and moderate to excellent for the Protective subscale. While overall, inter-rater was in the good range (based on the average ICC

across 20 assessments), an examination of the individual items showed that certain items demonstrated lower agreement. In particular, the substance abuse item yielded an ICC of .54, which falls within the fair range. Despite this, these results are encouraging and suggest that those case management officers that were trained on the SDAC-21 may have had a clear understanding of the conceptual underpinnings of the items (Lloyd, 2015). This is particularly promising with the Protective subscale as research in this area is still emerging, compared to the more established risk indicators. The SDAC-21 user manual appears sufficient, with training, to yield consistent assessments. It is important to note that because both raters were hearing the same responses from the offender (i.e., one coder interviewed the offender while the second coder listened to an audio recording of the interview); this might have contributed to an increase in reliability between the coders. More specifically, if the coders had each conducted their own interview, there may have been variability in how they asked the questions and the responses that were given.

Although the results demonstrated that they may have completed the SDAC-21 accurately, it is unclear how effectively they implemented intervention strategies in their case management practices. For instance, using a national survey of frontline community corrections staff, Miller and Maloney (2013) examined staff's compliance and noncompliance with risk/need tools. The authors found that about half of the subgroup completed the risk tools carefully and accurately and tended to use them for decision-making. However, the remaining subgroup of staff filled out the tools as intended but they often made decisions that did not correspond with the assessment results (i.e., they did not implement the results of the tool into their supervision practice). In addition, Chadwick (2014) found that the DRAOR Total and three domains

significantly predicted general recidivism for formally trained officers (AUCs ranged from .62 to .68), but not informally trained officers (AUCs ranged from .52 to .55).

Taken together, this demonstrates the importance of whether risk assessment tools are implemented with fidelity. That is, the quality of implementation is an important consideration of adopting risk/need tools. Some common challenges to implementation that have been identified include staff training on the use of the risk assessment tool, staff buy-in, and failure of staff to integrate risk assessment information in their decision-making (Bonta, Bogue, Crowley, & Motiuk, 2001; Latessa & Lovins, 2010; Vincent, Paiva-Salisbury, Cook, Guy, & Perrault, 2012). Therefore, it is possible to mitigate these barriers by ensuring quality training and providing refresher or "booster" sessions, taking into account staff concerns and resistance to change, and monitoring performance over-time (Vincent et al., 2012).

Multilevel modelling. An exploratory MLM was attempted to explore the nested structure of the data. However, the intra-class correlation, which represents the proportion of the total variability in the outcomes that is attributed to the institutions, demonstrated that only a small amount of variability in the outcomes was attributed to the institution. As such, the continuation of the model building process was not justified. Even if the grouping variable had accounted for more variance in the outcomes, the model building process would have been potentially limited as the data only included one institutional level variable-security level. Previous research that has examined institutional level variables included such factors as prison crowding, program involvement and type of programming, and staff-inmate ratios (French & Gendreau, 2006, Gendreau, et al., 1997). In their meta-analytic review, Gendreau and colleagues (1997) demonstrated that these institutional factors were one of the strongest predictors of misconducts. In addition, French and Gendreau (2006) demonstrate that institutional

misconducts were reduced by approximately 26% for those offenders who participated in programming. While the current study was unable to assess the aforementioned institutional level variables, this is an area that warrants further examination.

Relatedly, the SDAC-21 assessments in the dataset were also nested within staff administering the tool, but the SDAC-21 data were not grouped according to staff members. Similar to institutional level variables, nesting information is needed to separate the potential differential effects across case managers (Lloyd, 2015). As previously outlined, staff-level variables, such as training, buy-in, and the extent to which they integrate risk assessment information into their decision-making, can potentially have an impact estimates of the relationship between risk scores and outcomes. While individual-level variables are important in the prediction of misconducts, this level of analyses ignore the context of institutions in which they are placed.

Factor Analyses. An Exploratory Factor Analysis was first conducted to evaluate the factor structure of the SDAC-21. Results of this analysis suggested a two-factor model, with all of the original Protective items loading on one factor and a mix of Stable and Responsivity items loading on another. This second factor was specified as a *Risk* factor as the items that loaded on it could be conceptualized as risk items. Unexpectedly, the gang association item demonstrated low factor loadings and were subsequently dropped. Furthermore, the gang association item had low correlations with the other items. This was surprising as gang associations and antisocial peers are one of the strongest predictors of recidivism and prison misconducts (Andrews and Bonta, 2010; Cunningham & Sorensen, 2007; Gaes, et al., 2002; Gendreau et al., 1996; Pyrooz et al., 2016). It is important to note that the inter-rater reliability results for this item fell into the excellent range; therefore, lack of scoring accuracy likely did not contribute to these findings.

Further, the gang association item significantly predicted all four outcomes, although with varying degrees of accuracy (AUC values ranged from .55 to .63). Interestingly, Gaes and colleagues (2002) found that the level of institutional violence among gang members was affected by the degree of gang affiliation, where core members of gangs were more likely than affiliates of gangs to commit violent misconducts.

In addition, two of the Responsivity items, health problems and learning difficulties, failed to load onto either the Risk factor or the Protective factor. This may be that these two items are purely responsivity constructs, where they may provide additional information for case-management purposes as opposed to predicting misconducts.

The stability of the two-factor model was analyzed using Confirmatory Factor Analysis (CFA). In addition, a CFA was also conducted on the original SDAC-21 to provide a baseline of comparison with the two-factor model. Using various fit indices, both models demonstrated good fit to the observed data and acceptable psychometric properties.

