PROTECTIVE FACTORS AS USED IN RISK ASSESSMENT FOR CORRECTIONAL PSYCHOLOGY: a conceptual analysis

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Abstract:

Protective factors may be conceptualised as those variables which decrease the likelihood of an undesirable outcome, or increase the likelihood of a desired one. However, within the area of correctional psychology there is no consensus over a more exact conceptualisation, the mechanisms by which such factors work, or whether their inclusion in risk assessment is justified. Currently risk assessment measures focus almost exclusively on risk factors, which are conceptualised as those variables that make criminal behaviour more likely. The present research employed a narrative review of the current literature to critically examine the current usages of the term "protective factors", and whether there is sufficient justification for the creation of a new concept. From 31 studies, four main definitions were identified. In opposing poles and main effects conceptualisations, protective factors are essentially the reverse of risk factors, and the concept is redundant. In an interaction definition, protective factors are separate, distinct variables, which operate according to the level of risk present. In a trichotomization model, protective factors are identified by comparing two ranges of a variable through a standardized statistical method. The latter two conceptualisations offer more promise for supporting the addition of this new concept. However, the field's current lack of consensus regarding the mechanisms through which protective factors operate, the statistical framework for identifying them, and other related problems, will all need to be addressed before any progress will be made.

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CHAPTER ONE: Introduction:

In recent years there has been increasing reference to 'protective factors' as desirable inclusions in risk assessment of criminal behaviour. In this context, such factors are believed to reduce an individual's likelihood of offending or reoffending. Thus, they may provide additional information towards assessing risk, as well as targets for treatment or prevention. This may lead to protective factors being used alongside risk factors in risk assessment measures, treatment plans, and prevention policies. Protective factors therefore have the potential to be a very important concept; however this topic is relatively under-researched. Moreover, given that risk factors are such a well-established concept within the area of risk assessment in correctional psychology, convincing justification would be needed for the addition of a clearly related concept.

Risk assessment:

Predicting criminal behaviour may be one of the most essential tasks within the field of criminal justice. These assessments have implications for prevention and treatment interventions, community safety, as well as ethical and legal consequences such as sentencing, probation, and parole decisions. The risk-needs-responsivity model of offender management states that in order for treatment to be effective its intensity must be matched to the offender's risk level, such that high-risk offenders receive high intensity treatment and low-risk offenders receive minimal intervention (Andrews & Bonta, 2010). Within New Zealand this principle is implemented by assigning medium- to high-risk offenders to high-intensity treatment programs, such as those for violent offenders (Te Whare Manaakitanga, Puna Tatari, and Matapuna Special Treatment Units), and those for child sex offenders (Te Piriti and Kia Marama Special Treatment Units). Furthermore, this principle is also reflected in the recent

creation of a Short Intervention Programme for lower-risk child sex offenders run by Kia Marama Special Treatment Unit. Because offending can have extensive personal, societal, and economic costs the consequences of being seen as being at a high risk for committing such acts can be significant. It is therefore very important that risk assessment measures are as accurate as possible in order to avoid incorrectly labelling individuals. However, the need for such accuracy must also be weighed against the need to identify as many individuals as possible who truly are at increased risk of offending or reoffending (Andrews & Bonta, 2010; Yang, Wong, & Coid, 2010). Clearly, if there is reason to suppose that protective factors represent a second set of factors with an influence on offending, then the accuracy of risk assessment might be improved by including them in the process. For several decades however, risk assessment developed without the inclusion of explicit protective factors.

Risk assessment has changed considerably within a time span of approximately 40 years, during which time the conceptualisations and predictive abilities of assessment measures have improved (Andrews & Bonta, 2010). The first generation of risk assessment mainly involved unstructured professional judgements around the likelihood of offending behaviour (Andrews, Bonta & Wormith, 2006). Such approaches have been shown to be highly subjective and inaccurate due to their informal nature and because the factors that would typically be assessed lack empirical backing. The next generation of risk assessment measures therefore moved away from this unstructured approach to focus on evidence-based actuarial measures predominately composed of static risk factors, providing significantly greater predictive accuracy. However, the static nature of these measures means that they only assess factors which do not change and therefore cannot provide any information relevant to treatment or case management. Furthermore, while the assessed factors

were statistically derived, they were generally atheoretical in nature (Andrews & Bonta, 2010; Guy, Packer, & Warnken, 2012). Thus the third generation of risk assessment measures continued to include these empirically established factors but expanded on them to include dynamic risk factors. In contrast to the previous second generation measures, third generation measures commonly have a theoretical basis (Andrews, Bonta & Wormith, 2006). The fourth and most current generation of risk assessment measures continue to build on the improvements seen in this area by using the identified dynamic risk factors to guide case management for an integrated assessment and intervention framework (Andrews & Bonta, 2010).

Another approach to risk assessment involves the use of Structured Professional Judgement (SPJ), also referred to as Structured Clinical Judgement (SCJ). Such assessments also consider static and dynamic factors demonstrating an empirical relationship to the outcome variable. However unlike the second through fourth generations of assessment methods described above, professional experience is utilized to assess which factors are relevant in each individual's case, assign weightings to these factors, and also to make decisions in regards to treatment needs (Guy, Packer, & Warnken, 2012; Pedersen, Rasmussen, & Elsass, 2010). It is for this reason that SPJ approaches have been described as a variation of the first generation clinical judgement approach (Andrews, Bonta & Wormith, 2006). However unlike this early method where decisions were made based on non- structured judgements, SPJ measures include established guidelines in order to ensure the reliability and validity of assessments (Guy et al., 2012; Lavoie, Guy, & Douglas, 2009; Pedersen et al., 2010). The predictive accuracy of these measures is reportedly moderate to high (Lavoie, et al., 2009; Yang, et al., 2010), however there is concern over their use in that professional overrides to actuarial results may become too frequently relied on

with no sound reasoning employed (Andrews & Bonta, 2010). Finally, another way that risk assessment can be differentiated is by whether it is conducted in regards to general offending (e.g. RoC*RoI; Bakker, Riley, & O'Malley, 1999; The Level of Service Inventory – Revised, Andrews & Bonta, 1995), or with a more specific focus, such as violent offending (e.g. the Violence Risk Appraisal Guide; VRAG, Quinsey, Harris, Rice, & Cormier, 2006) or sexual offending (e.g. Static–99; Hanson & Thornton, 2000).

Risk factors:

As mentioned, current risk assessment measures are largely composed of risk factors. In correctional psychology, risk factors typically refer to variables which are associated with an increased likelihood of offending (Andrews & Bonta, 2010; Farrington & Ttofi, 2012). Risk factors can be broken down into two broad categories: static and dynamic factors. Static risk factors are those which cannot be changed, and are often historical (e.g. age at first arrest, having one or more criminal parents). Dynamic risk factors are those which are open to change (Andrews & Bonta, 2010). For example, attitudes towards crime and antisocial associates are both risk factors that can be changed. Static risk factors have historically received more attention than dynamic risk factors. However dynamic factors may add important value to risk assessment, as well as offer directions for treatment goals. Accordingly, more recent risk assessment instruments have begun to include additional dynamic risk factors, allowing changes in risk over time to be measured (Andrews & Bonta, 2010; de Ruiter & Nicholls, 2011; Rogers, 2000).

Another way of classifying risk factors is whether they are empirically or theoretically driven. The second generation of risk assessment measures, described above, focused on factors that showed a statistical relation to offending or

reoffending. Conversely, the later generations of risk assessment tended to be theoretically driven, while still having an empirical backing (Andrews et al., 2006). It could also be argued that the first generation of risk assessment, professional judgement, may also be based somewhat on theories although without either the necessary empirical evidence or consistent application of theoretical frameworks across practitioners. However, past research has demonstrated that simply choosing variables as risk factors rather than empirically validating their relationship with risk can be problematic. A key example here is the long-held belief that childhood sexual abuse is a risk factor for later becoming a sexual offender (e.g. Ryan, 1989), which is still seen in the current literature (Andrews & Bonta, 2010). However, while the presence of a sexual abuse history has been shown to differentiate between sexual offenders and general offenders (Jespersen, Lalumière, & Seto, 2009) it does not reliably predict sexual recidivism (Hanson & Morton-Bourgon, 2005), and the majority of children who are sexually abused do not go on to become sexually abusive themselves (Paolucci et al., 2001; Salter et al., 2003). It has been suggested that it may instead be that there is a more general link between childhood maltreatment or adversity and later negative consequences (Hanson & Slater, 1988; Skuse et al., 1998). Thus, while this factor may make theoretical sense (e.g. Hudson, Ward & McCormack, 1999; Marshall & Marshall, 2000) or appeal to a clinical judgement approach, empirical support is limited (Glasser et al., 2001; Whitaker et al., 2008).

In addition to the question of which risk factors are more important to assess (static versus dynamic, theoretical versus purely empirical, general offending versus specific offences) and the way in which to do so (actuarial versus structured professional judgement), there is also growing concern over the field's overreliance on *risk* factors, typically to the exclusion of others (de Ruiter & Nicholls, 2011; Hall

et al., 2012; Rogers, 2000). Therefore while risk factors offer substantial information to the area of correctional psychology, it may be important to explore other areas which may also influence an individual's likelihood to offend.

Protective factors:

While the idea of factors that may protect against or reduce the likelihood of offending can be found in papers as far back as the 1980s (e.g. Garmezy, Masten, & Tellegen, 1984; Rutter, 1985, 1987), there has been little progress from this rudimentary point. Because of this there is still no definitive definition as to what a protective factor is. While interest in protective factors is present in many other areas of psychology the focus of the present research is predominantly on studies within the correctional field, specifically those which look at protective factors in regards to offending. However, this concept is still in its infancy. Thus, a proportion of the literature discussed may not directly involve correctional psychology, but will still be focused on the occurrence or reoccurrence of antisocial behaviour.

At the most basic level, a protective factor would be one which decreases the probability of a negative outcome (Loeber & Farrington, 2012; Rogers, 2000). This could be either through encouraging positive outcomes, suppressing negative ones, or a combination of both (Stouthamer–Loeber et al., 1993). In the study of risk factors, the focus is on the conditions which contribute to negative outcomes whereas with protective effects it is on factors which make such outcomes less likely, even in the face of risk (Hoge, Andrews, & Leschied, 1996). However, there is a great deal of conflict over more precise conceptualisations of protective factors and their relationship with risk factors, with several often incompatible views. Such obvious and widespread conflict in definitions leads to many inconsistencies in the literature on protective factors as used in correctional psychology. It is extremely difficult to

assess the additional value which the inclusion of protective factors in risk assessment measures may provide when there is no agreement over what exactly a protective factor is. This is not a new issue for the concept. As early as 1985, Rutter stated that if the concept of protective factors were to have any use to the field then these factors must represent something more than the opposite of risk. Thus, he argued against a conceptualisation where protective factors exist on a continuum at the opposite pole from risk factors. If this conceptualisation is accepted the same items reframed (or reverse scored) would function as risk factors, and the only distinguishing feature would be the arbitrary decision about how to frame these items in the first place. From this point of view there is no tangible difference between the two, and protective factors are redundant. An alternative view is that this "arbitrary" distinction is nevertheless clinically useful because it clarifies the direction in which the factor changes outcomes, that is whether high scores on the factor indicate higher or lower probability of offending. This argument seems misguided at best and condescending at worst. Practitioners gain ample experience over the course of psychometric scoring and assessments of the fact that some items need to be reverse-scored when calculating a final score, and that does not require the creation of a second construct (the reverse of the one measured by the test). In what follows, I shall assume that practitioners understand that this occurs because of the way some items have been framed. Similarly, I shall assume that their training includes sufficient knowledge of statistics that they can accurately interpret positive and negative correlations between outcomes and the factors that influence them, specifically that a positive correlation between "adequacy of family functioning" is the same thing as a negative correlation between "inadequacy of family functioning" with the same outcome variable. In

short, from the start I take Rutter's position that protective factors are redundant both scientifically and clinically when defined as simply the reverse of risk factors.

Rutter's research was within developmental psychopathology and resilience, but the issue he raised is relevant for correctional psychology. Over 25 years later, there is still no agreed upon definition, and several of the definitions currently employed may in fact conceptualise protective factors on the same variable as risk, as evidenced by the so-called "opposing poles" view. In addition to the conflict *between* the proposed models, there is also conflict and confusion *within* each model over the terminology used. Thus, while there is a variety of models and terms used to describe protective factors, many of these are in reality describing the same processes and mechanisms. The lack of agreement over the concept of protective factors does not appear to be of concern to many authors. While some give the conflict mention, the acknowledgment is typically brief. To my knowledge there have been few who have attempted a comprehensive analysis of the various definitions in use, or answer the question of whether the inclusion of protective factors in risk assessments truly provides additional knowledge of overall risk. Those who have addressed the issue (e.g. Hall et al., 2012) have only done so briefly. Following from this lack of definition, there is also no consensus regarding the appropriate statistical procedure for distinguishing protective factors, although several have been proposed. Therefore, a clear definition and framework for identifying protective factors needs to be established and agreed upon in order to advance knowledge in this area. In order to incorporate protective factors into risk assessment, it is necessary to have a thorough understanding of their underlying mechanisms and effect on risk scores. If protective factors exert their influence by subtracting from risk factors this would have a very different result than if they moderate (i.e. re-weight) the overall risk level. It also

needs to be known how multiple protective factors may work to change the risk level for an individual, that is whether their effects produce a cumulative and linear reduction in risk, or whether protective factors only work to reduce risk to a certain point. Again, these two options would produce very different results and have different implications.

Despite the lack of agreement of the basic qualities of protective factors, research has already started to explore more specific domains. As previously highlighted, risk factors can be examined broadly in terms of general offending or more specifically for subsets of offence type. Similarly, if protective factors offer additional information to risk assessment they could also be examined in such ways. Research has already begun into more specified protective factors, such as those for violent offending (Borum, Bartel, & Forth, 2003; de Vogel, de Ruiter, Bouman, & de Vries Robbé, 2009), adolescent delinquency (Hoge et al., 1996; Vilogen et al., 2012), and juvenile sexual offending (Spice et al., 2012). However, without an established definition of the construct, or proven value of adding protective factors to risk assessment, such studies may be premature. Likewise, the issue of whether static or dynamic factors give more useful information may need to be addressed in the area of protective factors as it has been in risk factors, but again there needs to be an established definition before this is done. Thus, it appears that research in the area has run ahead of its current stage of knowledge. The more pressing issue at this stage is to increase the conceptual clarity regarding what protective factors are, and to definitively answer Rutter's (1987) question of whether they are more than the opposite of risk.

The present research:

The lack of conceptual clarity and multiple inconsistencies noted above raises the question of how widespread the "opposing poles" conceptualisation of protective factors in the correctional psychology literature is. One might also ask how many different definitions of protective factors are present in this literature, since there appears to be no universally accepted definition. Therefore, in this thesis I shall review the current usages of the concept of protective factors in the area of correctional psychology, the rationale behind these definitions, and the frequency of each usage. A broad sample of the literature will be examined to determine which definition each author is using, either implicitly or explicitly, and then assess whether or not the conditions necessary for its application have been met. Another aim is to critically examine the variables claimed to be protective against offending, with a particular focus on the assessment of such variables and how, analytically, they were determined to be protective factors. This information will be utilized to determine the definition of protective factors that is most commonly being used in correctional psychology, thereby assessing the current validity of the concept in this field. The final aim is to highlight any future research that is needed in this area.

Methodology and main results:

Journal articles were identified through searches of PsycINFO, PubMed and Google Scholar in July and August 2013 using the key search terms [(protective factor + correctional psychology) (protective factor + offending) (protective factor + risk assessment)]. Relevant studies were identified from these results, and also from the references of the originally selected articles. A total of 31 studies of suitable relevance were found. Four main conceptualisations were identified from these studies, labelled as "opposing poles conceptualisation", "main effects

conceptualisation", "interaction conceptualisation", and "trichotomization conceptualisation". Each study was examined to determine which of these the author was purporting to use, and then critiqued as to whether they demonstrated evidence of having adhered to their chosen conceptualisation.