Between-offender analyses. Comparisons between offenders who incurred a misconduct and those who did not on key indicators revealed significant differences. The results from the independent sample t-tests demonstrated that those offenders who incurred a misconduct had significantly higher mean scores on the IVVI risk measures, the original SDAC-21 Stable and Responsivity subscales and total scores as well as higher mean scores on the revised Risk and Total factors. In addition, they also had lower scores on the Protective subscale. These results were consistent for all four outcomes. The highest effect sizes, as measured by Cohen's *d*, were observed for offenders using the Predatory criterion to distinguish between the two groups. However, the base rates for this offending category were quite low and should be evaluated with caution.

Predictive accuracy. The predictive accuracy of the SDAC-21 was established using AUC analyses. More specifically, these analyses were conducted to examine whether the SDAC-21 subscales and total scores, static risk scores (i.e., IVVI violence and IVVI victimization) and the Risk and Revised total scores could discriminate between those who incurred a misconduct and those who did not. With respect to non-compliance and any misconducts, the IVVI risk measures, and the Stable Protective subscales demonstrated small effects (AUC values ranging from .57 to .62), while the Responsivity subscale, SDAC-21 total score and the revised Risk and Total scores produced medium effect sizes (AUC values of .66 for each) and provided greater discrimination in predicting any misconduct and non-compliance. The pattern of results for management misconducts were similar, although when examining this outcome, the Stable subscale yielded medium effects compared to small effects. Effect sizes for predatory misconducts ranged from small to large, with the SDAC-21 total score, Responsivity subscale and the revised factor scores demonstrating the best predictive accuracy (AUC values ranging from .77 to .79). However, the low base rates and large confidence intervals indicated less precision and stability in prediction across the different variables. At the item level, AUCs ranged from .50 to .74, depending on the outcome. The substance abuse item consistently failed to reach significance, while conduct issues demonstrated the highest AUCs across outcomes (AUC values ranged from .69 to .74).

Incremental validity. A series of hierarchal Cox regression analyses were conducted to determine if the SDAC-21 and revised Risk and total scores would predict misconducts over and above static risk. Harrell's *c* statistics were also computed for all the models. For each of the outcomes, the SDAC-21 (including the revised Risk and Total scores) incrementally predicted misconducts over and above static risk estimates. However, the Stable subscale consistently

failed to reach significance when it was included in an overall model with the other predictors. The Protective subscale did not emerge as a significant predictor when included in an overall model; however, this was only observed when examining predatory misconducts. Harrell's *c* statistics ranged in magnitude between small and large effect sizes, with the largest effects observed with predatory misconducts.

Moderated cox regression. The results of the moderation analyses demonstrated that the Protective scores did not appear to buffer the risk of misconducts. However, the Protective domain revealed independent effects irrespective of static risk. These results are consistent with previous research examining the interaction between risk and protective factors. For instance, previous research conducted with young offenders (Hoge et al., 1996) and adult offenders (Ullrich & Coid, 2011), found that none of the interactions of risk and protective factors emerged as statistically significant, but instead found that protective factors yielded a significant independent effect (i.e., a promotive effect).

Limitations

The results of this study should be considered in light of limitations. While a strength of this study was the large sample size, which provided enough power to detect effects when they were present, the low base rates of predatory misconducts is a clear limitation. However, a decision was made to include the predatory outcome throughout the study as it highlights the importance of considering base rates and the potential impact it has on analyses (e.g., wide confidence intervals, less precision and stability). A longer follow-up time may have resulted in a larger prevalence rate for this type of outcome; however, these results are likely attributed to the enhanced physical restrictions of imprisonment (Bottoms, 1999). In other words, the prison

environment may have reduced the likelihood of predatory misconducts (e.g., violence) due to the restrictions on opportunity (Bottoms, 1999).

Another potential limitation is related to the study cohort included. That is, the sample included all offenders who had received an SDAC-21 assessment, regardless of when they had been admitted. As such, it was not possible to control time already served. Ideally, the SDAC-21 would be administered as part of the intake process. However, since the prison admit date was omitted from the dataset, it is conceivable that a large portion of the sample had already been incarcerated for some time. Time served has been identified as an important variable worth taking into account when examining the frequency and type of institutional misconducts (Bottoms, 1999; Griffin & Hepburn, 2006). For instance, previous research has showed that violent misconducts were more likely to occur in the first months and years of incarceration than in the later stages of imprisonment (Bottoms, 1999; Flanagan, 1983; Griffin & Hepburn, 2006).

Another limitation is related to the fact that classifications scores were not included. While security level was provided and the results demonstrated differences in mean SDAC-21 scores across security levels (i.e., higher risk scores and lower protective scores observed among higher security levels), evaluating how the SDAC-21 could complement existing classification methods was not possible. Many correctional departments have adopted an objective prison classification scheme used to determine security level and program assignment, thereby trying to ensure that excessive controls are not imposed (Austin, 2003; Luciani, Motiuk, & Nafekh, 1996; Webster & Doob, 2004). Typically, custody classification is concerned with identifying those offenders that may pose a risk to escape or who will have potential management problems while incarcerated. In contrast, conventional risk assessment approaches usually assess the risk and

needs of the offender (e.g. criminal history, antisocial attitudes and substance abuse) with the goal of predicting post-release recidivism.

Despite the advantages of custody classification measures, they can be narrow in focus and may lack the breadth necessary to detect behavioural change that would warrant a change in security designation. More specifically, custody classification decisions are based on either actuarial or clinical approaches (Austin, 2003). The actuarial approach to custody classification involves objective procedures to combine and weight factors that produce on overall score and recommendation for placement decisions. The clinical method relies mainly on the experience and judgment of criminal justice professionals, which is a similar to unstructured clinical judgements (Austin, 2003). Not accounting for an offender's level of need could potentially lead to "over-classification", where offenders that have made significant progress maintain their current classification designation and does not permit a reclassification to a less restrictive custody level.

The SDAC-21 was designed to inform professional decision making around intervention and case management. Because the items in the SDAC-21 are dynamic in nature, it can potentially complement initial classification schemes. That is, it can be used as a reclassification tool, where re-assessment of key items can permit refinement of an offender's initial assessment to reflect change and potentially better manage risk over time. This may result in a more focused and case-specific approach to case planning as well as serving to modify an offender's current security level. This in turn may demonstrate cost-savings while also meeting the least restrictive requirement outlined in legislation. For example, the Iowa Department of Corrections spends, on average, $177 USD per day per offender to maintain an individual in a maximum-security facility (IDOC, 2017), whereas it costs approximately $62 USD per day per offender to maintain

an individual in one of their medium security facilities (IDOC 2018b).[10] This translates into a potential cost savings of $115 per offender per day. Therefore, future research should explore whether the SDAC-21 can augment custody classification by examining change on SDAC-21 scores.

Despite the fact that custody classification scores were unavailable, the IVVI-violence and victimization risk measures are measures of static risk. Because many of the items overlap between the IVVI measures and the Iowa Classification system (e.g., offence history, age, security threat group affiliation, escape and release history), the IVVI measures could be considered proxy measures for custody classification. In fact, the IVVI measures are administered at intake and form part of the case management plan, along with the SDAC-21 and Iowa Classification system.

It is worth noting that diversity was not well represented in the sample. Particularly, the lack of women in the sample demonstrated that the data provided did not fully capture the Iowa correctional population, which is an area that warrants future research.

Implications and Directions for Future Research

While both the two-factor model and the original SDAC-21 were able to differentiate between those who incurred a misconduct and those who did not, as well as demonstrate similar rates of predictive accuracy, it is questionable whether the SDAC-21 be reduced or subscales revised at this stage. The SDAC-21 was designed to inform professional decision-making around case planning, intervention, and management. While the Stable subscale contains items that are

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[10] These cost estimates were based on site-specific financial disclosure information contained in the annual reports from the Iowa Department of Corrections. For instance, the cost information for the maximum-security estimates were based on the average daily cost to maintain an offender in the Iowa State Penitentiary. In contrast, the average daily costs for the medium security facility were based on estimates for Fort Dodge Correctional Facility.

conceptualized as offender characteristics that reflect ongoing engagement in criminal orientation, the Responsivity subscale includes items that may act as barriers to change (i.e., issues that may prevent an offender from effectively engaging in programming). Failing to account for specific responsivity factors may impede an offender's compliance with treatment, which may in turn increase the likelihood of program attrition. In a recent meta-analytic review, Olver and colleagues (2011) found that treatment non-completers were higher risk offenders and attrition from all programs significantly predicted recidivism. The authors concluded that treatment attrition can be managed through various means, including adherence to the responsivity principle. Some specific responsivity factors that have been found to predict offender treatment attrition include substance abuse, mental health concerns, and low motivation (Nunes, et al., 2010; Olver et al., 2011). However, exploring the relationship between specific responsivity and other case-management considerations was not possible in the current study Therefore, examining the extent to which the responsivity items contained in the SDAC-21 may predict treatment attrition is an area worth further exploration.

Concerning Protective factors, the results of this study indicated the potential importance of Protective factors in predicting institutional misconducts. That is, those offenders that had higher risk scores and lower Protective scores were more likely to incur an institutional misconduct. In addition, the likelihood of incurring a misconduct decreased by 10% to 17% (depending on the type of misconduct) for every one-point increase in Protective scores. The Protective domain also demonstrated incremental validity over and above risk. Lastly, the SDAC-21 Protective domain had an impact on misconducts, regardless of offender risk. This finding has implications for case-management staff as they can target these strength factors for intervention and case planning. Despite these promising results, research on the relationship

between protective factors and criminal behaviour is still in its infancy. Considering a range of internal and external attributes that may reduce offenders' risk of reoffending may provide useful information regarding the transition into desistance.

The SDAC-21 was developed to ensure continuity of dynamic risk assessment and intervention strategies from the institutional setting to community case management. The SDAC-21 was modelled after the DRAOR and strongly aligns with the relevant subscales (i.e., Stable Risk and Protective Factors). Future research should examine the relationship between the SDAC-21 and DRAOR assessments to evaluate the continuity of care from the institutional setting to the community setting. Because institutional behaviour can be viewed as a proxy for criminal behaviour in the community, targeting problematic behaviours and attitudes while incarcerated (and augmenting protective items) may contribute to lower rates of reoffending once released.

Another avenue of research that warrants further research is examining change over time. While static risk estimates provide information regarding which offenders are higher risk to engage in institutional misconducts, they are limited in their ability to inform individual case base-decisions in order to enhance supervision practices. Although the SDAC-21 includes putative dynamic items, where the goal is to monitor and assess change in risk over time, the current study evaluated the dynamic items at only one time point. While the current dataset did not include multiple assessments, which is needed to evaluate change over time, future research should continue to examine variability in dynamic risk and protective scores over time and whether changes on these variables are related to differential outcomes for offenders. However, previous work on the DRAOR has demonstrated that re-assessment improves predictive validity, specifically by showing incremental prediction of re-assessments over baseline scores, and

incremental prediction of the most proximal assessment compared to averages of earlier scores (Lloyd, 2015). In addition, Hanby (2013) found that Stable and Acute dynamic risk scores decreased over time while Protective scores increased, suggesting that the DRAOR was sensitive to change. Recidivists differed from non-recidivists in stable dynamic risk and protective factors in the month prior to follow-up end and in acute dynamic risk in the second month prior to follow-up end.

While the results of the current study demonstrated that the SDAC-21 was able to accurately predict institutional misconducts, the creation of cut-off scores, which would place an offender in different risk categories, is a matter worth exploring. Creating cut-offs can provide information about the proportion of offenders that fit into the various risk categories, which can offer structured guidelines for informing decision-making around custody re-classification. For instance, based on changes in the SDAC-21 items, an offender may move to a different risk category (e.g., from medium to low risk), which can signal the need to modify an offender's current security level.