An opposing poles conceptualisation describes protective factors as being the opposite of risk factors, and does not assess any other conceptualisation, such as unique contributions or interaction effects. A main effects conceptualisation states that protective factors make a unique contribution, over and above that of risk factors, to the prediction of offending outcomes. Studies were coded as adhering to this model if their statistical analyses were consistent with this view, such as those studies which used hierarchical multiple regression in an attempt to test incremental validity. An interaction model of protective factors describes protective factors as moderating or interacting with risk so that there is a differential relationship between risk level and the outcome variable depending on the presence or absence of the protective factor. Studies were assessed to be using this model if their statistical analyses were consistent with this theory, such as those studies which tested for interaction effects using regression analyses. Due to the nature of the main effects and interaction conceptualisations, it was possible for studies to be assessed as using both. Criteria for a trichotomization conceptualisation were similar to that for main effects and interaction conceptualisations in that these studies also asserted that protective factors exert effects that are independent from risk, and can also interact with it. Studies were assessed to be using this model if they measured variables above a dichotomous level and examined the linearity of the relationship between variables with the assessed outcome. Specifically, this involved splitting a variable into three groups and testing

outcomes for each of the two ends of the variable against the outcomes observed in the middle group.

Table 1 gives the results of the 31 studies examined, the conceptualisations they purported to use, and the conceptualisations they were assessed as using. The majority purported (either explicitly or implicitly) to use conceptualisations consistent with a moderator definition and/or independent main effects definition. While 23 studies claimed to use a moderator/interaction conceptualisation, six did not test for an interaction between risk and protective effects. Of those who did test interactions, eight did not find any significant results. Ten studies tested interactions using individual protective factors, six used composite scales/indexes, and one study (Krohn et al., 2010) tested both. There were 5 studies which reported to use a trichotomization/direct protective approach. Finally, only 2 studies were identified as intentional use of a conceptualisation consistent with the opposing poles definition; however both of these were implied usages. The finding of four apparently different conceptualisations suggests a failure of agreement about what protective factors really are. It also appears that authors may not truly understand the positions they seem to be adopting. This was evidenced by them asking the wrong questions of their data and using inappropriate analyses. Furthermore, while the results show four main conceptualisations represented in the literature this does not necessarily mean they are distinct from one another, and it remains to be seen whether in fact they are.

Table 1:
List of reviewed studies, the definitions purported or implied to be used, and definitions assessed as being used.

Study	Definition purported or implied to be using	Definition assessed as using
Bernat et al. (2012)	Trichotomization	Trichotomization
Brookmeyer et al. (2005)	Interaction and main effects	Interaction
Chen et al. (2013)	Interaction and main effects	Interaction and main effects
Deković (1999)	Interaction and main effects	Interaction and main effects
Fergusson et al. (2007)	Interaction and main effects	Interaction and main effects
Gorman-Smith et al. (2004)	Interaction	Interaction
Henrich et al. (2005)	Interaction and main effects	Interaction and main effects
Henry et al. (2012)	Trichotomization	Trichotomization
Herrenkohl et al. (2007)	Main effects	Main effects
Herrenkohl et al. (2012)	Trichotomization	Trichotomization
Hoge et al. (1996)	Interaction and main effects	Interaction and main effects
Jessor et al. (1995)	Interaction and main effects	Interaction and main effects
Jessor et al. (1998)	Interaction and main effects	Interaction and main effects
Klein et al. (2012)	Opposing poles	Opposing poles
Krohn et al. (2010)	Interaction and main effects	Interaction and main effects
Lodewijks et al. (2010)	Interaction and main effects	Main effects
Logan-Greene et al. (2010)	Interaction and main effects	Main effects
Miller (2006)	Interaction and main effects	Main effects
Nash et al., (2011)	Interaction and main effects	Interaction and main effects
Newcomb & Felix-Ortiz (1992)	Interaction and main effects	Interaction
Pardini et al. (2012)	Trichotomization	Trichotomization
Rennie & Dolan (2010)	Interaction and main effects	Main effects
Resnick et al. (2004)	Interaction and main effects	Main effects
Spice et al. (2012)	Interaction and main effects	Interaction and main effects
Stouthamer-Loeber et al. (2002)	Trichotomization	Trichotomization
Ullrich & Coid (2011)	Interaction and main effects	Interaction and main effects
van der Laan et al. (2010)	Interaction	Interaction and main effects
Vance et al. (2002)	Interaction and main effects	Main effects
Viljoen et al. (2012)	Interaction and main effects	Interaction and main effects
White et al. (1989)	Interaction and main effects	Interaction
Wilson et al. (2010)	Main effects	Opposing poles

From here, a number of these studies were reviewed in greater depth to examine study characteristics such as the factors used, how they were assessed and measured, the populations used, statistical analyses, and the conclusions the authors reached from results. Studies from each identified conceptualisation were reviewed in order to assess similarities and differences present within each definition. One of the central focuses in this further examination was whether the four identified conceptualisations are truly distinct from each other, and whether the literature supports the addition of protective factors in risk assessment.

CHAPTER TWO: Conceptualisations of Protective Factors

Opposing poles model:

The first major conceptualisation to be discussed is that where protective and risk factors are viewed as simply being opposing poles of the same variable. For example, high intelligence has been cited as a protective factor against offending, while low intelligence has been cited as a risk factor (White, Moffitt, & Silva, 1989). Another example is family management, with good family management named as a protective factor and poor family management as a risk factor (Herrenkohl et al., 2012). This conception has been criticised on grounds of redundancy (Hawkins et al., 1992; Rutter, 1987). The above examples both refer to a single relationship (for example, that between family management and offending). Different values or positions on the family management dimension are given different labels (risk and protective). It is difficult to see how there could be an increase in accuracy if high good family management is added as a protective factor in risk assessment if family management is already present in the assessment protocol. In terms of intervention or treatment, attempting to reduce a risk factor (poor family management) would be equivalent to attempting to enhance the corresponding protective factor (good family management) and again there is no apparent value added.

While many authors explicitly denounce this view as being redundant, further examination of their conceptualisations of protective factors may nevertheless show that this is ultimately the definition they are employing. In this conceptualisation protective factors are purely the opposite of risk factors; therefore there are essentially no statistical requirements which need to be met in order for this view to be applied. Furthermore, unlike other conceptualisations of protective factors, an opposing poles definition is mutually exclusive with any other viewpoint. For example, it is not

possible to conceptualise protective factors on a continuum with risk factors and also state that they exert their effects on the outcome independently or through interaction effects. Therefore, the studies discussed in this section employ only this view.

Wilson, Desmarais, Nicholls, and Brink (2010)

Wilson, Desmarais, Nicholls, & Brink (2010) assessed risk of violence using the Short-Term Assessment of Risk and Treatability (START), one of the few available assessment measures which acknowledges the possibility of protective effects (Webster, Martin, Brink, Nicholls, & Middleton, 2004). The START is a structured professional judgement (SPJ) approach, with a focus on short-term outcomes. The focus of the START on short-term violence (i.e. risk over weeks or months) is a departure from previous risk assessment measures which tend to examine risk in terms of longer periods of time, such as over a year or more. It contains 20 dynamic items which are all scored as both strengths and vulnerabilities, using a 0 – 2 point scale (minimal – definite) when assessing both aspects for each item. Having scored all items for both, the evaluator considers them alongside relevant historical factors to reach a specific risk rating of low, medium, or high. These ratings are made for seven different types of negative outcomes including risk to others (Wilson et al., 2010). According to the START's theoretical framework, strengths are viewed as assets available to an individual, such as a supportive family. When these assets are utilized by the individual to reduce or manage risk they are then termed protective factors (Webster, Nicholls, Martin, Desmarais, & Brink, 2006). Thus, strictly speaking, protective factors in this view are not just "strengths", but "utilized strengths". This distinction may make a difference when comparing the START to other assessment measures which include protective factors. Under this definition an individual could be scored as "definitely" (i.e. a score of 2) having a specific strength

because this asset is very available to them, but in reality they may not actually be utilizing it and thus it is not acting as a protective factor.

Wilson et al., (2010) examine the predictive validity of the START for assessing short-term risk of violence in 30 male forensic psychiatric inpatients, with a specific focus on the role of strengths in these predictions and the extent to which they add incremental validity to the overall risk estimate. The study was retrospective in design, with the data sourced from a larger research project where file information for inpatients was available and included information regarding whether or not they had been aggressive in the following 12 months was recorded. Half of the participants (n = 15) in Wilson and colleague's study were randomly selected from those who were aggressive (including physical aggression towards others or objects, verbal aggression, and sexually inappropriate behaviour) during the follow-up period, and were then matched with non-aggressive patients based on index offence (violent versus non-violent), length of stay, and age. Four START assessments were made for each inpatient based on their file information, with each risk estimate being for three months. Thus, for each patient the estimated risk of violence for the first three months was based on file information from the preceding three months.

To examine the predictive validity of the START assessments, data was analysed using correlational, receiver operating characteristic (ROC), and regression analyses. Here, total scores (strength and vulnerability) and overall violence risk estimates were both tested in terms of their association with the outcome variable (aggression). Logistic regression analysis was also used to examine the association between risk group and the outcome variable, testing whether aggression was more likely for individuals with a vulnerability total score greater than their strength total score and whether it was less likely for individuals with a greater strength total score.

In this analysis the patients in the first group had vulnerability total scores that were equal or higher than their strength total scores, and the patients in the second group had vulnerability total scores that were less than their strength total scores.

Correlational analyses showed a significant negative association between the START strength and vulnerability total scores ($r = -.90$, $p < 0.01$), as well as significant associations for both with the outcome variable where higher vulnerability scores were related to the presence of an aggressive outcome ($r = .34$, $p < 0.01$) and higher strength scores were related to its absence ($r = -.31$, $p < 0.01$). Furthermore, a significant positive association was demonstrated between overall risk estimate and aggressive outcomes, where patients who were assessed as being more at risk were more likely to be aggressive over the follow-up period. ROC analyses showed that strength total scores, vulnerability total scores, and overall risk estimates all predicted aggression in the three months following assessment. Furthermore, strength total scores were shown to predict violence up to nine months from assessment, and vulnerability scores for up to six months. Logistic regression analyses showed that strength total scores and vulnerability total scores were both significant predictors of aggressive outcomes when entered in separate regression models. When entered together they produced a regression model that was still significant overall, however neither demonstrated independent contribution towards predicting an aggressive outcome, thus negating the possibility of incremental validity. There was also no evidence for incremental validity of strength scores in relation to overall risk estimates. That is, strength total scores gave no additional contribution to the overall risk estimate over that of vulnerability total scores. Regression analyses also showed a significant model using the overall risk estimate to predict the aggression in the following three months. Finally, logistic regression demonstrated that having a higher

total strength score than vulnerability score was significantly associated with a decreased likelihood of an aggressive outcome. The authors conclude that while strength scores did not improve violence risk prediction, this may have been at least partially due to their large inverse correlation with vulnerability scores and that, overall, the results provide support for the "clinical utility" of using strength scores in risk management.

Critique:

Although Wilson et al. describe the inherent disparity present in current risk assessment measures in terms of risk versus protective factors they do not discuss the conflict over the definition of a protective factor. There is no mention of the possibility of protective factors/strengths acting as moderators or interacting with risk factors/vulnerabilities. Thus, while several methods of analysis are used to evaluate the predictive validity of START assessments, the issue of interaction/moderation is not addressed. Logistic regression analyses are used, and the authors do hypothesise the potential incremental validity that strengths may add to risk assessment. However this is not their main focus regarding the effect of protective factors in risk assessment, and it is reported that there was no independent contribution to the predictive validity from either. Thus, a main effects conceptualisation is not supported either.

The fact that the possibility of interactions was not mentioned at all, combined with the way in which protective factors are defined (i.e. by simply assessing the same variables as both vulnerability and strength factors) highlights the redundancy of this conceptualisation. Wilson et al. note that the strength and vulnerability total scores show a large inverse correlation. This is not surprising, given the fact that they are literally the inverse of each other, and again illustrates the inherent redundancy

present. When employing the opposing poles definition, a strong negative correlation is essentially inevitable. Furthermore, while the nature of the START's strength factors logically precludes any significant interactions with the vulnerability factors, there are researchers who use the same scale and at least attempt to measure them (e.g. Viljoen et al., 2012). Another limiting factor in this study is the use of overall strength and vulnerability scores. When used in clinical settings the START is not intended to be coded by summing up totals scores. Instead, it is intended to be used in a typical SPJ manner by considering the coded variables in conjunction with historical factors to reach a specific risk judgement rating for different outcomes (e.g. low, medium, or high risk of violence to others). Once again, this raises issues involved with favouring clinical judgement over an empirical evidence. Webster et al. (2006) state that total scores can be used in research settings, and this is the method used by Wilson et al. in their analyses. However doing so makes it difficult to reach conclusions about whether specific factors have a higher contribution towards the predictive validity of the measure than others. Additionally, because the START is not being used as it would be in real-world settings, generalising from these results is problematic.

Despite the fact that strengths were not shown to provide any unique contribution towards the predictive validity of violence, Wilson et al. conclude that the clinical utility of strengths in risk management is supported. In my opinion, there are a number of reasons why this viewpoint is flawed. First, although the START is designed with clinical utility in mind (Webster et al., 2006), in Wilson et al. (2010) the primary purpose of the study was to assess the predictive validity of the START, and no criteria for clinical utility were given. While the authors do reference the shift in focus in the correctional field from risk prediction to risk management, they do not

address the ways in which the findings may be applied to clinical settings. Thus it is difficult to see how this clinical utility would be implemented or assessed; a clear indication of what the authors have in mind is needed, but not provided. Second, this 'clinical utility' would need to stand for something that transcends statistical validity. However this would again require specific criteria demonstrating this to be the case. Moreover, such a viewpoint also ignores the fact that the history of risk assessment has shown that it is best practice to use empirically supported factors when addressing risk. Stating that items shown to have no significant contribution to predicting outcomes can instead be used for treatment targets goes against this, leading back into the dangerous territory of trusting opinion over evidence. Thus, in my view, there is no support for Wilson and colleagues' conclusions regarding clinical utility. Instead, it appears that they are attempting to hide behind something else given the failure of their statistical analyses, while being deliberately vague about that this something else is.

Due to the discussed reasons, Wilson et al., (2010) is one of the papers coded as only showing an opposing poles-based definition. No mention is given to the possibility of an interaction between risk and protection; however the conceptual redundancy present would negate this option in any case. Finally, the fact that the same 20 items are assessed twice, once as vulnerabilities (e.g. risk factors) and once as strengths (e.g. protective factors), illustrates the superfluous role protective factors play in an opposing poles conceptualisation.

Klein et al. (2012):

Klein et al. (2012) used two instruments (the SAVRY and the SAPROF) in a pilot study of the relationship between risk and protective factors for alleged youth sexual offenders. The Structured Assessment of Violence Risk in Youth (SAVRY;

Borum et al., 2003) includes protective factors. Like the START (Webster et al., 2004), the SAVRY is also based on the Structured Professional Judgement (SPJ) format. The specific focus of the SAVRY is on predicting outcomes of violent youth offenders. In comparison to the START, the SAVRY is somewhat more complex in its distinction between risk and protective factors, in that the same variables are not just assessed for each factor. In total there are 6 protective factors assessed as either present or absent, alongside 20 risk factors rated as either low, medium, or high (Klein et al., 2012). However, some of the 6 protective factors included are merely simplified/vague versions of risk factors that are also assessed. For example, commitment to school is listed as a protective factor, whereas low school commitment is a risk factor (Borum et al., 2003; Klein et al., 2012). The Structured Assessment of Protective Factors for violence risk (SAPROF; de Vogel et al., 2009) is another risk assessment tool, however it only includes protective factors, so is intended to be used in conjunction with other instruments to provide an overall estimate of risk. The SAPROF also follows the SPJ method of risk assessment, and contains 17 items which are rated on a three-point scale (de Vogel, de Vries Robbé, de Ruiter, & Bouman, 2011; Klein et al., 2012).