Conclusions

This was the first empirical validation of the SDAC-21 used in a sample of incarcerated male offenders. The results demonstrated that overall, this tool was able to accurately predict institutional misconducts over and above static risk estimates. In addition, the results were consistent to some extent with current theory of criminal behaviour and crime desistance. More specifically, higher scores on the SDAC-21 risk factors, many of which reflect key psychosocial and context variables identified in theories of criminal behaviour, were related to an increased likelihood of institutional misconducts. In addition, the Protective domain uniquely and incrementally contributed to the prediction of institutional misconducts. This showed that those

offenders with higher protective scores were less likely to engage in criminal behaviour. However, in order to develop a more in-depth understanding of individual variations in criminal behaviour and further support current theory, evaluating intra-individual change on these putatively dynamic factors is needed. While being able to accurately predict who is at an increased risk to engage in criminal behaviour is important, whether it be institutional misconducts or reoffending in the community, developing prevention strategies to mitigate this risk is an important consideration for future research and practice. For instance, Labrecque and Smith (2019) have argued that a promising prevention strategy would be to triage short-term treatment services at the front end of prison sentences, particularly for high-risk offenders. Therefore, using the SDAC-21 to identify areas of need may assist in ensuring that appropriate resources and treatment services are being provided. Despite the limitations outlined above, the results are encouraging and offer an important first step in the continued use of the SDAC-21. Future research should examine how the information assessed from the SDAC-21 is used (i.e., develop case-specific management strategies) and if this has an impact on reducing the likelihood of institutional misconducts and improving overall case-management.

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Appendix A: Mean Scores across Security Level

Table C1

Variables	*M (SD)*	*N*
	Minimum Security	
IVVI-Violence	4.98 (2.41)	836
IVVI-Victimization	5.50 (2.70)	836
SDAC		
Stable	6.69 (2.64)	841
Responsivity	3.98 (2.56)	841
Protective	6.46 (2.86)	841
Total	4.20 (6.58)	841
	Medium Security	
IVVI-Violence	5.75 (2.81)	2675
IVVI-Victimization	6.28 (3.12)	2675
SDAC		
Stable	7.81 (2.77)	2732
Responsivity	5.23 (2.88)	2732
Protective	5.84 (2.98)	2732
Total	7.19 (6.83)	2732

Variables	*M (SD)*	*N*
	Multi-level	
IVVI-Violence	6.20 (3.02)	450
IVVI-Victimization	6.67 (3.26	450
SDAC		
Stable	7.80 (2.91)	463
Responsivity	6.24 (3.01)	463
Protective	6.13 (3.16)	463
Total	7.90 (7.40)	463
	Maximum Security	
IVVI-Violence	7.42 (3.24)	165
IVVI-Victimization	7.93 (3.52)	165
SDAC		
Stable	7.96 (2.63)	181
Responsivity	6.78 (2.47)	181
Protective	5.51 (2.52)	181
Total	9.23 (6.11)	181

Appendix B: Structured Dynamic Assessment Case-management-21 items (SDAC-21)

Coding sheet SDAC-21 – Assessment of dynamic risk factors and protective assets and responsivity factors

Name:		**PRN:**	**Date:**	
Age:		**Gender: Male** ☐	**Female** ☐	
Case management category:				
Stable factors		Score (0,1,2)	Key issue	Goal
1	Gang association		☐	☐
2	Negative attitudes authority		☐	☐
3	Impulse control		☐	☐
4	Problem solving		☐	☐
5	Sense of entitlement		☐	☐
6	Attachment with others		☐	☐
7	Substance abuse		☐	☐
Total Stable scr				
Responsivity factors		Score (0,1,2)	Key issue	Goal
8	Health problems		☐	☐
9	Conduct issues		☐	☐
10	Personal distress		☐	☐
11	Unresponsive rehabilitation		☐	☐
12	Hostility/interpersonal aggress		☐	☐

13	Offence mirroring behaviours		☐	☐
14	Learning difficulties		☐	☐
	Total Responsivity scr			
Protective factors		Score (0,1,2)	Key issue	Goal
15	Responsive to advice		☐	☐
16	Prosocial identity		☐	☐
17	High expectations		☐	☐
18	Costs/benefits		☐	☐
19	Social supports		☐	☐
20	Social controls		☐	☐
21	Employability		☐	☐
	Total Responsivity scr			

Other management considerations:
Most likely risk scenario: Prison based ☐ Community based ☐ • *Related to the following offence/misconduct:* • *The victim(s)- age, gender, relationship would be:* • *The impact on victim(s) is:* • *Aggravating features for this scenario are.* • *Situational/Environment risk factors for the scenario are.* • *Protective factors- current or future for the scenario are:*
Most serious risk scenario: Prison based ☐ Community based ☐ • *Related to the following offence/misconduct:* • *The victim(s)- age, gender, relationship would be:* • *The impact on victim(s) is:* • *Aggravating features for this scenario are.* • *Situational/Environment risk factors for the scenario are.* • *Protective factors- current or future for the scenario are:*

Final structured case management summary decision:	**Stable** ☐ Low ☐ Moderate ☐ High	**Responsivity** ☐ Low ☐ Moderate ☐ High	**Protective** ☐ Low ☐ Moderate ☐ High
Imminent risk concerns (to self or to others)? **Yes/No** **If yes is there a need to inform other staff to manage risk?** **Action:**			
Case management actions identified from SDAC-21 administration: Action 1: Action 2: Action 3: Action 4:			
Name of case manager: **Signature:**			