Klein et al (2012) describe the SAPROF as being more comprehensive (including more protective factors than the SAVRY), which is why both measures were used in the study. Yet another instrument, the Screening Tool for the Assessment of Young Sexual Offenders' Risk (STAYSOR), was constructed to also measure risk factors in the study. The studied population were 66 male juveniles accused of committing sexual offenses, pre-trial and pre-treatment. Correlational analyses of the total scores for each measure were used to examine the relationships between these measures. Risk and protective factors showed significant negative

correlations. Additionally, the protective factors from the SAVRY showed a significant positive correlation with the SAPROF total score ($r = 0.80$, $p<0.01$). Measures of psychopathology showed a positive correlation with risk factors and a negative correlation with protective factors. The authors conclude that although more study of these instruments is needed to examine their predictive validity, the results support their clinical utility in risk assessment. Furthermore, they believe that their study offers information to increase understanding in the relationship between risk and protective factors of juvenile sexual offending.

Critique:

Although Klein and colleagues (2012) do not explicitly measure each variable twice (as seen in Wilson et al., 2010), they in effect do so with some of the variables used in their study and thus fail to avoid the opposing poles definition. As shown in Table 2, seven of the 22 protective factors in the instruments used already have clear corresponding risk factors also being assessed. For example, the SAVRY includes low commitment to school as a risk factor, yet also includes commitment to school as a protective factor. Similarly, while the SAVRY has low empathy as a risk factor the SAPROF conversely uses empathy as a protective factor. In both examples it is clear that the variables are situated on a continuum, with risk at one end and protection at the other, thus clearly demonstrating an opposing poles definition. In these instances, if an individual exhibits a risk factor (e.g. low commitment to school), it would not be possible for them to also exhibit the corresponding protective factor (commitment to school), and thus the two are mutually exclusive. Therefore, one issue with this study is that some of the protective factors are purely mirror images of already assessed risk factors.

Table 2:
Risk and Protective factors assessed by Klein et al. (2012)

Risk Factors (SAVRY)	**Protective Factors**
History of violence	
History of non-violence	
Early initiation of violence	
Supervision failure	
History of self-harm/suicide attempts	
Exposure to violence at home	
Childhood maltreatment	
Parental criminality	
Caregiver disruption	
Poor school achievement	
Peer delinquency	
Peer rejection	
Poor parental management	
Community disorganization	
Substance use	
Anger problems	
Attention deficit	
Poor compliance	
Poor coping	Coping (SAPROF)
Lack of support	Social support (SAVRY) Social network (SAPROF)
Negative attitudes	Positive attitudes (SAVRY)
Impulsivity	Self-control (SAPROF)
Low empathy	Empathy (SAPROF)
Low school commitment	Commitment to school (SAVRY)
	Attachment (SAVRY and SAPROF)
	Intelligence (SAPROF)
	Prosocial Involvement (SAVRY)
	Intimate relationship (SAPROF)
	Work (SAPROF)
	Leisure activities (SAPROF)
	Financial management (SAPROF)
	Motivation for treatment (SAPROF)
	Attitudes toward authority (SAPROF)
	Lifegoals (SAPROF)
	Medication (SAPROF)
	Resilient traits (SAVRY)
	Professional care (SAPROF)
	Living circumstances (SAPROF)
	External control (SAPROF)

Furthermore, of the remaining items adopted as protective factors, the majority can be easily reframed as risk factors, and frequently are. This highlights a very

important point for the conceptual status of protective factors, the fact that some of the protective factors used in research are only "protective" statistically because of the way the authors have framed them, a decision that is essentially arbitrary. This issue can be frequently observed throughout the literature, yet is typically never addressed. In these cases, the same information about a variable will be gained regardless of how it is framed. Again, this negates the need to create a new concept and goes against Klein and colleagues' conclusion that in order to reduce or prevent recidivism it is essential that an individual's strengths (i.e. protective factors) are also considered alongside risk factors. For example, 'prosocial involvement' could very easily be thought of as being the opposite of a history of antisocial behaviour, or having involvement with antisocial associates, both of which are known to belong to "The Big Four" risk factors for criminal behaviour. Additionally, factors related to work, leisure activities, and intimate relationships are all known to belong to the "The Moderate Four" risk factors for criminal behaviour (Andrews & Bonta, 2010). Thus, any additional information provided by these items is the consequence of an arbitrary decision to frame them as they have. The same information would be gained if they were reverse-coded and added to the existing risk factors. However, while these decisions are arbitrary in the fact that the resulting information does not change either way, it is nevertheless important to consider the possible biases, whether intentional or not, that may be behind such decisions.

As with Wilson et al. (2010), Klein et al. (2012) do not mention the disagreement over the definition of protective factors or the possibility of interactions or moderation between risk and protective factors. Furthermore, when introducing the concept, Klein et al. cite authors who describe protective factors as representing the opposite pole of risk factors (e.g. Busch et al., 2009; Webster et al., 2004; Zagar,

Busch, Grove, & Hughes, 2009), and do not criticize or question this viewpoint at all. When examining the relationship between the risk and protective factors measured, Klein and colleagues only employ correlation analyses of totals scores. While their results were in the expected directions, they do not provide any in-depth insight into the nature of the relationship between risk and protection, or address possible redundancy between protective factors and risk factors. There is also little value gained by comparing the two protective factor scales if there is no concrete definition for the concept. If the two measures are based on the same definition, they will likely show strong correlations, regardless of the validity or usefulness of the definition. Furthermore, the authors interpret the finding that no individuals in the high-risk category showed any protective factors as further evidence of a negative relationship between risk and protection. Again this is offered as support for the measures used. However, if protective factors are simply the opposite of risk factors this result is foregone, and it is not surprising if individuals with more protective factors are at less risk of a negative outcome, as in this scenario having more protective factors automatically decreases the total risk factors they can possess. Additionally, because the only data collected was from pre-trial and pre–treatment, there is no information regarding recidivism. Thus, there is no outcome variable, and it is not possible to assess predictive validity of the measures, or an interaction between risk and protective factors. However, while this was a pilot study of an exploratory nature, it is a recent study and there is enough mention in previous research to warrant a discussion of the possibility of interactions. Indeed, when discussing previous studies of protective factors, the authors cite several papers which do highlight the possibility of interactions (e.g. Lodewijks et al., 2010; Rennie & Dolan, 2010), but Klein et al. do not make any reference to such effects. When discussing possibilities for future study,

the authors mention testing incremental validity of dynamic risk factors. But there is no mention of protective factors in regards to this.

The authors raise an interesting question about the differences in results using a measure based on an overall violence risk assessment (the SAVRY) versus one focused solely on sexual offending (the STAYSOR), showing that more of the sample were assessed as being higher risk using the former. This makes intuitive sense given that sexual offending is a more serious subset of overall offending, and again this may well be an area that deserves more attention in the future. However as previously discussed, it appears that such detailed exploration is premature until a united view of protective factors is reached. Examining the topic in greater depth before a consensus is reached runs the risk of creating further inconsistency within this area, as well as being unnecessary and a waste of research resources. Klein and colleagues conclude that their study contributes to a greater understanding of the relationship of risk and protective factors for youth sexual offending, and that the instruments used are valuable for risk assessment in this area. However, given the lack of conceptual clarity around protective factors (including exploration of possible interactions), this claim seems rather ironic.

Opposing poles model conclusion:

Although only two of the 31 studies investigated were assessed as using an opposing poles definition, the criteria to do so were rather stringent. If a study mentioned the possibility of another definition and *at least attempted* to assess this, it would not be coded as adhering to an opposing poles conceptualisation. However, I believe that the two studies discussed in this section clearly demonstrate adherence to the opposing poles conceptualisation of protective factors and highlight the redundancy involved in this definition. It is my belief that if protective factors are

conceptualised this way there can be no place for them in risk assessment. Not only would this mean there would be no gain in information from the addition of this concept, it could also double the time it takes to complete a risk assessment measure. Given that this process can already be time consuming and taking into account the often limited resources available in correctional settings, including protective factors would return no benefit. Any possible clinical value in the addition of this construct would need to be much more rigorously justified than either Wilson et al. (2010) or Klein et al. (2012) do.

Main effects model:

The case for including protective factors in risk assessment might be strengthened if it could be shown that they make a contribution to the prediction of outcomes over and above the contribution made by risk factors. When protective factors are referred to as having main effects, they are thought to have a direct influence on the outcome variable (e.g. offending) whereby they contribute an effect that is separate from that contributed by risk. Such relationships are typically assessed using hierarchical multiple regression, with the proposed risk and protective factors entered in separate stages. The rationale behind this method is that by statistically controlling for the effects that risk factors have on the outcome (i.e. by including risk factors in a separate stage of the regression), any remaining variance accounted for can be attributed solely to the protective factors (Henrich, Brookmeyer, & Shahar, 2005; Hoge et al., 1996; Logan-Greene et al., 2010). In this way, demonstrating a main effect of at least some protective factors may be sufficient to justify their inclusion as a separate construct. What needs to be borne in mind here is that items that add information on additional domains of the individual's life, not represented among the risk factors studied, might make a unique contribution whether they were

framed as protective factors or as risk factors. The issue of how items are framed was raised earlier, in relation to Klein et al.'s (2012) study. For example, "attitudes" might make a unique contribution to prediction of offending (if the risk factors in the regression did not include anything about attitudes), but do so equally well whether the item concerned "positive" attitudes (protective) or "negative" ones (risk). If the item was (arbitrarily) framed as a protective factor, a significant main effect would support the importance of attitudes, but could not be said to support the role of protective factors *per se* because, were it framed differently, it would simply be an additional risk factor. Thus, the majority of justification behind this definition may come down to the arbitrary decision to frame additional variables in a manner that is consistent with a protective function. If this is the case, a main effects model of protective factors is essentially the same as an opposing poles model. Reframing these variables as risk factors would produce the same information and not require the creation of a new concept. Despite this many authors who employ a main effects definition make clear attempts to differentiate it from an opposing poles one, and often explicitly argue against the idea that protective factors are just mirror images of risk factors. It is for this reason that I have separated these two terms into different sections in order to best reflect the current literature. However, through deeper examination of the studies using this conceptualisation I will assess whether they are significantly different, or if it is better to consider them as examples of the same model.

Similar to concern regarding whether variables are framed in a protective or risk focused manner, there is also an issue regarding how variables are measured. This issue can be seen throughout the protective factors literature, however is of particular relevance within the main effects definition. A strong example of this involves an

individual's associates or peers. As mentioned, having antisocial associates is well known to be one of the major risk factors for offending. Likely due to this, the presence of prosocial or non-delinquent associates is a commonly purported protective factor. However, the way this "associates" variable is measured may make a large difference to the relationship it shows with offending. It may be that it is the overall proportion of pro- versus antisocial associated that influences the outcome behaviour. Or it could be more related to the absolute number of each type of associate. There may also be differences related to how the two are defined. For instance, associates may not be prosocial just because they do not have any convictions or are unknown to the police. This may mean that associates' prosocial activities or beliefs need to be explicitly measured. Thus, there are potential complications inherent in the main effects conceptualisation of protective factors.

As with other models of protective factors, there is also conflict over the terminology used when discussing main effects models. One of the major difficulties within this conceptualisation is the use of the term "independent" when discussing the effects of proposed protective factors. The majority of authors who use the main effects conceptualisation also use this term, and often refer to protective factors as exerting 'independent main effects'. It appears that this is intended to describe the unique contribution these factors provide over and above that accounted for by any assessed risk factors. However, labelling this as independent may also lead to the assumption that such effects meet the requirements of statistical independence (implying the absence of an interaction, as discussed later). To avoid confusion I will therefore be describing these effects as 'unique', unless the analyses used are consistent with a statistical definition of independence. Indeed, it is often unclear whether the term "protective" is being used to describe a main effect or an interactive

effect (Luthar, 1993), or if it is being used interchangeably to describe both types of effect (e.g. Gorman-Smith, Henry, & Tolan, 2004; Jessor et al., 1995, 1998). Luthar (1993) suggests labelling unique main effects simply as protective and differentiating interaction effects with intuitively descriptive terms. However, as mentioned, other researchers use the label protective to refer to interaction effects. In a different attempt to distinguish between the two, some researchers (e.g. Chen et al., 2013; Krohn et al., 2010; Stouthamer-Loeber et al., 2002; van der Laan et al., 2010) use the term "promotive" to describe factors which unique main effects (Krohn et al., 2010). Promotive factors are at times conceptualised as having a corresponding risk factor (Stouthamer-Loeber et al., 2002; van der Laan et al., 2010). This shows a strong similarity to an opposing poles definition, with the key difference being that main effects are described as being independent from the corresponding risk factor.

van der Laan and colleagues (2010) suggest that protective factors are a subtype of promotive factors, with the term promotive used to describe all variables which exert a main effect and the term protective used to differentiate those which only exert interactive effects. In this view, a "compensatory model" describes the effects of promotive factors, where an accumulation of these factors is hypothesised to decrease the likelihood of a negative outcome and increase the likelihood of a positive one (van der Laan et al., 2010). Thus, the main effects of promotive factors *compensate* for the negative main effects produced by risk factors (Fergusson, Vitaro, Wanner, & Brendgen, 2007). It must be noted however that these promotive factors could only be definitely protective, and thereby warrant the addition of a new construct, if for some reason they could not be reframed as a risk factor. Thus, they too run the risk of being relegated to an "opposing poles" definition.

Stouthamer-Loeber et al. (2002) also refer to promotive factors as a way of signifying the belief that they have a corresponding risk factor from the same variable, and separating this from the interactive view associated with protective factors. According to the authors, the same variable can act as a risk factor for one person, as a protective factor for a second, and be neutral for a third. As with other main effects models, these effects are described as being independent from each other, even though the factors can represent the same variable (Stouthamer-Loeber et al., 2002). This conceptualisation is very similar to that of the 'direct protective factors' model to be discussed in the following section (indeed, several authors from Stouthamer-Loeber et al. were involved in the research panel who proposed this model), again reflecting the confusion present with differing terminology.

Luthar (1993) argues that a main effects model would be applicable if the effects of the specific attribute were only of interest in regards to high-risk individuals (i.e. whether high-risk individuals with the attribute showed better functioning than high-risk individuals without it), and the functioning of low-risk individuals was not of concern. This reduces to an opposing poles definition applied only to high risk cases. A given factor is a risk factor if it is framed that way and as a protective one if it is framed another way.

Two illustrative examples of studies where a main effects definition is adopted are described and critiqued below.

Ullrich and Coid 2011

Ullrich and Coid (2011) looked at possible protective factors against violent reoffending and how these may relate to risk factors, citing Rutter's (1985) definition of protective factors as those which modify an individual's response to risk (implying interaction). The authors discuss the lack of empirical research and theoretical

agreement in the area of protective factors, in both general offending, in adult populations, and also more specifically for adult violent offending. They also raise the issue of whether protective effects are stable over time. In this study, 800 male offenders were interviewed while incarcerated to obtain a measure of static risk. These offenders were then interviewed again after they had been released into the community, this time using a questionnaire developed for the study relating to 15 hypothesized protective factors, derived from research of the available literature and clinical expertise. These factors related to areas such as social and emotional supports, religion, financial circumstances, employment, and accommodation. Exploratory analyses showed the inclusion of criminal family members and friends in factors relating to social networks (for example, subjectively perceived social, or emotional, support) to be risk factors. It was therefore decided to exclude from the protective factor list networks associated with criminality. The outcome variable of interest was whether the participants violently reoffended post-release.

Ullrich and Coid employed logistic regression to assess the effects of the possible risk and protective factors. The protective factors were initially assessed using logistic regression, where five of the 15 protective factors were reported to have significant protective effects and were therefore used in subsequent analyses (social support, emotional support, spare time spent with family or friends, involvement in religious activities, and closeness to others). Risk was classified in four levels (low, moderate, high, very high). To assess unique risk and protective effects these risk ratings were entered simultaneously in another regression with the five individual protective factors previously found to have significant relationships with the outcome variable. Only one of the five tested factors showed a significant main effect in this model (spare time spent with family or friends). Risk-level x individual protective

factor interactions were also assessed, however none of these were found to be significant.