Appendix C: Iowa Violence and Victimization Instruments

	Violence Score	Victimization Score
Current Offense		
1. Active Offenses Include --		
a. Assault, Attempted Murder, Burglary, Robbery, Murder, Theft from a Person, Vandalism or Voluntary Manslaughter	2	2
b. Not as above but **most serious offense** is Forgery/Fraud	-1	0
c. Not as above	0	0
2. Number of Counts, Current Property Offenses		
a. None	0	0
b. One	0	1
c. Two or More	0	2
Criminal History -- Volume and Seriousness		
3. Ever Convicted of Murder/Manslaughter, Robbery or Theft from a Person (Priors Only)		
a. Yes	1	1
b. No	0	0
For Items 4-5, consider only convictions where date of conviction or sentencing is 10 years or less from the earliest sentence date of the current offense(s).		
4. Number of Prior Counts for Violent Crimes Within Last 10 Years (Any Offense Level)		
a. None	0	0
b. One to Three	1	1
c. Four or More	2	2
5. Prior Convictions Within the Last 10 Years (check ALL that apply) --		
For a through c, count only aggravated misdemeanors, felonies or juvenile commitment offenses:		
a. Property Crime	0	1
b. Burglary (include violent and property offense types)	1	1
c. Weapons	1	1
d. Flight/Escape (any offense level)	1	1
e. Not as above	0	0
Criminal History - Recency		
For Item 6, consider only convictions where date of conviction or sentencing is 5 years or less from the earliest sentence date of the current offense(s).		

6. Prior Conviction for Violent Crime in the Last 5 Years (Any Offense Level)		
a. Yes	2	2
b. No	0	0
Iowa Parole Risk Assessment (cont.)	**Violence Score**	**Victimization Score**
Criminal History - Recency (continued)		
For Item 7, count from last release from prison or juvenile commitment to current prison admission date.		
7. Released from Prison or Juvenile Commitment in the Last 5 Years for (check ALL that apply) --		
a. Violent Crime	2	2
b. Property Crime	0	1
c. Not as above	0	0
Criminal Orientation/Associates		
8. Security Threat Group Membership		
a. Confirmed Member	3	3
b. Suspected or None	0	0
Current Age		
9. Current Age		
a. 24 or Younger	2	1
b. Age 25-29	2	0
c. Age 30 - 37	1	0
d. Age 38 - 54	0	0
e. Age 55 or Older	0	-1
Total Scores		

Violence Score Categories	
Low	-1 to 2
Moderate	3 to 5
High	6 to 9
Very High	10+

Victimization Score Categories	
Low	-1 to 1
Low/Moderate	2 to 3
Moderate/High	4 to 7
High	8+

Appendix D: Polychoric Correlations between SDAC-21 Items

	Aa	IC	PS	SE	A/O	SA	HP	CI	NM	UR	An	OMB	LD	RA	PI	HE	CB	SS	SC	EM
Gang Association	.27	.07	.10	.17	.16	-.00	.01	.28	.02	.12	.18	.24	.11	-.08	-.17	-.05	-.08	-.07	-.13	-.16
Attitude toward Authority (Aa)		.51	.49	.53	.35	.10	.12	.60	.30	.40	.49	.43	.18	-.44	-.42	-.25	-.34	-.23	-.31	-.24
Impulse Control (IC)			.76	.36	.33	.27	.11	.44	.31	.33	.41	.30	.20	-.35	-.29	-.16	-.28	-.17	-.33	-.18
Problem Solving (PS)				.41	.41	.28	.15	.45	.29	.41	.41	.31	.23	-.40	-.35	-.23	-.31	-.23	-.31	-.21
Sense of Entitlement (SE)					.41	.30	.18	.37	.23	.32	.38	.37	.14	-.37	-.30	-.19	-.26	-.18	-.25	-.15
Attachment with Others (A/O)						.12	.20	.23	.29	.28	.39	.29	.20	-.34	-.35	-.34	-.25	-.41	-.40	-.19
Substance Abuse (SA)							.12	.09	.19	.28	.08	.06	.10	-.14	-.12	-.10	-.15	-.10	-.14	-.15
Health Problems (HP)								.17	.39	.11	.18	.16	.28	-.10	-.15	-.21	-.14	-.13	-.10	-.17
Conduct Issues (CI)									.32	.32	.44	.57	.21	-.32	-.32	-.20	-.27	-.15	-.21	-.17
Negative Mood (NM)										.27	.37	.26	.27	-.17	-.21	-.23	-.15	-.15	-.15	-.15
Unresponsive Rehabilitation (UR)											.30	.29	.14	-.38	-.29	-.25	-.29	-.16	-.22	-.19
Anger (An)												.38	.18	-.33	-.30	-.22	-.23	-.20	-.20	-.15
Offence Mirroring Behaviour (OMB)													.18	-.23	-.31	-.19	-.23	-.17	-.24	-.16
Learning Difficulties (LD)														-.15	-.18	-.23	-.12	-.11	-.13	-.30
Response to Advice (RA)															.61	.44	.53	.36	.52	.32
Prosocial Identity (PI)																.60	.40	.49	.57	.38
High Expectations (HE)																	.56	.51	.50	.37
Costs Benefits (CB)																		.44	.55	.35
Social Support (SS)																			.63	.33
Social Control (SC)																				.40
Employability (Em)																				1.00

Appendix E: AUC Difference Tests

Table E1

AUC Difference Tests: Non-Compliance

Variable 1	Variable 2	AUC 1	AUC 2	Difference AUC 1 – AUC 2	*Z*	*D*	*P*
IVVI-Violence	Stable Total	.58	.62	-.04	-2.86		<.01
IVVI-Violence	Responsivity Total	.58	.66	-.08	-5.74		<.001
IVVI-Violence	Protective Total	.58	.60	-.02		-0.72	.47
IVVI-Violence	Total Score	.58	.66	-.08	-5.59		<.001
IVVI-Violence	Risk Total	.58	.66	-.08	-5.83		<.001
IVVI-Violence	Revised Total	.58	.66	-.08	-5.56		<.001
IVVI-Victimization	Stable Total	.57	.62	-.05	-3.59		<.001
IVVI-Victimization	Responsivity Total	.57	.66	-.09	-6.37		<.001
IVVI-Victimization	Protective Total	.57	.60	-.03		-1.45	.15
IVVI-Victimization	Total Score	.57	.66	-.09	-6.27		<.001
IVVI-Victimization	Risk Total	.57	.66	-.09	-6.48		<.001
IVVI-Victimization	Revised Total	.57	.66	-.09	-6.24		<.001
Stable Total	Responsivity Total	.62	.66	-.04	-4.25		<.001
Stable Total	Total Score	.62	.66	-.04	-5.73		<.001
Stable Total	Risk Total	.62	.66	-.04	-6.86		<.001
Stable Total	Revised Total	.62	.66	-.04	-5.38		<.001
Protective Total	Stable Total	.60	.62	-.02		-2.23	<.05
Protective Total	Responsivity Total	.60	.66	-.06		-5.50	<.001
Protective Total	Total Score	.60	.66	-.06		-8.23	<.001
Protective Total	Risk Total	.60	.66	-.06		-6.00	<.001
Protective Total	Revised Total	.60	.66	-.06		-8.66	<.001

Note. AUC = Area under the curve; Z = difference in AUCs based on Delong method; D = difference in AUCs based on Bootstrapping method.

Table E2

AUC Difference Tests: Any Misconducts

Variable 1	Variable 2	AUC 1	AUC 2	Difference AUC 1 – AUC 2	*Z*	*D*	*P*
IVVI-Violence	Stable Total	.59	.62	-.03	-2.61		<.01
IVVI-Violence	Responsivity Total	.59	.66	-.07	-5.58		<.001
IVVI-Violence	Total Score	.59	.66	-.07	-5.38		<.001
IVVI-Violence	Risk Total	.59	.66	-.07	-5.58		<.001
IVVI-Violence	Revised Total	.59	.66	-.07	-5.33		<.001
IVVI-Victimization	Stable Total	.58	.62	-.04	-3.38		<.001
IVVI-Victimization	Responsivity Total	.58	.66	-.08	-6.25		<.001
IVVI-Victimization	Total Score	.58	.66	-.08	-6.09		<.001
IVVI-Victimization	Risk Total	.58	.66	-.08	-6.26		<.001
IVVI-Victimization	Revised Total	.58	.66	-.08	-6.05		<.001
Stable Total	Responsivity Total	.62	.66	-.04	-4.26		<.001
Stable Total	Total Score	.62	.66	-.04	-5.74		<.001
Stable Total	Risk Total	.62	.66	-.04	-6.72		<.001
Stable Total	Revised Total	.62	.66	-.04	-5.33		<.001
Protective Total	Stable Total	.59	.62	-.02		-2.16	<.05
Protective Total	Responsivity Total	.59	.66	-.07		-5.67	<.001
Protective Total	Total Score	.59	.66	-.07		-7.83	<.001
Protective Total	Risk Total	.59	.66	-.07		-5.73	<.001
Protective Total	Revised Total	.59	.66	-.07		-8.72	<.001

Note. AUC = Area under the curve; Z = difference in AUCs based on Delong method; D = difference in AUCs based on Bootstrapping method.

Table E3

AUC Difference Tests: Management Misconducts

Variable 1	Variable 2	AUC 1	AUC 2	Difference AUC 1 – AUC 2	*Z*	*D*	*P*
IVVI-Violence	Stable Total	.60	.65	-.05	-3.06		<.01
IVVI-Violence	Responsivity Total	.60	.68	-.08	-5.03		<.001
IVVI-Violence	Total Score	.60	.68	-.08	-4.99		<.001
IVVI-Violence	Risk Total	.60	.69	-.09	-5.24		<.001
IVVI-Violence	Revised Total	.60	.68	-.08	-4.81		<.001
IVVI-Victimization	Stable Total	.59	.62	-.03	-3.42		<.001
IVVI-Victimization	Responsivity Total	.59	.65	-.06	-5.39		<.001
IVVI-Victimization	Total Score	.59	.68	-.09	-5.36		<.001
IVVI-Victimization	Risk Total	.59	.68	-.09	-5.61		<.001
IVVI-Victimization	Revised Total	.59	.69	-.10	-5.20		<.001
Stable Total	Responsivity Total	.65	.68	-.03	-3.00		<.01
Stable Total	Total Score	.65	.68	-.03	-4.01		<.001
Stable Total	Risk Total	.65	.69	-.04	-5.27		<.001
Stable Total	Revised Total	.65	.68	-.03	-3.55		<.001
Protective Total	Stable Total	.60	.65	-.05		-3.07	<.01
Protective Total	Responsivity Total	.60	.68	-.08		-5.55	<.001
Protective Total	Total Score	.60	.68	-.08		-7.95	<.001
Protective Total	Risk Total	.60	.69	-.09		-5.99	<.001
Protective Total	Revised Total	.60	.68	-.08		-8.02	<.001

Note. AUC = Area under the curve; Z = difference in AUCs based on Delong method; D = difference in AUCs based on Bootstrapping method.