To assess protective effects over time, the occurrences of violent reoffending were sorted on the basis of when they occurred after release from prison (in year 1, 2, 3, or beyond year 3). The five significant protective factors from the initial regression analysis were then assessed according to this ordering. Significant protective effects were exhibited for two of the protective factors across all the specified time categories (social support, spare time spent with family/friends). Of the remaining factors, only involvement in religious activities did not show a significant time trend.

The authors concluded that their findings support the view of unique protective effects but not that of an interactive effect between risk and protection. The majority of the significant main effects were related to social supports, and the authors argue that the finding that these significant results only occurred after removing criminal associates from the analyses is important, as it shows that the quality of social bonds is crucial in influencing a positive outcome.

Critique:

In my view, this study demonstrates the seemingly typical use of a main effects model of protective factors, where the belief is that protective factors exert a unique effect on the outcome variable and the underlying rationale that logistic regression can be used to demonstrate this. As previously stated, I do not believe that such a conceptualisation offers any added value to risk assessment, as it is essentially subscribing to an opposing poles definition.

Results showed that social networks only had significant protective effects when they did not include criminal associates. The authors describe this finding as being of considerable importance, stating that it shows how the quality of

interpersonal bonds play a vital role in the relationship between social networks and violent offending. While I strongly agree with this sentiment (indeed it would be extremely difficult to present a convincing argument to the contrary) in my view this is still analogous to an opposing poles conceptualisation, with prosocial associates at one end and antisocial (criminal) associates at the other end of a continuum. Having antisocial peers is a well-known risk factor (Andrews and Bonta, 2010), and I fail to see that this result is demonstrated to be "independent" from it.

Furthermore, the authors report high correlations for seven of the hypothesised protective factors, with four out of the five significant protective factors related to social support showing a strong interrelation. Ullrich and Coid argue that each factor "reflects different aspects of protection" and therefore chose to preserve each variable as separate factors in the analyses instead of employing data reduction, stating that this method avoided problems with multicolinearity. However, no further evidence or rationale is given by the authors for this distinction, and their method appears to instead avoid *removing* problems of multicolinearity. I believe this highlights a potentially important issue in the area of protective factors; that is, the benefits and risks of using broad versus specific factors. Is it preferable to have many very specific factors related to the same overall area (as may be the case in this study) and thereby run the risk of data redundancy and multicolinearity? Or is it instead better to employ broader definitions and face the possibility of only vaguely describing a certain phenomenon? Thus, even if the conceptualisation employed by Ullrich and Coid is accepted as valid, it is possible that there were truly only two significant protective factors found given the strong interrelation between these social support factors.

The use of only static factors to assess levels of risk in this study is also worth mention as it differs from other research in the area (e.g. Hoge at el., 1996; Jessor et

al., 1995; Lodewijks et al., 2010). The authors do not explicitly provide rationale for this, but do comment that the assessment instrument used was chosen due to its simplicity and ease of use compared to other measures while showing comparable accuracy. By nature, static variables are those that cannot change, such as previous criminal convictions or age at first offence, thus it could be argued that the results must be a result of independent effects on the outcome variable. Alternatively, it could also be argued that these variables may instead have a relationship with risk factors not utilized in the study (e.g. their dynamic counterparts), again pointing to a decision to frame a variable as a protective factor rather than a risk factor.

Another notable point of this study is that none of the clinically conceived variables exhibited "main" protective effects; indeed two of them exhibited risk effects instead. This reflects the importance of the methods used to decide which variables used in risk assessment, and supports previous findings that clinical judgement is widely acknowledged as being less effective than empirically based approaches (Hanson & Morton-Bourgon, 2009).

Fergusson, Vitaro, Wanner, and Brandgen (2007)

Fergusson et al. examined the effects of various factors on the relationship between exposure to delinquent friends and self-reported delinquent behaviours in young adolescents. The authors discuss the ways in which factors may operate to exert an influence on an outcome, covering the possibility of both main effects and moderating effects. Fergusson et al. describe moderating relationships (using the term "protection") to describe factors that interact with another factor to lead to a positive outcome, and "vulnerability" to describe factors that interact with another factor to lead to a negative outcome. However, while the authors emphasize the importance of the presence of an interactive process, they also describe these two processes

(vulnerability versus protection) as being "almost interchangeable" (Fergusson et al., 2007, p. 34), and describe the absence of a vulnerability factor as acting as a protective factor. Here, the authors give the example that if childhood adversity is a vulnerability factor that increases the influence of deviant peers the absence of this adversity may be suggested to act as a protective factor by reducing this influence.

Fergusson and colleagues also describe main effects which work to either increase or decrease the likelihood of an undesirable outcome occurring. In Fergusson et al.'s description of main effects, this involves either risk or "compensatory" factors. Here, a compensatory factor acts by exerting a positive main effect that offsets the negative main effect of a risk factor, therefore decreasing the overall risk. Again, the authors describe the relationship between the two types of factors as that of opposites, or "different sides of the same coin" (Fergusson et al., 2007, p. 35), using an example of weak parental attachment as a risk factor and strong parental attachment as a compensatory factor.

A multiple linear regression model was used for the analysis of both main and interactive effects, with self-rated delinquency as the dependent variable. Significant main effects were found for five of their six possible risk/compensatory factors (family background, academic achievement, puberty status, novelty seeking, and harm avoidance). The authors conclude that these variables act as risk/compensatory factors, possessing the ability to either increase or decrease the overall level of risk in all individuals. Only two interactions were found to be significant (puberty status x friends' delinquency; novelty seeking x friends' delinquency).

Fergusson et al. also examined possible cumulative effects using composite scores of the vulnerability/protection or risk/compensatory factors. A composite score was created for each participant, with these scores ranked from participants with low

V/P and R/C composites (high family adversity, novelty seeking, and puberty status; low academic achievement and harm avoidance) to participants with high V/P and R/C composites (low family adversity, novelty seeking, and puberty status; high academic achievement and harm avoidance). A two-way analysis of variance (ANOVA) was conducted with self-rated delinquency as the dependent variable and the composite scores and friends' delinquency as the independent variables. Significant main effects were demonstrated for both, however the interaction of the two was not found to be significant, thus Fergusson and colleagues conclude that the results support a compensatory model.

The authors conclude that their results supported the belief that factors can reduce risk via compensatory processes, shown by main effects, and give evidence against Rutter's argument that an interaction is needed to differentiate between risk and protection.

Critique:

Fergusson and colleagues assert that their study highlights key theoretical issues in the question of how different factors may affect desirable or undesirable outcomes. Indeed, they have demonstrated that influential factors sometimes have simple additive effects on outcomes (or "main effects"), whereas other variables exert an influence that depends on the individual's status on other variables (interaction). This distinction is important in that it determines how each factor should be entered into risk assessment, either by the addition (or subtraction) of a constant, or the addition of a variable that depends on other variables. This type of effort is valuable. However, in my opinion the authors are nonetheless subscribing to an opposing poles definition of protective factors, and as such their conceptualisation of protective factors is redundant in terms of risk assessment.

Rutter's (1985) argument that in order for protection to be differentiated from risk it must be shown to be something other than its mere opposite is referenced by Fergusson and colleagues, as is his subsequent proposal of an interactive model of protective factors. However the authors then go on to assert that their significant main effects show how protective processes can 'cancel out' exposure to other risk factors, resulting in positive outcomes in the face of adversity. Here they argue that their results clearly show that an interactive relationship is not the only way that protective processes work, and that an interaction is therefore not necessary to demonstrate the occurrence of a protective effect. This conclusion is problematic, and it appears that the authors have missed Rutter's point that protective factors are redundant under an opposing poles definition. Instead they seem to have asked whether protective factors (of the opposing poles kind) could be demonstrated without evidence of an interaction. While Fergusson et al. do show that certain variables can exert an effect to decrease the likelihood of a negative outcome, the fact that these appear to be located on a continuum with corresponding risk factors once again evokes Rutter's question regarding the need to create a new concept if these variables can be, or are already being, assessed as risk factors. While it is true that an interaction is not necessary under an opposing poles definition, accepting this means also accepting a redundant conceptualisation of protective factors.

Additionally, unlike others who employ a main effects model of protective factors (e.g. Chen et al., 2013; Jessor et al., 1995; Ullrich and Coid, 2011) the authors never explicitly discuss or measure the incremental validity that might be achieved by including protective factors in risk assessment, although their use of logistic regression assures that the test variables make a contribution to prediction over and above that of exposure to delinquent peers. This leads me to believe that Fergusson et

al. are not employing a main effects model in order to demonstrate that protective (compensatory) factors are a separate construct from risk factors. Instead, it appears to me that the reasoning behind Fergusson and colleagues' approach centres on the notion of additive or subtractive effects. This in turn is dependent on the fact that the variables are not being compared with each other; rather they are all being tested in relation to a single risk factor (exposure to delinquent friends). Fergusson et al. state that the significant main effects all had additional contributions to self-delinquency rates above those from friends' delinquency. However this does not necessarily mean that the protective/compensatory end of the continuum has a different effect from the risk end. It is hardly surprising that a variable such as family background has an additional contribution to self-delinquency after friends delinquency is taken into account. It is logical that an adolescent's family background could influence their delinquent behaviour in either a positive or a negative direction, and in ways that would be different to those that delinquent friends could. However such an occurrence does not demonstrate the existence of two unique processes (risk versus compensatory), it merely shows that family background and friends delinquency are different in their relationship to the outcome. Thus in my opinion this does not provide a satisfactory rationale, and shows no unique information that would be added by assessing these protective/compensatory factors. As in other examples, they can be re-framed as risk factors, a compensatory process is not necessary and no new construct is called for.

The participants in this study are consistent with a general population sample rather than a high risk one, a factor that may influence how the assessed variables are viewed. Particularly, when authors are using general population samples they may reference their variables in relation to norms (for example, viewing academic

achievement as below normal, normal, or above normal). It might be that they are implicitly asking whether these two differences (below-normal, normal-above) affect outcomes differently. In psychology, with specific populations it is more common to have a scale from low to high, and simply ask whether there is a correlation. It appears that these factors were measured and entered as continuous variables with risk at one end and compensatory at the other. This would make Fergusson et al.'s approach consistent with that typically seen within psychology for specific populations, and is therefore potentially at odds with their choice of a general population sample. The variables' purported effects are based on the direction of influence on the outcome variable, specifically either a decrease or increase in participant delinquency. The direction, in turn, would depend simply on whether the item was framed positively or negatively. (Notably, in this study a desirable outcome is defined as "low" delinquent behaviours.)

In conclusion it appears to me that, despite the authors' assertions, there is no attempt to show the usefulness of a main effects model. In my opinion this is another example of how the frequently criticised opposing poles model can be repackaged to have greater face validity, while in reality not providing any additional informational from existing risk factor models.

Main effects model conclusion:

I believe that the current usage of main effects models of protective factors does not provide any additional information to risk assessment or address Rutter's concern over the creation of a redundant concept. While these models may differ in their central reasoning, they are all essentially based on the principle of having a direct effect on the outcome variable. However, this rationale does not necessarily mean that such factors are uniquely protective, just that they have a different

relationship (i.e. the reverse relationship) to the outcome variable than the predefined "risk factors" they are being compared to. When assessing such studies, it is important to ask whether scoring "yes" on one of these purported protective factors shows any difference from scoring "no" to its corresponding risk factor. That is, would assessing a variable along a continuum which allows for protective effects tell us any more than assessing either the presence or absence of its corresponding risk factor would? While opposing poles models of protective factors are openly criticised and seldom used in an explicit manner, main effects models are far more common and accepted. However, it can be argued that they are essentially the same. Additionally, both of the studies discussed in detail (and many others included in the review of the current literature) include analyses that go beyond the initial question of assessing the viability of proposed protective factors. Ullrich and Coid analysed the effects of protective factors over time, and Fergusson et al. considered possible cumulative effects. While such questions may certainly hold merit, there is again the need to have an agreed definition of protective factors in place before exploring them; otherwise such research will only serve to further confuse an already conflicted subject matter.

Interaction/moderating model

An alternative view is that protective factors are separate, distinct variables and *interact* with risk factors to determine probability of offending. In this view, protective factors exert a buffering or moderating effect on recognised main effects. As illustrated in Figure 1, if protective factors act as moderators there is a differential relationship between risk level and the outcome variable. If protection is absent or low, there is a positive linear relationship between the two. However if protection is high, the relationship is markedly reduced, indicating an interaction (Jessor et al.,

1995). The terms “moderator” and “buffer”, in their technical senses, refer to the same effect.

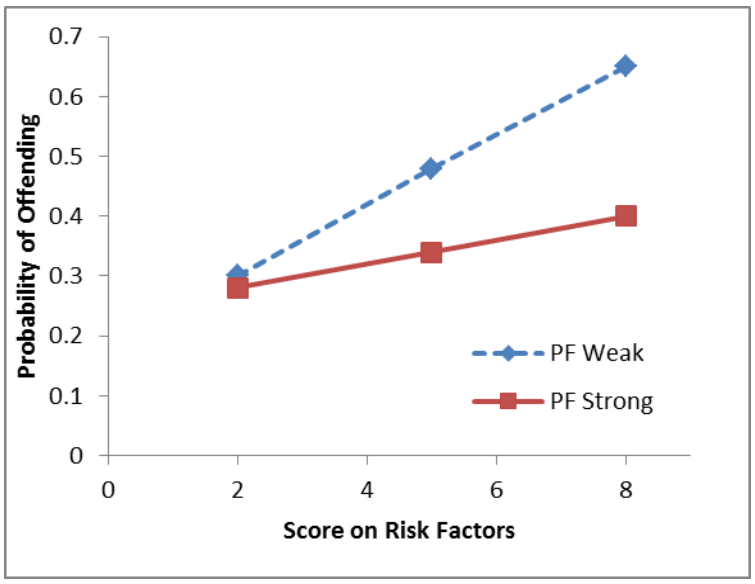

Figure 1: interactive relationship between risk and protective factors

For example, Chen et al. (2013) found that future expectations moderated the relationship between violence exposure (risk factor) and delinquency, whereby the association between the risk factor and outcome variable was weaker when future expectations were high than when they were low. This meant that for individuals who thought they were more likely to experience positive outcomes (e.g. graduating from college) there was less difference in delinquency rates between the exposed and unexposed groups than there was for individuals who did not think they were likely to experience positive outcomes (Chen et al., 2013). Thus, unlike the opposing poles model, here the influence of protective and risk factors comes from different domains (Jessor et al., 1995; Jessor, Turbin, & Costa, 1998) and also affect the outcome (probability of offending) in very different ways.

In this view, for a protective effect to be demonstrated, there is a requirement of a statistical interaction between the protective factor and risk. Such protective factors would not simply subtract from (or add to, if framed differently) risk scores, as is the case for the opposing poles and main effects models. Instead their presence would alter the weighting given to a risk factor score in calculating overall risk. Thus, the steps needed to incorporate this type of protective factor into risk assessment would likely be much more complicated. For example, in Chen et al.'s (2013) findings, the extent of violence exposure and the height of positive expectations would influence the final outcome probability in a way that cannot be assessed by simple addition or subtraction. This model may be more useful than the alternatives, and would warrant the addition of protective factors to risk assessment. However, survey of the literature suggests that this definition is not always employed, and when it is it there are often associated problems.

Of the 31 studies surveyed in the present research, 14 did not test for interactions. Of those that did, only 9 found significant results. Furthermore, even when this definition purportedly *is* adopted, there is variation in how strictly the conditions for its application are imposed. For example, some research reports endorse the interaction view of protective factors, but do not test for or report interactions (e.g. Miller, 2006; Rennie & Dolan, 2010; Vance et al., 2002). In Rennie and Dolan (2010), for example, the possibility of interactive effects of protective factors is mentioned, however only correlational and regression analyses are used, with no interaction term tested and no reference to this omission. The authors refer elsewhere to possible 'buffering' effects of protective factors, and report Receiver Operator Characteristic (ROC) analyses to assess them. This analysis is discussed in terms of assessing predictive validity of the protective factors for individual

reoffending. It is also stated that the Area Under the Curve (AUC) is used to determine the optimal number of protective factors required for a buffering effect. The authors conclude that the effects of risk factors on reoffending *might* be buffered by protective factors, and that one protective factor is the optimum number to do so. However, no further justification is given for how ROC or AUC demonstrate a buffering effect. Given that this is not the standard use of such analysis it therefore appears that the authors are using the term buffering in a colloquial sense, as its use in a technical sense is unsubstantiated. Much the same criticism can be made of several other studies, where terms such as interaction, moderation or buffering are used but the statistical analyses reported do not support them. For example, Hoge et al. (1996) found no significant interaction between risk and protective factors with juvenile delinquents, yet go on to conclude that several of the protective factors assessed acted as "buffers against risk" (see also: Lodewijks et al., 2010).

Among the interactions which meet the statistical definition, there is a range of different relationships that could reasonably be described as protective effects. Luthar (1993) proposes that there be further differentiation of protective factors by specifically labelling three different relationships. In Luthar's terminology, "protective-stabilizing" is used to describe relationships where individuals with the protective factor show stability of functioning across risk levels, such that there is no (or weak) difference in performance between low and high risk individuals who possess the protective factor, but those without it show progressively poorer outcomes as risk increases (Figure 1). Two others are illustrated in Figure 2. "Protective-enhancing" describes a situation where the possession of the protective factor allows the individual to improve their outcomes by 'engaging' with risk. Lastly, "protective/reactive" relationships are where the presence of the protective factor is

generally advantageous, but especially so at low risk levels. In all these examples high-risk individuals who possess the protective factor show better functioning and outcomes than those who do not, but it is clear that the processes behind these relationships are markedly different. In Luthar's conceptualisation, direct ameliorative effects (i.e. main effects with no interactions) would be simply labelled "protective". Luthar suggests that these differentiating labels could also be applied to vulnerability (i.e. risk).

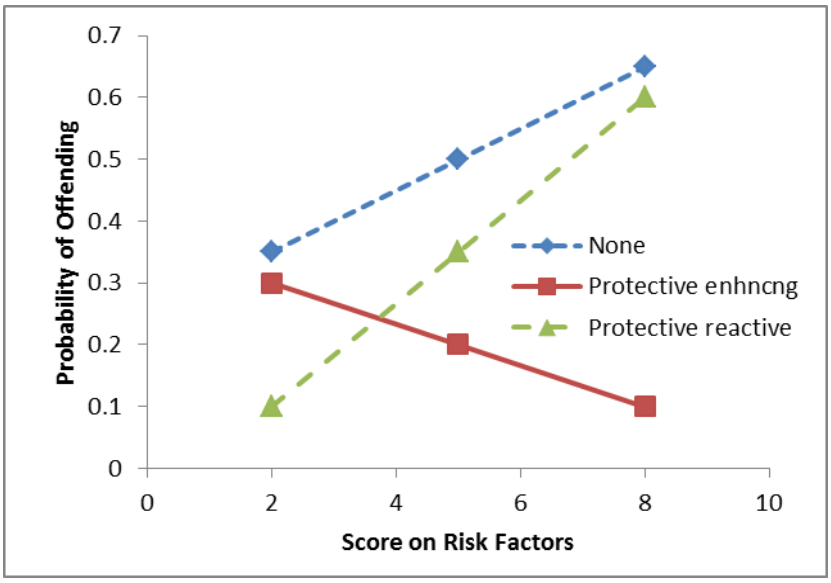

Figure 2: protective-enhancing and protective-reactive interactions

Statistical interaction is typically tested using regression analysis with an interaction term. However, some researchers who apparently adopt this definition employ alternative statistical methods, a number of which are questionable in their ability to identify interactions. One example is the use of chi-square analysis to test differences in the influence of protective factors on offending for groups of low- and high-risk individuals. In such cases, samples are split into high and low risk subgroups using a median split. They are then further split to compare the impact of protective factors on recidivism *within* each risk level. For the high-risk groups, analysis compares those who have protective factors to those who do not. For the low-

risk groups, those with zero or one protective factors are compared to those with two or more protective factors. Thus, the high- and low-risk groups are never compared to each other. Authors then conclude that protective factors demonstrate a buffering or interactive effect if significant differences are found for the within-group comparisons. For example, if individuals in the high-risk group with protective factors have significantly lower recidivism rates than those with no protective factors, a buffering effect is said to be present (e.g. Lodewijks et al., 2010). Results of such tests have been used to assert interactive effects of the measured protective factors on the likelihood of violent reoffending (Lodewijks et al., 2010); however it is very questionable whether these analyses truly test for interactions.

Another potential issue in the use of an interaction definition is that instead of testing interactions between individual risk and protective factors, some researchers instead use composite of multiple factors to test for an interaction. These may be composed of all the risk or protective factors measured (e.g. Deković, 1999; Jessor et al., 1995; Jessor et al., 1998) or separated into domains (e.g. van der Laan et al., 2010). This raises the question of whether it is more useful to know whether total risk and total protective factor scores interact, or whether individual items should be studied. If the latter, then there are problems arising from statistical power (to avoid Type 2 error) and the need for replication (to avoid Type 1 error) that place rather greater demands on research than the study of main effects. As shown by Krohn et al. (2010) if research of possible interactions between individual protective and risk factors involves testing each possible combination, the large number of results makes it likely that some significant interactions will be found. Thus, the multiple comparisons needed increases the risk of Type 1 errors. Conversely, it is also crucial to note the potential difficulty faced in detecting truly significant interactions (false

negatives). One reason for this is that the statistical power available to identify interactions is unavoidably less than that in direct analyses, such as those assessing main effects (Rutter, 2012). Paradoxically, the small effect sizes associated with interaction analyses mean that replication of significant results is necessary, while also making the likelihood of such an outcome low (Luthar, 1993).

Chen and colleagues' (2013) study represents the successful application of an interaction model. In the following pages, I describe and comment on several others that illustrate the problems identified above.

Jessor, Van Den Bos, Vanderryn, Costa, and Turbin (1995):

Jessor and colleagues (1995) examined how psychosocial variables may act as protective factors in relation to youth delinquency and other problem behaviours, specifically focusing on moderator relationships between protective factors and risk level. While the outcome variable of interest (problem behaviour) was not specifically focused on youth delinquency (alcohol and drug abuse and early sexual intercourse were also measured), this study is relevant to the present research given that such behaviours during adolescence are typically violations of the law. Additionally, alcohol and drug abuse are commonly linked with offending (Andrews & Bonta, 2010).

In this study, the authors conceptualise protective factors as variables which decrease the probability of behaving in a socially undesirable or unacceptable way, with various ways in which the factor can influence behaviour. According to their view, some factors, such as strong religious beliefs or consistent parental discipline, can act directly as personal or social restraints against problem behaviour. Other factors act more indirectly, such as involvement in and orientations toward conventional prosocial groups or activities generally being incompatible with or

providing a replacement to antisocial behaviours and cognitions. Jessor and colleagues specifically address the issue of whether the risk and protective factors used are merely opposite poles of the same variables and not separate independent variables. According to the authors, this potential problem is avoided by deliberately conceptualising protective factors as having markedly different properties from risk factors. In the conceptualisation used, protective factors are variables that show an individual is involved in and dedicated to "conventional society", and that control against or are incompatible with socially unacceptable activities and behaviour.

In order to test the nature of the relationship between risk and protection, Jessor and colleagues created composite scores for both, using variables with an established relationship to problem behaviour. The Protective Factor Index (PFI) was comprised of seven protective factors from three categories. Personality factors were: positive orientation to school; positive orientation to health; and intolerant attitudes toward deviance. In later waves of the study, religiosity was also included in this section. Factors related to an individual's perceived environment were: positive relations with adults; the perception of strong social controls or sanctions for transgression; and awareness of friends who model conventional behaviour. The one behavioural factor included was actual involvement in prosocial behaviours (e.g. volunteer work, family activities). The Risk Factor Index (RFI) included six risk variables from the same categories. Personality factors were: low expectations for success; low self-esteem; and a general sense of hopelessness about life. Perceived environment risk factors were: awareness of friends who model involvement in problem behaviour; and a greater orientation toward friends than toward parents. Poor school achievement (and, in subsequent waves, school dropout) was the one behavioural risk factor.

Jessor and colleagues' employed hierarchical multiple regression to analyse the risk and protective composite scores in predicting problem behaviour. The results showed a significant RFI x PFI interaction, indicating a protective effect. Specifically, when protection was high there was a greater reduction on the effect of risk on problem behaviour than there was when protection was absent or low. (In Luthar's terms, this is a "protective-stabilizing" effect.) Cross-sectional replication of these results using subsequent waves of data also showed significant interaction effects in two out of three cases. The additional variance accounted for by these interactions was generally not large; however the authors argue that it is still noteworthy given the difficulties faced in finding significant moderator effects in field studies (e.g. McClelland & Judd, 1993). The results also showed significant main effects for protective factors.

Jessor et al. conclude that the evidence of moderator effects of protective factors, as shown by RFI x PFI interactions, were likely the most theoretically significant results of their study. They also conclude that the results support their conceptualisation of protective factors as being distinct from risk factors and show the value for this distinction. Several results are cited by the authors as evidence that protective factors are conceptually distinct from risk factors, including the finding that the PFI and RFI only share 18% common variance. Another example used is that while the risk factor Friends as Models for Problem Behaviour and the protective factor Friends as Models for Conventional Behaviour appear likely to be opposing poles on the same variable, the two measures only show a modest correlation of -.20. Furthermore, correlations with other measures were relatively different for the two, such as Prosocial Activities, which had a correlation of .32 with Friends as Models for Conventional Behaviour, compared to a correlation of -.11 with Friends as Models for

Problem Behaviour. Similarly, the Multiple Problem Behaviour Index, which was the overall composite of problem behaviours, showed a correlation of -.21 with Friends as Models for Conventional Behaviour, in contrast with a correlation of .62 with Friends as Models for Problem Behaviour.

Critique:

In my view, Jessor and colleague's study shows both strengths and weaknesses in regards to the conceptualisation and examination of protective factors. Their attention to the question of whether risk and protection are separate constructs is commendable, as is their inclusion of the potential moderating role of protective factors. There is however a potential issue with composite scores being used to examine the relationships between risk and protection. Jessor et al. address the fact that such method can conceal the differential influence of specific factors and therefore "unpack" the composite scores and retest the correlations of each factor individually, but do not include interactions in this stage. While this may indicate factors to further examine, it does not provide specific factors to add to risk assessment. Ultimately though, the findings of RFI x PFI interactions do hold promise for this conceptualisation.

The main effects findings show similar issues to studies previously discussed. Most of the risk factors used by Jessor et al. do not have corresponding protective factors, or vice versa. The authors cite the low correlations between variables as evidence for the two representing distinct domains, and at first glance this argument appears compelling. However, with the exception of Friends as Models of either conventional (protective) or problem (risk) behaviour, there are no exact opposites among the two categories, which could account for the lack of strong correlations. The question of how such items are framed is therefore relevant here, as all the

proposed protective factors could be reframed as risk factors. Additionally it is again worth considering that how the factors are measured may influence the findings. For example it may be that the *proportion* of friends who are engaged in either conventional or problem behaviour is more important than the absolute number. That is, if some respondents have some friends doing one and some doing the other, while others have only friends doing one of these, it may (again) explain the low correlations. Therefore, it appears that the significant main effects found may have more to do with the how the items were framed or measured rather than each category representing distinct constructs. It is essentially still possible that all the "protective" factors (excluding Friends as Models for Conventional Behaviour) are actually just the opposite end of risk factors that might have been (but were not) included in the RFI. If this is the case there would still be no additional benefit gained by accepting these as protective factors.

Hoge, Andrews, and Leschied (1996):

Hoge, Andrews, and Leschied (1996) examined the relationship between specific risk and protective factors and their effect on reoffending and compliance with probation conditions. The study population consisted of 338 male and female convicted youth offenders, thus this study relates directly to correctional psychology. Three risk factors were selected to represent family functioning: family relationship problems, parenting problems, and parental problems. The four items included as possible protective factors were related to social and academic functioning: positive peer relations, participation in organised leisure activities, positive response to authority, and good school performance. Risk and protective variables were analysed in terms of their individual main effects with the outcome measures, and also for interaction effects. Results showed that two of the three risk factors (problems in

family relationship and parenting) had a significant relationship with both reoffending and probation compliance, where the presence of these factors was associated with higher levels of reoffending and lower levels of probation compliance. Additionally, all four protective factors showed significant relationships with the outcome variables, in that their presence was associated with lower reoffending rates and increased compliance. Logistic regression analyses were used to look for any interaction effects between risk and protection, with the parent problems index omitted due to it not showing a significant correlation with the outcome measures. All protective factors remained significantly related to both outcome variables once the risk factors were controlled for. However, results showed no significant interaction effects between any of the risk and protective variables. Thus, protective factors did not influence the impact of risk factors on reoffending across the individuals. However, the authors then proceed to describe the protective factors as acting as "buffers" between the risk factors and outcome variables measured. Furthermore, they also conclude that protective variables should be included in assessment in order to consider potential strengths.

Critique:

The main problem with Hoge and colleagues' study concerns their use of the term "buffer" in the absence of a moderating relationship. In their Introduction, the authors make references to Luthar's classification and emphasize the distinction between interactions and main effects, but then seemingly disregard this after failing to find significant interaction effects. Their recommendation to include protective factors in assessment therefore seems to lack foundation. The main effects they report for purported protective factors may justify inclusion of items concerning the domains of social and academic functioning. However it seems an arbitrary decision to frame

questions concerning family functioning as deficits and those concerning social and academic functioning as strengths.

Krohn, Lizotte, Bushway, Schmidt, and Phillips (2010):

Krohn, Lizotte, Bushway, Schmidt, and Phillips (2010) employ two methods in defining and assessing relationships between risk and protective factors: a "traditional" approach, and a new approach using a trajectory-based analysis. The same data were used in both cases, sourced from the Rochester Youth Development Study. This study involved information collected from 1,000 adolescents in relation to the causes and consequences of various forms of delinquency. The data used by Krohn and colleagues encompassed eight waves of data collection, with the average age of participants ranging from 14 to 17.5 years of age during this period. The majority of this sample (75%) was deemed to be at a greater risk than the general population for serious and violent delinquency, due to intentional oversampling of males and students from high-crime neighbourhoods.

Krohn and colleagues address some of the issues faced when studying protective factors, namely whether risk and protection are conceptually and empirically distinct, and the danger of producing statistically significant results through chance. When discussing these points, they argue that because their trajectory based approach focuses on behaviour that has already been "expressed" (i.e. some of the adolescents in the sample have already committed violent acts) identifying risk factors predictive of the outcome variable is no longer a requirement. According to the authors' reasoning, the trajectory approach shifts thinking from a prevention based framework to one instead focused on treatment, which (in their opinion) is more relevant due to the prevalence of violence present in this population. Krohn et al. also argue that because multiple individuals may start out at the same point but diverge in

their behaviours, and therefore outcomes, it is more productive to identify which patterns are the most amenable to treatment, and which patterns are likely to cease the unwanted behaviour over time without intervention (i.e. the desistors). The authors also assert that because the trajectory approach removes the need for testing the large amount of interactions commonly seen in traditional methods, there is less likelihood that any significant interactions are only due to chance. Thus, in Krohn et al.'s view their trajectory approach avoids the difficulties typically seen when attempting to distinguish risk and protection from one another.