Table E4

AUC Difference Tests: Predatory Misconducts

Variable 1	Variable 2	AUC 1	AUC 2	Difference AUC 1 – AUC 2	*Z*	*D*	*P*
IVVI-Violence	Stable Total	.63	.69	-.06	-2.51		<.01
IVVI-Violence	Responsivity Total	.63	.75	-.12	-4.51		<.001
IVVI-Violence	Total Score	.63	.74	-.11	-4.12		<.001
IVVI-Violence	Risk Total	.63	.74	-.11	-4.06		<.001
IVVI-Violence	Revised Total	.63	.73	-.10	-3.61		<.001
IVVI-Victimization	Stable Total	.61	.69	-.08	-3.17		<.01
IVVI-Victimization	Responsivity Total	.61	.75	-.14	-5.13		<.001
IVVI-Victimization	Total Score	.61	.74	-.13	-4.74		<.001
IVVI-Victimization	Risk Total	.61	.74	-.13	-4.66		<.001
IVVI-Victimization	Revised Total	.61	.73	-.12	-4.25		<.01
Stable Total	Responsivity Total	.69	.75	-.06	-2.82		<.01
Stable Total	Total Score	.69	.74	-.05	-3.22		<.01
Stable Total	Risk Total	.69	.74	-.05	-3.45		<.001
Stable Total	Revised Total	.69	.73	-.04	-2.34		<.05
Protective Total	Stable Total	.64	.69	-.05		-2.23	<.05
Protective Total	Responsivity Total	.64	.75	-.11		-4.70	<.001
Protective Total	Total Score	.64	.74	-.10		-6.34	<.001
Protective Total	Risk Total	.64	.74	-.10		-4.22	<.001
Protective Total	Revised Total	.64	.73	-.09		-5.56	<.001

Note. AUC = Area under the curve; Z = difference in AUCs based on Delong method; D = difference in AUCs based on Bootstrapping method.

Appendix F: SDAC-21 Item Level Predictive Accuracy

Table F1

Non-Compliance

Variable	AUC	*SE*	95% CI
Stable			
Gang Association	.55***	.01	[.53, .57]
Attitudes Towards Authority	.61***	.01	[.59, .63]
Impulse Control	.58***	.01	[.55, .60]
Problem Solving	.58***	.01	[.56, .60]
Sense of Entitlement	.57***	.01	[.55, .59]
Attachment with Others	.55***	.01	[.53, .57]
Substance Abuse	.51[ns]	.01	[.49, .53]
Responsivity			
Health Problems	.52 [ns]	.01	[.50, .54]
Conduct Issues	.69***	.01	[.67, .71]
Negative Mood	.58***	.01	[.56, .60]
Unresponsive Rehabilitation	.56***	.01	[.54, .58]
Anger	.60***	.01	[.58, .62]
Offence Mirroring Behaviour	.60***	.01	[.57, .62]
Learning Difficulties	.57***	.01	[.54, .59]
Protective			
Response to Advice	.56***	.01	[.54, .58]
Prosocial Identity	.58***	.01	[.55, .60]
High Expectations	.55***	.01	[.53, .57]
Costs Benefits	.56***	.01	[.54, .59]
Social Support	.54***	.01	[.52, .56]
Social Control	.56***	.01	[.54, .58]
Employability	.56***	.01	[.54, .58]

Note. AUC = area under the curve; SE = standard error; CI = confidence interval.
[ns]Nonsignificant.
* $p < .05$; ** $p < .01$; *** $p < .001$.

Table F2

Any Misconduct

Variable	AUC	*SE*	95% CI
Stable			
Gang Association	.55***	.01	[.53, .57]
Attitudes Towards Authority	.61***	.01	[.58, .63]
Impulse Control	.57***	.01	[.55, .59]
Problem Solving	.58***	.01	[.56, .60]
Sense of Entitlement	.57***	.01	[.55, .59]
Attachment with Others	.55***	.01	[.53, .57]
Substance Abuse	.52[ns]	.01	[.49, .54]
Responsivity			
Health Problems	.52 [ns]	.01	[.50, .54]
Conduct Issues	.69***	.01	[.67, .71]
Negative Mood	.58***	.01	[.56, .60]
Unresponsive Rehabilitation	.56***	.01	[.54, .58]
Anger	.60***	.01	[.58, .62]
Offence Mirroring Behaviour	.59***	.01	[.57, .61]
Learning Difficulties	.56***	.01	[.54, .59]
Protective			
Response to Advice	.56***	.01	[.54, .58]
Prosocial Identity	.57***	.01	[.55, .59]
High Expectations	.55***	.01	[.53, .57]
Costs Benefits	.57***	.01	[.54, .59]
Social Support	.54***	.01	[.52, .56]
Social Control	.56***	.01	[.54, .58]
Employability	.56***	.01	[.54, .58]

Note. AUC = area under the curve; SE = standard error; CI = confidence interval.
[ns]Nonsignificant.
* $p < .05$; ** $p < .01$; *** $p < .001$.

Table F3

Management Misconduct

Variable	AUC	*SE*	95% CI
Stable			
Gang Association	.57***	.01	[.54, .60]
Attitudes Towards Authority	.62***	.01	[.60, .65]
Impulse Control	.59***	.01	[.57, .62]
Problem Solving	.60***	.01	[.57, .63]
Sense of Entitlement	.58***	.01	[.56, .61]
Attachment with Others	.55***	.01	[.53, .58]
Substance Abuse	.52[ns]	.01	[.50, .55]
Responsivity			
Health Problems	.52 [ns]	.01	[.49, .55]
Conduct Issues	.71***	.01	[.69, .73]
Negative Mood	.59***	.01	[.56, .62]
Unresponsive Rehabilitation	.58***	.01	[.55, .60]
Anger	.62***	.01	[.59, .64]
Offence Mirroring Behaviour	.61***	.01	[.58, .63]
Learning Difficulties	.58***	.01	[.55, .61]
Protective			
Response to Advice	.56***	.01	[.53, .59]
Prosocial Identity	.58***	.01	[.55, .61]
High Expectations	.56***	.01	[.54, .59]
Costs Benefits	.57***	.01	[.55, .60]
Social Support	.55***	.01	[.52, .58]
Social Control	.56***	.01	[.53, .59]
Employability	.56***	.01	[.53, .59]

Note. AUC = area under the curve; SE = standard error; CI = confidence interval.
[ns]Nonsignificant.
* $p < .05$; ** $p < .01$; *** $p < .001$.

Table F4

Predatory Misconduct

Variable	AUC	*SE*	95% CI
Stable			
Gang Association	.63**	.02	[.58, .68]
Attitudes Towards Authority	.64***	.02	[.60, .69]
Impulse Control	.60***	.02	[.56, .64]
Problem Solving	.61***	.02	[.57, .65]
Sense of Entitlement	.62***	.02	[.58, .66]
Attachment with Others	.59***	.02	[.55, .63]
Substance Abuse	.50 [ns]	.02	[.46, .55]
Responsivity			
Health Problems	.56**	.02	[.52, .61]
Conduct Issues	.74***	.02	[.71, .78]
Negative Mood	.62***	.02	[.57, .66]
Unresponsive Rehabilitation	.62***	.02	[.58, .66]
Anger	.65***	.02	[.60, .69]
Offence Mirroring Behaviour	.66***	.02	[.62, .71]
Learning Difficulties	.60***	.02	[.56, .64]
Protective			
Response to Advice	.58**	.02	[.54, .62]
Prosocial Identity	.64***	.02	[.59, .68]
High Expectations	.58***	.02	[.54, .63]
Costs Benefits	.62***	.02	[.57, .66]
Social Support	.55*	.02	[.50, .60]
Social Control	.56***	.02	[.54, .63]
Employability	.56*	.02	[.51, .60]

Note. AUC = area under the curve; SE = standard error; CI = confidence interval.
[ns]Nonsignificant.
* $p < .05$; ** $p < .01$; *** $p < .001$.

Appendix G: Incremental Cox Regression Survival Analyses

Table G1

Cox Regression Survival Analysis Predicting Non-Compliance and Any Misconducts: Multivariate Analyses

					95% CI for *Exp(B)*		
Model	Covariates	*B (SE)*	*Wald*	*Exp(B)*	Lower Bound	Upper Bound	*C (SE)*
			Non-Compliance				
1	IVVI-Violence	.04 (.01)	14.15	1.05***	1.02	1.07	.65 (.01)
	Risk Total	.11 (.01)	183.46	1.12***	1.10	1.14	
2	IVVI-Violence	.05 (.01)	15.04	1.05***	1.02	1.07	.65 (.01)
	Revised Total	.08 (.01)	179.89	1.08***	1.07	1.09	
3	IVVI-Victimization	.03 (.01)	9.91	1.04**	1.01	1.06	.65 (.01)
	Risk Total	.11 (.01)	186.94	1.12***	1.10	1.14	
4	IVVI-Victimization	.04 (.01)	10.814	1.04**	1.01	1.06	.65 (.01)
	Revised total	.08 (.01)	182.85	1.08***	1.07	1.09	
			Any Misconduct				
1	IVVI-Violence	.05 (.01)	15.64	1.05***	1.02	1.07	.65 (.01)
	Risk Total	.11 (.01)	179.69	1.15***	1.10	1.13	
2	IVVI-Violence	.05 (.01)	16.31	1.05***	1.02	1.07	.64 (.01)
	Revised Total	.08 (.01)	178.40	1.08***	1.07	1.09	
3	IVVI-Victimization	.04 (.01)	10.69	1.04**	1.01	1.06	.64 (.01)
	Risk Total	.11 (.01)	183.34	1.12***	1.10	1.14	
4	IVVI-Victimization	.04 (.01)	10.73	1.04**	1.01	1.06	.64 (.01)
	Revised total	.08 (.01)	181.56	1.08***	1.07	1.09	

Note. CI = confidence interval; SE = standard error; Exp(B) = hazard ratio; C = Harrell's *c*.
* $p < .05$; ** $p < .01$; *** $p < .001$.

Table G2

Cox Regression Survival Analysis Predicting Management Misconducts and Predatory Misconducts: Multivariate Analyses

					95% CI for *Exp(B)*		
Model	Covariates	*B (SE)*	*Wald*	*Exp(B)*	Lower Bound	Upper Bound	*C (SE)*
			Management				
1	IVVI-Violence	.06 (.02)	17.69	1.07***	1.04	1.10	.62 (.01)
	Risk Total	.13 (.01)	144.56	1.14***	1.12	1.17	
2	IVVI-Violence	.07 (.02)	18.54	1.07***	1.04	1.10	.65 (.01)
	Revised Total	.09 (.01)	141.43	1.10***	1.08	1.11	
3	IVVI-Victimization	.06 (.01)	15.18	1.06***	1.03	1.09	.60 (.01)
	Risk Total	.13 (.01)	146.19	1.14***	1.12	1.17	
4	IVVI-Victimization	.05 (.01)	15.17	1.06***	1.03	1.09	.65 (.01)
	Revised total	.09 (.01)	142.34	1.10***	1.08	1.11	
			Predatory				
1	IVVI-Violence	.11 (.03)	17.85	1.12***	1.06	1.17	.75 (.02)
	Risk Total	.19 (.02)	86.97	1.21***	1.16	1.25	
2	IVVI-Violence	.11 (.03)	18.95	1.12***	1.06	1.18	.74 (.02)
	Revised Total	.13 (.01)	87.43	1.14***	1.11	1.17	
3	IVVI-Victimization	.08 (.02)	11.32	1.09**	1.04	1.14	.74 (.02)
	Risk Total	.19 (.02)	90.25	1.21***	1.16	1.26	
4	IVVI-Victimization	.08 (.02)	11.71	1.09**	1.04	1.14	.73 (.02)
	Revised total	.13 (.01)	90.15	1.14***	1.11	1.17	

Note. CI = confidence interval; SE = standard error; Exp(B) = hazard ratio; C = Harrell's *c*.
* $p < .05$; ** $p < .01$; *** $p < .001$.