Krohn and colleagues also make a distinction between promotive and protective factors, with the term promotive being used to describe factors which reduce violence for the whole population (main effects) and protective being used to describe only those factors which reduce violence in the presence of risk (interaction effects). According to the authors' conceptualisation of protective factors a significant relationship between a promotive factor and the outcome variable is not enough to constitute a protective effect, consistent with Rutter's view. Instead, Krohn et al., argue that an interaction needs to be present, thus showing that protective factors reduce the outcome variable more for those individuals who are at high risk than for those at low risk. Consequently, the two methods used by Krohn and colleagues both employ an interaction based approach, but differ in the way risk is defined and interacted with the possible protective factors.

In their first method, referred to as the "traditional approach" Krohn et al. grouped 20 risk factors into six groups (four domains and two cumulative measures). Possible protective effects were assessed by testing all possible interactions between these risk groups with 20 promotive factors (15 individual factors and 5 cumulative measures) for each of the two outcome variables (violence incidence; gun or weapon

carrying). This method results in a total of 240 interactions. There were only 8 significant interactions present, all of which were for the same outcome variable (violence incidence). Thus, Krohn and colleagues conclude that the presence of significant interactions using this method was likely only due to chance. According to Krohn et al., assessing all possible interactions is problematic because the lack of a systematic approach is inefficient and may lead to chance findings being accepted as meaningful.

To test a possible alternative to the traditional approach, Krohn et al. employed a trajectory based approach for their second method, aiming to both conceptually and empirically identify factors that have a protective effect on adolescents already engaging in violence. This is done using information regarding an individual's past behaviour to define their risk for violence and estimate their future trajectory of behaviour. According to the authors, a trajectory based approach takes the changing nature of behaviour across adolescence into consideration, analysing not just the beginning and end points but also the period between. In their view, there are two key differences between the methods. First, the trajectory approach utilizes developmental information collected in previous waves. Second, the trajectory approach focuses on violent behaviour (outcome variable) instead of variables hypothesised to increase risk, thus following the notion that understanding past behaviour is the best way to predict future behaviour, at least when considering behavioural patterns that are typically established by mid adolescence.

Krohn and colleagues estimated these trajectories based on participants' self-reports of violent behaviour over 7 waves of the study (average age 14 to 17) in order to predict violence in wave 8. Here, the sample population was divided into four groups representative of the key patterns of offending shown (non-offenders,

decliners, bloomers, and chronics). In this approach, risk is a latent variable measured using the data from waves 1-7 and represented by these trajectory groups. Each group was then tested for a significant interaction with the promotive factors used in the first method. For example, the "bloomer" group would be tested for interactions with the 15 individual promotive factors and the five cumulative measures. Unlike in the first method where each possible interaction was tested in a separate equation, the trajectory approach employs a more complex formula, thus resulting in fewer equations. The non-offenders group acts as a reference group and is therefore excluded from this formula, and the three remaining groups are entered in each equation. This results in three interaction coefficients being tested for each equation, although significant interactions were only expected for the "chronic" and "late-bloomer" groups because they are the only trajectories which represent active violence.

Results from Krohn et al.'s trajectory approach were supportive of this model of protection. For the outcome variable of violence incidence, none of the interactions between the decliner group trajectory and promotive factors were found to be statistically significant. However, significant interactions were present for promotive factors with both the chronic and the late-bloomer trajectories when predicting violent outcomes. These findings were in accordance with the authors' hypothesis that decliners and non-offenders do not need protection and therefore there would not be any significant interactions present. Only two significant main effects were found for promotive factors across both outcome variables, which the authors suggest were likely due to chance, indicating that these variables do not act by decreasing violent behaviour in all individuals. However main effects were not the focus of this study, or thought to play a role in the trajectory model of protection.

There were six significant negative interactions for promotive factors with the chronic offender trajectory group, thus indicating protective effects. Family-related promotive factors showed the most significant interactions of any one domain, with parental supervision, parent partner status, and cumulative family domain promotion all showing interactive effects with the chronic offender trajectory. Educational aspirations, self-esteem, and cumulative promotion across all domains also displayed significant interactions. Krohn and colleagues suggest that these results are very encouraging given that chronic offenders show a very serious trajectory and intuitively appear unlikely to change. Additionally, the fact that cumulative promotion across all the domains shows a significant protective effect means that violence incidence will decrease as the total promotive factors, across domains, increases. The late bloomer group only showed significant interactions for academic achievement and group conventional behaviour, indicating that individuals in this group may be sensitive to specific protective effects but not broad (cumulative) ones. Krohn et al. did not find any significant interaction effects for the gun or weapon carrying outcome variable.

From their research, the authors conclude that their trajectory model of risk and protection is more suitable than the traditional approach, and that there is an important need to shift from a prevention focused model to a treatment based one. In Krohn et al.'s opinion, the traditional method of testing all possible risk and promotive interaction terms for protective effects is cumbersome and jeopardizes the statistical legitimacy of any significant results. Measuring risk using a trajectory approach means that fewer interaction terms need to be tested and, according to the authors, provides a more accurate measure of how risk operates over time.

Additionally, they believe that their approach avoids the difficulties regarding overlap of risk and protective variables, both conceptually and empirically.

Critique:

Krohn and colleagues' use of a trajectory model to test for interactive effects of protective factors appears to offer a promising alternative to assessing problem behaviour. The attention to the variation present in such situations demonstrates the fact that individuals can exhibit the same early problem behaviour, but reach different outcomes than one another. I also appreciate Krohn and colleagues' emphasis on the statistical issues present in traditional approaches when testing interactions, and believe that this is a crucial matter to attend to when conceptualising protective factors. However, I do not agree with Krohn et al.'s opinion that the trajectory approach concretely distinguishes between risk and protection. Instead, in my view, it simply removes the need to compare the two. In this instance, risk is only framed as the pattern of behaviour (e.g. violence) across time. The authors argue that removing the focus from prevention removes the need for traditional risk factors to be measured because they no longer need to be identified once the outcome behaviour is already expressed. According to their reasoning because the behaviour is already occurring it is no longer necessary to predict it. It appears to me that this may instead be another way to re-frame already existing risk factors. This would make the main effects demonstrated redundant, although as noted these were not the key focus of the study and they appeared to be due to chance anyway. However, the fact that significant interactions were found indicates that the protective factors were doing something more than just subtracting from (or "compensating") risk, which suggests potential for this method. Additionally, the authors also emphasise how the treatment-centric mindset of this approach differs as compared to the prevention focus of traditional

models. However, it is difficult to see that there is a real distinction between this and current risk assessment where one of the main purposes is to decide who needs what type of treatment or intervention. Thus, I believe that a trajectory approach is promising but requires further study to investigate whether it truly supports the addition of protective factors as a new concept.

Interaction/moderating model conclusion

I believe that a conceptualisation of protective factors centred on the principle of an interactive or moderating relationship with risk level is one which offers the most promise in terms of identifying a new *construct* that makes a unique contribution to risk assessment. However, the increased complexity of this model compared to others can lead to additional difficulties surrounding the definition and assessment of such factors. The statistical limitations found when testing multiple factors for possible interactions may play a significant role in this research, but that is a practical rather than conceptual issue. The use of composite scores for testing interactions is another area in need of further examination, as it is fairly commonly employed but under researched. As examination of the above studies underscores, the issue of variation in definitions and methodology is apparent in this conceptualisation as well, further limiting the conclusions that can be drawn about the sample as a whole. Again, I believe there is a great need for further acknowledgement of this variation, and increased research and effort for finding a more unified approach.

"Trichotomization" model:

The last major conceptualisation to be discussed is the so-called "direct" risk and protective factors advocated by the American Centers for Disease Control (CDC) in a recent issue of the American Journal of Preventive Medicine, which uses the process of trichotomization to examine separately the effect on outcomes of two

"ranges" of values on the factor of interest; low-normal, and normal-high (e.g. Hall, Simon, Mercy, et al., 2012; Stouthamer-Loeber et al., 1993). This view is similar to the main effects conceptualisation already discussed, in that it asserts the independence of protective and risk effects on the outcome variable, however the rationale and methodology seen in this research differs from that previously discussed. The methodology behind this conceptualisation was first proposed by Stouthamer-Loeber and colleagues (1993) based on the view that protective effects are related to desirable outcomes and can be exerted by a variable that may also act as a risk factor. Recently this model has been expanded in a series of articles from an expert panel of the American Centers for Disease Control (CDC) looking at protective factors for youth violence perpetration (see Hall, Simon, Mercy, et al., 2012). Again, this is not strictly in the area of correctional psychology, however the topic of violence is undoubtedly relevant and the promise of this conceptualisation bears exploration.

In this conceptualisation, "direct" protective factors are identified through the identification of linear versus nonlinear relationships between outcomes and a predictive factor. Specifically, a sample is split into three roughly-equal groups (hence "trichotomized") based on scores on the factor of interest. Outcomes for each of the two extremes (high and low) are then tested against the outcomes observed in the middle group, using a standard statistical test.

This middle group is purported to represent a "neutral" group, and the method of comparing each extreme to this group is asserted to ensure variables can be correctly assessed for both risk and protective effects (Bernat, Oaks, Pettingell, & Resnick, 2012; Herrenkohl, Lee, & Hawkins, 2012; Stouthamer-Loeber et al., 1993). The panel state that this allows for direct protective effects to be identified in a

method similar to that used for identifying risk effects, whereby the amount or sort of risk factors also present has no influence (Hall, Simon, Mercy, et al., 2012). It may appear that this conceptualisation is identical to the main effects one previously discussed. Indeed, Lösel and Farrington (2012) correctly describe direct protective factors as referring to the main effect of a variable, and Hall, Simon, Mercy, et al. (2012) state that such factors are best identified through analyses of main effects. However, the panel clearly attempts to differentiate their conceptualisation from those previously used. It is easy to see this in regards to an opposing poles theory, as there are multiple instances where the authors are openly critical of methods that assume protective factors are simply the opposite of known risk factors (e.g. Hall, Simon, Mercy, et al., 2012; Loeber & Farrington, 2012). Their dissent from the "traditional" main effects model (such as that used by Jessor et al., 1995) is not as explicit, however it can still be inferred from their statements regarding what is necessary for identifying direct protective factors. Thus, the process of trichotomizing potential risk and/or direct protective factors (that is, the requirement of three categories at minimum to ensure the presence of a "neutral middle") and analysing the linearity of their relationship to the outcome variable are the central justifications of this conceptualisation.

According to this model, some variables may act as either only a direct risk factor, or only a direct protective factor, which is demonstrated as a non-linear relationship in the relevant direction (Loeber & Farrington, 2012). For the sake of clarity, such variables will be referred to here as 'pure' factors. Alternatively, a variable may act as both, as seen in linear relationships (Loeber & Farrington, 2012). The authors discuss the variety of descriptive labels applied to factors with protective effects in the current literature, but make a decision to limit such description within

their work and instead place emphasis on the actual mechanisms that produce these protective effects (Hall, Simon, Mercy, et al., 2012). In the case of a pure direct protective factor, different values on the variable may reduce risk below that of the middle group (i.e. the reference level), but there is no range of values that take the individual's risk above it. Conversely, pure direct risk factors are those where certain values may increase risk above the middle group, but there are none that take the individual's risk below it. Thus, both exhibit nonlinear relationships to outcomes (violence). These pure risk and direct protective functions can be combined, such that the two extremes have risk and protective influences respectively, *relative to* the nominated reference level. In such cases, the relationship is linear. These three relationships are illustrated in Figure 3 (assume that large differences in outcome are statistically significant, and small ones are not). The process of trichotomization is purported to ensure that risk and protective factors remain independent (Loeber & Farrington, 2012; Stouthamer-Loeber et al., 1993).

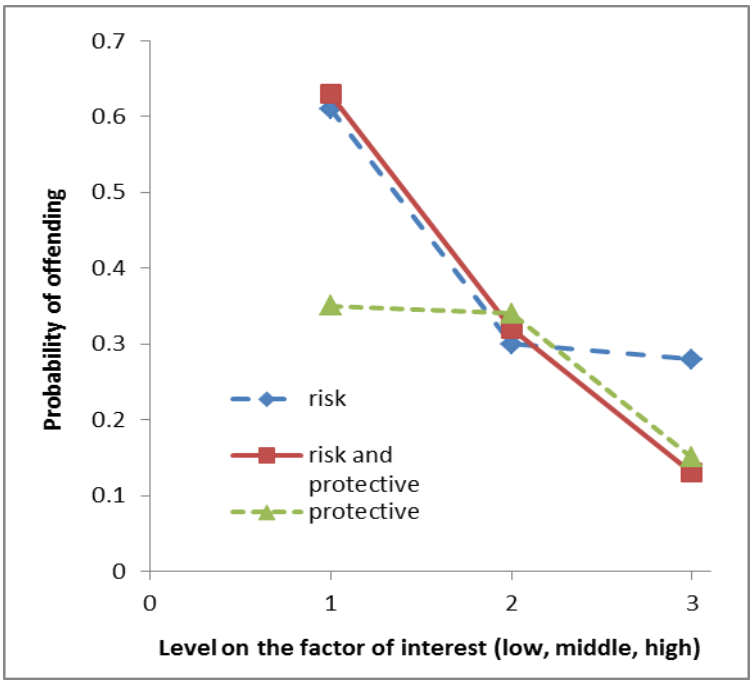

Figure 3: examples of linear and non-linear relationships between risk, protection, and offending

An important requirement of this method is that variables are measured at above a dichotomous level. Another requirement is a statistical design sensitive to non-linear relationships (Lösel & Farrington, 2012). Throughout the article series, the authors state that risk and direct protective effects are independent and conceptually distinct. However, Lösel and Farrington (2012) also assert that in principle they come from the same variables and in linear relationships a variable can act as either, with the effect from the protective pole of a variable (indicating not just a lack of risk, but also an active, positive influence on the likelihood of a desirable outcome). Thus, the panel's use of the terms risk and protective can refer to different extremes or degrees of a variable and not a separate variable overall. Lösel and Farrington acknowledge that in a conceptualisation where a given variable is both a risk and protective one it is possible to emphasize one over the other, resulting in a possibly biased perspective. In their perspective, when outcome prediction is guided predominately by risk factors, the amount of remaining variance for the protective influence of the same variables is reduced. Thus, they assert that "researchers can decide whether they want to give more emphasis to the risk or protective side of their investigation" (Lösel and Farrington, 2012, p S17). The panel also consider that protective factors may change over the developmental period, with factors that are protective at one age no longer being so at another. For example, high educational aspirations may show a direct protective effect against violence in the early years of adolescence, but not be predictive of violence involvement in later stages (Bernat et al., 2012). Protective factors may also differ over the course of a specific behaviour, such that factors that are protective against the onset of violence may not be so in the desistance of it and vice versa (Lösel & Farrington, 2012).

Overview on entire CDC study

The CDC panel's investigation included four studies of direct protective factors. The studies' key definition of direct protective factors is that they *"precede youth violence perpetration and predict a low probability of youth violence perpetration in the general population"* (Hall, Simon, Mercy, et al., 2012, p S3). Lösel and Farrington (2012) advocate the use of population samples due to the fact that they are generally larger, have increased statistical power, and allow for more complex analyses in comparison to using high-risk populations which typically have greater clinical relevance. Direct protective factors are related to desirable outcomes, and are said to act directly to either decrease or prevent the likelihood of violence in a way that is not conditional on the risk level present (Hall, Simon, Mercy, et al., 2012). The definition of violence varied slightly across studies, but essentially consisted of aggravated assault, robbery, and weapon use in a fight (Loeber & Farrington, 2012). Because the examined studies were independently designed there was more variation in the predictor variables assessed, however all came from the core domains of individual, peer, school, family, and community factors (Loeber & Farrington, 2012; Pardini, Loeber, Farrington, and Stouthamer–Loeber, 2012).

Statistical analyses

In the trichotomization methodology as applied by the CDC panel to the four studies (Bernat et al., 2012; Henry, Tolan, Gorman-Smith, & Schoeny, 2012; Herrenkohl et al., 2012; Pardini et al., 2012), analyses were first performed at the bivariate level using the trichotomized groupings to identify which variables had significant direct protective and/or risk effects on the outcome measure of violence. As previously mentioned, this process involves scores on the variable to be divided into 1) the lower 25%, 2) the (purported neutral) middle 50%, and 3) the upper 25%

of scores. Contrast-coded dummy variables were created when possible in order to separate the examined variables, allowing for simultaneous comparison of both the possible risk and direct protective factors to the assumed neutral middle within the regression model. An example of this could be when examining the effects of attention problems, scores within the lower 25% could be coded as "1", scores within the middle coded as "2", and scores within the upper 25% coded as "3". For some variables trichotomization was not possible and thus only the risk or the direct protective effect was tested, based on previous research (Hall, Simon, Lee, & Mercy, 2012; Herrenkohl et al., 2012).

The next stage of analysis was at the multivariate level using logistic regression. Here the variables found to have significant effects at the bivariate level were entered as predictor variables, and violence as the outcome variable. If a non-linear relationship (e.g. only a risk effect or only a direct protective effect) was found for a variable at the bivariate level, it was then dichotomized, meaning that the extreme 25% would be compared to the remaining 75% for the multivariate analysis. This was done in order to preserve statistical power by including maximum participant numbers. However for those variables with a linear relationship, the contrast-coded variables were retained in order to test both effects. (Loeber & Farrington, 2012; Pardini et al., 2012).

Individual studies

The CDC panel applied their trichotomization framework of risk and direct protective factors to four studies. Henry and colleagues (2012) analysed data from the Multisite Violence Prevention Project (MVPP). This study included 4,432 youth from multiple schools sourced from four American cities and contained approximately equal numbers of males and females. Potential risk and direct protective factors were

assessed at approximately 12 years of age. Violence was assessed in the following two years. Bivariate analyses displayed the following results: only risk effects were identified for attitude toward school, alcohol and drug use, and truancy; only direct protective effects were identified for low depression (youth with fewer symptoms of depression were less likely to be violent), and family involvement; and both risk and direct protective effects were exhibited for attention problems, other delinquency, study skills, and peer delinquency. The final multivariate model displayed a significant pure risk effect for alcohol/drug use; and both a risk and a direct protective effect for other delinquency and attention problems. No pure direct protective effects were found. Such results would suggest that there is a benefit in reducing alcohol and drug use, but only to the point where it was in the "normal" range, and benefit in promoting attentional abilities and reducing non-violent delinquency, even to the point where they exceed the norm.

Bernat and colleagues (2012) applied the study of risk and direct protective factors to a subsample of data from the National Longitudinal Study of Adolescent Health, an American population-based study. This subsample was selected to be consistent with the other studies included in the panel's research in terms of age at baseline. Included participants also had to have completed two out of three waves of the study. As nothing is stated regarding selecting the subsample based on risk it is assumed that it was consisted with the National Longitudinal Study of Adolescent Health in that the sample was nationally representative. Potential predictive factors were assessed when participants were 13 years old. Violence was assessed at age 14 (Wave-2), and again at ages 18-20 years (Wave-3). This subsample was composed of 1,226 adolescents at Wave-2 (55.1% female) and 1,037 adolescents at Wave-3 (58.0% female). Thus, there was a slightly higher representation of females. Bivariate

analyses at age 14 years displayed the following results: risk effects were identified for low school connectedness and high peer delinquency; direct protective effects were identified for low emotional distress and high educational aspirations; both risk and direct protective effects were exhibited for ADHD symptoms and grade-point average. Bivariate analyses at ages 18-20 years indicated only a direct protective effect on violence for low peer delinquency, with no other significant risk or direct protective factors found. At the multivariate stage of analyses, significant direct protective effects were exhibited at age 14 years for low ADHD symptoms and low emotional distress, and at ages 18-20 years for low peer delinquency.

Pardini and colleagues (2012) examined the youngest cohort from the Pittsburgh Youth Study (PYS). Male youths (N = 503) were first assessed for possible risk and direct protective factors at age 12, and then assessed for violence at ages 13-14 and 15-18 years. Results differed between the two outcome assessments: risk effects only were identified for high depressed mood and low religious observance (ages 13-14) and negative attitude towards school (ages 15-18); only direct protective effects were identified for low depressed mood and good academic achievement (ages 15-18); both a risk and a direct protective effect was exhibited for peer delinquency (ages 13-14 and 15-18) and ADHD problems (ages 15-18). Thus, under this model a factor may exert effects at one specific developmental stage, and then not have any effect at another stage. Or, it may exert only a risk effect during one period, and then only a protective effect at another. Conversely, it may show a linear relationship (acting as both a risk and a protective factor) at one assessment point, and then change to a non-linear relationship. at a different assessment point Multivariate analyses displayed significant risk effects for high depressed mood and low religious observance (ages 13-14); both risk and direct protective effects for peer delinquency

(ages 13-14); and a direct protective effect for low peer delinquency (ages 15 -18) in the final logistic regression models. The PYS study also assessed a number of study-specific potential direct protective and risk factors that the other CDC studies did not (13 possible direct protective and 19 possible risk factors). Of these, bivariate analyses showed direct protective effects were found for negative attitude towards delinquency (ages 13-14), low housing quality (ages 13-14 and 15-18), good parental supervision (ages 15-18) and older mother at birth of first child (ages 15-18); pure risk effects for positive attitude towards delinquency, family on public assistance, high levels of: interpersonal callousness, victim of theft, neighbourhood poverty/crime, and low levels of: parental reinforcement, relationship with peers, and perceived likelihood of getting caught (all at ages 15-18). None of the additional factors assessed exhibited both a risk and direct protective effect. Multivariate regression models were re-run using both the study-specific and common variables. Only two of the study-specific variables remained significant in the final model, both of which were risk effects for violence at ages 15-18 years: low perceived likelihood of getting caught, and high neighbourhood poverty/crime. None of the study-specific variables remained significant in the final multivariate model for effects on violence at ages 13-14 years. Finally, in addition to the CDC panel's "standard" trichotomization methodology (as outlined above), Pardini et al. (2012) also examined the possible impact of participant risk level, re-running all multivariate regression models with the additional covariate of high conduct-problem status and testing for possible interaction effects between this covariate with each of the other predictor variables. The significant results discussed previously did not change, however results also showed a significant interaction between peer delinquency and conduct-problem

status, where low peer delinquency had a direct protective effect on violence at ages 13-14 only for youths with high conduct-problems.

Herrenkohl and colleagues (2012) analysed data from the Seattle Social Development Project (SSDP), containing 808 participants with approximately equal numbers of males and females. Predictor variables were measured at age 10-12 years, and violence was measured at 13-14 and 15-18 years. Bivariate analyses at ages 13-14 years displayed the following results: risk effects were identified for truancy, running away from home, marijuana use, attention problems/ADHD, delinquent peers, low grades, low school commitment, and neighbourhood kids in trouble; direct protective effects were identified for prosocial peers, not using alcohol, and attachment to school; both risk and direct protective effects were exhibited for prior violence, prior nonviolent delinquency (where not having committed any such acts had a direct protective effect), and the perceived availability of and exposure to marijuana. Bivariate analyses at ages 15-18 years showed: risk effects for prior violence, truancy, running away from home, nonviolent delinquency, marijuana use, peer delinquency, low educational aspirations/expectations, low school commitment, neighbourhood kids in trouble, low neighbourhood attachment; a direct protective effect for academic achievement; and both a risk and a direct protective effect for attention problems and perceived availability and exposure to marijuana. Multivariate analyses displayed significant risk effects for attention problems (13-14 years, 15-18 years), perceived availability and exposure to marijuana (13-14 years, 15-18 years), and neighbourhood kids in trouble (13-14 years, 15-18 years), coming from a family in poverty (15-18 years), delinquent peers (15-18 years); and a direct protective effect for attachment to school (13-14 years) in the final logistic regression models.

All four studies were longitudinal in nature. The MVPP and SSDP both included intervention conditions, the remaining two studies did not. Only the SSDP study was designed specifically to assess possible protective effects.

Overall results from the CDC studies and their conclusions:

In the 92 bivariate analyses conducted over the four different studies only 12% revealed variables with significant pure direct protective effects. Across the studies, none of these variables was found to have such a result more than once. Linear relationships (variables with both risk and direct protective effects) were demonstrated in 18% of the tests, and pure risk effects in 23%. Furthermore, in the multivariate analyses only one variable (attachment to school) showed a pure direct protective effect. This was identified by Herrenkohl et al. (2012), where a high level of school attachment reduced the likelihood of violence at 13-14 years of age. Variables showing a combination of risk and direct protective effects across at least two studies included depression, academic achievement, ADHD symptoms, and peer delinquency. The only variable to exhibit risk effects across every study was peer delinquency, however it also demonstrated direct protective effects in all but one study (Hall, Simon, Lee, & Mercy, 2012). Thus, probability of violence increased progressively with increasing delinquent-peer interaction (Bernat et al., 2012; Henry et al., 2012; Pardini et al., 2012). The PYS study (Pardini et al., 2012) also included constructs not measured in the other studies, assessing attitudes and beliefs regarding delinquency. Multivariate analyses demonstrated a direct protective effect for attitude toward delinquency, where youths that viewed delinquent behaviours as negative showed a reduced likelihood of violence at ages 13-14 years. Conversely, judging the likelihood of being caught committing delinquent acts as low served as a risk factor for violent behaviour at ages 15-18 years (Pardini et al., 2012). There was variation

seen in all studies with regard to the nature of effects displayed by variables at different time points (Hall, Simon, Lee, & Mercy, 2012). For example, in Bernat et al. (2012), peer delinquency had a pure risk effect at age 14 years and a pure direct protective effect at ages 18-20 years. Similarly, it was common for a factor to have a significant risk and/or direct protective effect at one time point, and no significant effects at another.

The panel conclude that their results support further research into direct protective factors and their relationship with risk factors, with the aim of moving beyond opposing poles conceptualisations. They assert that while there can be cases of linear relationships or examples where the variable will be significant only at specific developmental stages there are also instances of factors that consistently exert only one type of effect. The authors believe that the risk and protective factors conceptualisation is flexible enough to incorporate and explain such results (Hall, Simon, Lee, & Mercy, 2012). Lösel and Farrington (2012) suggest an inverse dose-response relationship exists between protective factors and violent outcomes, where an increase in the number of protective factors present is associated with a decrease in the likelihood of violence.

When discussing the implications of their research on future prevention strategies, the panel states that examining the linearity of effects is important for the cost-efficiency and robustness of programmes. They rightly argue that the resources required for attaining significant results may be misjudged if a variable is believed to exert a linear effect when it actually only acts as a direct protective factor. In the case of a pure direct protective factor, the point that the target variable needs to be raised above (or below, depending on the target variable) in order to show improvement will be the point at the neutral middle. For example, in the instance of school attachment

the high risk end (low school attachment) has the same outcome as the middle point of the variable, thus violence perpetration shows a plateau. It is not until school attachment changes from the middle point through to high attachment that violence perpetration begins to decrease. Reaching this point from the high risk end of the target variable therefore constitutes a fairly high threshold, as a large degree of change is needed. Thus, a large amount of effort could be needed to achieve this maximum potential. The authors also posit that the opposite may occur for variables with a pure risk effect, with the resources needed to bring them below the necessary threshold being overestimated. In this case, once violence is reduced from the high risk end of the variable to the middle no further reduction is beneficial, as this is the point where violence perpetration plateaus (Hall, Simon, Lee, & Mercy, 2012).

Critique:

Commendably, the panel acknowledges the ambiguous ways in which the term "protective factors" has been used in the literature, and makes a point of differentiating between main and interactive effects. They also emphasise the need to show the direct protective effects of variables empirically, and to resist an opposing poles methodology. However, there are also several issues that need to be addressed regarding its ability to add new information to current risk assessment methods, as well as whether it can be applied to high-risk populations such as offenders.. Furthermore, there is still the question of whether this conceptualisation is truly distinct from previous ones.

There is also the question of whether interaction effects between risk and protection do actually occur within this model. As discussed, direct protective factors are thought to precede the occurrence of youth violence, predict a low likelihood of it occurring in the general population, and involve positive main effects which are *not*

contingent on risk level. This last point would require the absence of an interaction, as it implies that a direct protective (main effect) will operate in the same way regardless of the level of risk present, whereas for an interactive process to occur there must be a differential relationship between risk level and the protective factor. This absence would either need to be demonstrated empirically (by testing interactions) or the two ranges (which are now separate "variables" in the analysis) must be mutually exclusive. In this second scenario, if an individual scores on one "variable" their score on the other must be zero (they cannot score on both), and there are surely no interactions between the two "poles" of the same variable. It seems that the authors take this latter view. However, stating that direct positive effects are not conditional on risk level is at odds with the fact that this conceptualisation also states that it is possible for a factor to display both direct protective effects *and* buffering (interactive) protective effects (Hall, Simon, Mercy, et al., 2012; Loeber & Farrington, 2012). If a variable exerts a protective effect that is independent from the amount of risk present, surely it cannot also exert a protective effect which changes according to the level of risk. Buffering effects were not the focus of the CDC articles however, and as such were not adequately explored. Only one of the CDC studies tests for an interaction (Pardini et al., 2012), and this is not mentioned in introduction or in detail later on. Therefore, future research will be needed to examine whether such effects do occur, and how these would influence risk assessment, treatment, and prevention. If buffering effects are demonstrated for variables with direct protective effects the conceptualisation's definition of the latter will also need to be addressed.

A potential limitation of the trichotomization method concerns its inability to contain certain important variables. For example, possession of a genetic variation cannot be trichotomized. Other variables are questionable, such as hard drug use

where an individual either does or does not, and further division seems somewhat forced. For some variables it may again come down to an issue of how they are framed, for example attention problems could either be framed as a presence or absence of diagnosed Attention Deficit Hyperactivity Disorder versus a continuum-based rating of attention (another distinction which may be deemed excessive). The three CDC studies which included attention problems/ADHD (Bernat et al., 2012, Herrenkohl et al., 2012, and Pardini et al., 2012) used the latter, scoring the frequency of symptoms associated with attention problems (e.g. on a four point rating scale from 0 = never or rarely present, to 4 = very often present). This approach however still assumes that there is a "normal" level of attention problems in a general population sample, which may be problematic. Finally, of the variables that can be trichotomized, it is likely that many are not measurable by the simple checklist assessment typically used in the field, and the method implicitly requires new approaches to date collection.

As with the other main effects models, one of the major questions is regarding the purported "independence" of the protective factors, with the trichotomization model stating that direct protective factors exert unique effects over and above those contributed by risk factors. It could be argued that this model is essentially the same as the more "typical" main effects models discussed above, and therefore should not be classed as a distinct conceptualisation. However, while it is similar in that it is interested in the "main effects" of protective factors, it relies on a different methodology for defining and identifying them. The important distinction here is that by identifying the "middle" group the trichotomization method asks a *two-fold* question. It questions whether improving an individual's status on the variable of interest from a "deficit" level (to that of the reference group) reduces their risk of the

outcome (i.e., a risk effect), *and further*, whether additional improvements beyond that level produce further reductions in risk (protective effect). This question is meaningless without the middle group as a reference, and would still be meaningless if the middle group's status on the variable of interest was not stable.

The central difference between the trichotomization model of protective factors and the main effects conceptualisation therefore lies in the former's heavy emphasis and reliance on the "norm", which typically plays only a minor part in correctional psychology research. Making use of the norm for the variable enables two ranges of the variable (low-normal, and normal-high) to be separated in a manner that is replicable (at least in the general population) to assess whether both ranges have an effect on outcomes. Therefore, this process allows researchers to ask whether these variable ranges make outcomes higher than or lower than the norm for the *outcome* in the study group. The trichotomization approach may also therefore provide information towards a clinical perspective, such as whether it is worthwhile to reduce an individual's status on a given factor to the "normal" level. Additionally, it would indicate whether it was also worthwhile to pursue further reductions, making the individual "better than normal" on that factor (or whether there would be no additional benefit in doing so). This may be advantageous in that it would simplify treatment plans. It would also allow for specific and measurable treatment goals. This approach is thus markedly different from the majority of existing studies which analyse simple, single linear relationships between a variable and an outcome using the entire range of the variables concerned. Instead, the trichotomization model subdivides the "entire range" and treats each part as a different variable. Multiple regression is still used however, so in some respects it does not appear all that different.

It appears that there is an additional, unstated assumption embedded in the logic of this method, which is that the study sample's middle group supplies the "norm" for the variable of interest. This assumption may be met in large-scale studies using general population samples such as those used in the CDC studies. However it will not be met in studies of either "at risk" groups (such as offenders) or low risk groups (such as university students). In short, the method should work in epidemiological studies, but not with the samples typically used in correctional psychology. The same would be true for the "convenience" samples often used in corrections-relevant research and development work. The necessity of norms again raises the issue of clinical versus conceptual validity and significance. Generally speaking, within psychology clinicians are usually interested in norms on various tests, whereas researchers seldom are. Norms might be involved in the definition of "clinical significance". They might also be used simply to determine where an individual or group is "at"; for clinicians, how badly a patient is in need of attention. For example, if they are 2 standard deviations below the norm on mood then their condition is severe, whereas if they are within 0.25 standard deviations of the norm then it is not. Conversely, researchers may be more interested in the dimension and whether it exerts an influence on the variables they are interested in. Thus, while norms may have some utility within the field they have not previously been considered in relation to the conceptual validity of protective factors.

Due to the aforementioned reasons, the CDC studies' use of representative general population samples (rather than an offender or forensic samples) for identifying risk and protective effects may therefore draw criticism. Lösel and Farrington (2012) state that specific populations, such as offenders or high-risk populations, offer results with greater clinical relevance but are less likely to produce

statistically significant results. They also highlight the greater statistical power and more complex statistical analyses afforded by general population samples. These factors may be used to argue that at this stage of the model's development it is therefore reasonable to use a general population to identify the variables which act as risk and/or direct protective factors. However, while Lösel and Farrington (2012) highlight the positive features of population samples, they do not appear to recognise that the whole method may be dependent on use of their use. This is because of the apparent reliance of the trichotomization process on having a stable "norm" to compare each extreme of the variable to, something which specific populations lack. This leads to the question of whether the trichotomization method will work with these different samples. It is also necessary to note that a considerable amount of research in the field does not use general population samples. Research and design work sometimes uses convenience samples (such as university students) and a large body of work has used offender samples. This again brings into question the use of general population samples for this research.

Because of these questions I conducted simulations to examine whether the trichotomization method can be applied with specific samples such as offender populations. In the case of a general population sample, it will ideally represent the same means and standard deviations as the general population. The general population sample for these simulations had a sample size of 1,000,000. However, if a biased sample is taken from that population, then the distribution will change. Offenders and university students are biased samples on the dimension of risk of conviction. The simulations used a risk scale, scores on which are exponentially distributed in the general population (i.e., most are at very low risk). As shown in Figure 4, in a high-risk community (e.g. a low SES neighbourhood) it is still the case that many people

are highly unlikely to offend (there are many low-risk cases), however there are a larger fraction than in the general population whose risk is appreciable or high. For the low-risk community (e.g. university students) there are very few who have appreciable levels of risk, and (presumably) the vast majority will not ever be convicted of a crime. Thus, risk distribution is noticeably different between these populations, especially for a high-risk community which shows a different trend altogether. It is likely that these differences in distributions will influence the method used in the trichotomization model of comparing the upper and lower quartiles of a distribution to the "neutral middle".

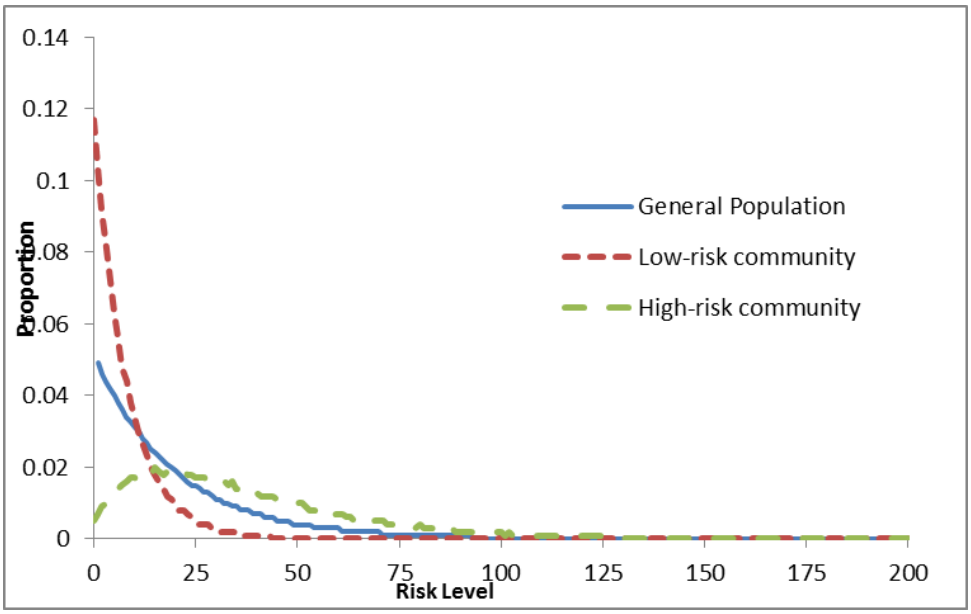

Figure 4: risk distributions for specific population samples

In the first simulations a "target factor" was constructed so as to be a "pure" protective factor in the general population. Each of the hypothetical individuals in the general population was assigned a value on this target factor based on their risk score. Thus, as risk increases, so does the score on the target factor *up to a point*, and then it stabilizes for the remainder of the risk scale. For example, on a factor where low

scores are protective a specific target factor could be “number of associates known to police”. To simulate a realistic setting, some “error” variance was included. Finally, each individual in the general population was, at random, deemed to have offended or not offended, based on a probability that comes directly from their risk score. The general population was then trichotomized and examined for the proportion of each group who “offended”. As shown in Figure 5, results confirmed the pattern programmed into the simulation with offending low for those who were low on the target factor, medium for those in the middle group, and medium for those in the high group. Thus, results were consistent with the CDC panel’s trichotomization model.

In order to examine if this model works the same for specific population samples, “biased” samples were taken from this general population. These were taken by intensively sampling from the general population at different ranges of the risk scale, with the low-risk sample constructed by intensively sampling from the low-risk range and the high-risk sample constructed by intensively sampling from the high-risk range. The sample sizes for each biased sample were 223,318 and 87,954 respectively. These biased samples were then trichotomized and the same process was repeated. Simulations were completed twice for each biased sample, with consistent results across replications. This meant that the general population sample was tested four times, again showing consistent results throughout. As shown in Figure 5, results showed that whether a variable acts as a pure protective, or both risk and protective factor changes across these samples implying that a variable’s function cannot be determined by studying it in a risk-biased sample. Specifically, the high-risk sample replicated the results from the general population, whereas the low-risk sample showed both risk and protective effects of the target variable.

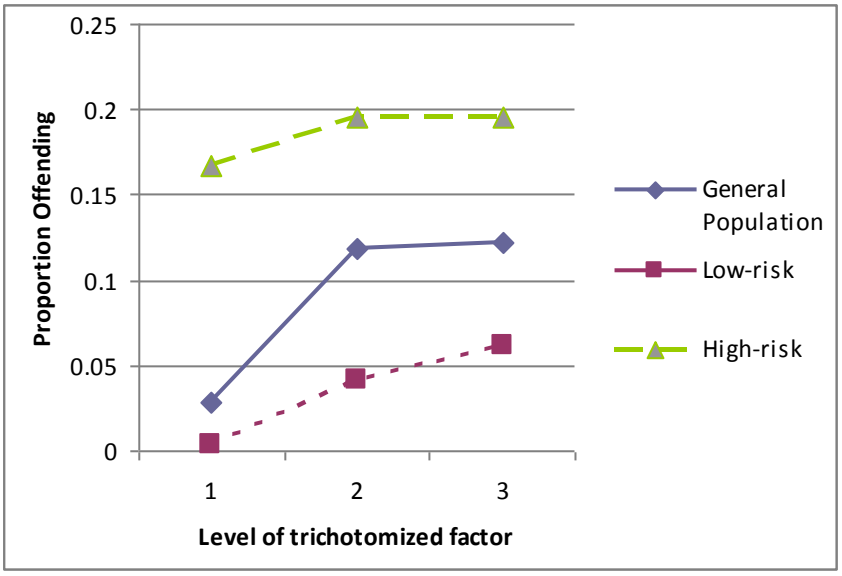

Figure 5: simulation results of a pure protective factor in a general population samples versus risk-biased samples

These results raise an interesting question: when considering a target variable such as the one programmed in the general population of these simulations, what does the trichotomization model suggest for dealing with an offender population? Trichotomization of this group would say not to attempt to improve individuals below the "middle" – the norm *for offenders* on that variable. This is because with the high-risk sample we replicate the effects seen in the general population. However, the norm for offenders is higher than that for the general population. This would therefore suggest it was not beneficial to get the offenders to the general population mean, even though the offending rate for the offender mean on the variable is higher than the offending rate seen at the general population mean.

Simulations were also constructed for a target factor which acted as a "pure" risk factor in the general population, where risk is fairly stable for the target factor at low and medium levels and then increases for the remainder of the scale. As demonstrated in Figure 6, results indicated that for the high-risk sample the relationship appears more linear and thus the factor exerts both risk and protective

effects in this sample. Conversely, in the low-risk sample (Figure 7) the factor appears to have very little influence on offending at any level. Therefore, it is again demonstrated that determining a variable's function by studying it in a risk-biased sample is problematic.

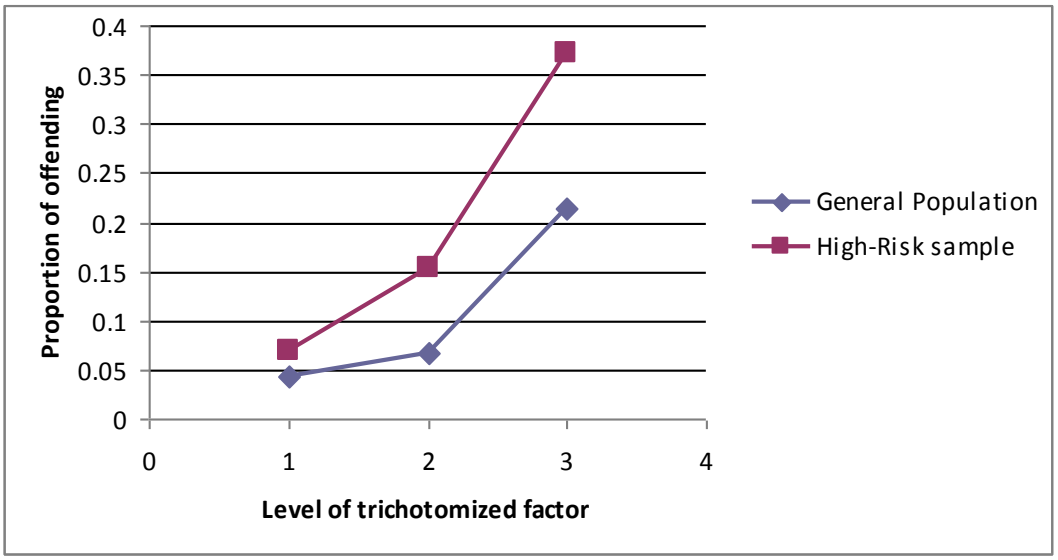

Figure 6: simulation results for a pure risk factor in a general population sample and a high-risk sample

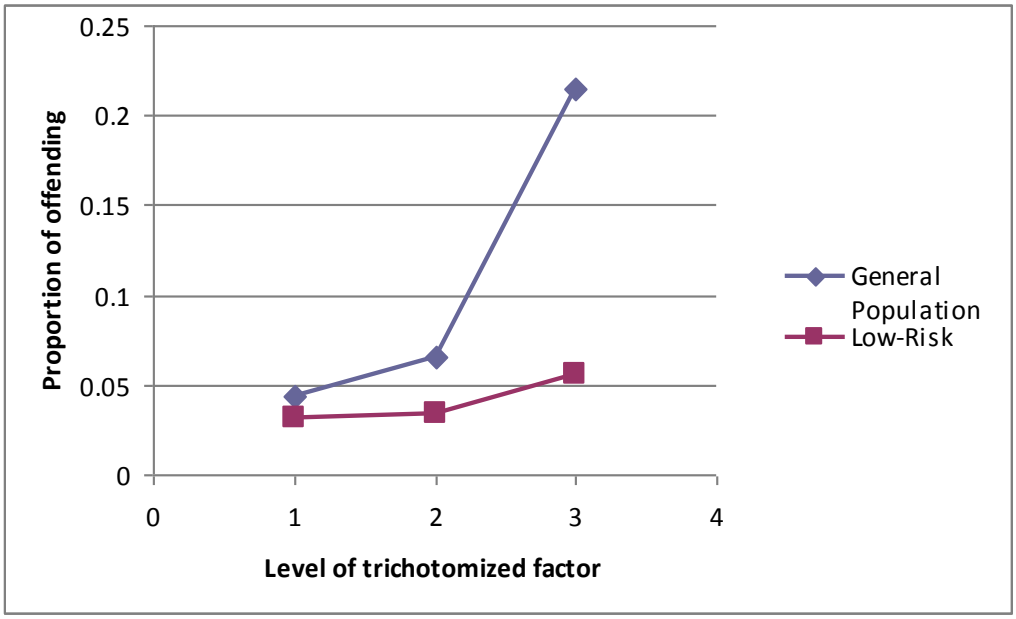

Figure 7: simulation results for a pure risk factor in a general population sample and a low-risk sample

With regard to these simulations it must be noted the large sample sizes used. These are considerably larger than is presently reasonable within research settings. Therefore, any significant relationships between the trichotomized levels of the target variable would need to be replicated in real-world conditions.

Trichotomization model conclusion

Overall, I believe that the trichotomization model has taken elements of the three previously discussed models of protective factors and employed a new methodology in order to differentiate itself. As is typical with the development of a new model, the authors attempt to distance themselves from their predecessors and are at pains to point out differences. However, I believe that one of the strengths of this conceptualisation could be its ability to at least partially unify the existing theories into a more cohesive and empirically defensible structure. The series of articles and studies by the CDC panel represent an important first step in developing an understanding of protective factors in a data driven manner rather than assuming factors based on what makes theoretical sense. One major issue for this model is the question regarding whether the trichotomization process can translate from being applied to general population samples to high-risk offender samples remains. As indicated by simulations, risk-biased samples do not always show the same results as general population samples. Thus, further research is needed to assess how suitable this model is for risk assessment of offending.

CHAPTER THREE: Summary and Conclusions

This research aimed to review the current usage of the term "protective factors" within the area of correctional and forensic psychology, with a specific focus on risk assessment for offending or reoffending. A narrative review of the existing literature illustrated the highly inconsistent use of this concept. Four main conceptualisations were identified showing that there is still no agreed upon definition for this term even though questions have been raised regarding this for several decades. One of the most troubling findings of this review was that many of the examined studies were not what they seemed. It appears that a number of authors report to be using one definition, however closer scrutiny reveals they are actually using another. The majority of examined studies purported (either explicitly or implicitly) to use conceptualisations consistent with a main effects definition and/or a moderator definition, yet many of their methods and analyses strayed from the requirements of these.

Of the 31 studies examined, only 2 were identified as intentionally using a conceptualisation consistent with the opposing poles definition. Both were implied usages. In an opposing poles conceptualisation, protective effects are believed to come from the same variables as risk effects, with the two simply sitting at opposing poles of a continuum. If this definition is adopted there is no conceptual difference between risk and protective factors, because protective factors are simply risk factors in reverse. The redundancy involved is readily apparent, and it is extremely difficult to make a convincing argument for a new conceptualisation which is merely the mirror image of an existing one. Adopting this definition would potentially double the amount of time needed to complete risk assessment while providing no new information. As such it is often explicitly criticised in the literature. However, as shown by detailed examination of these studies, many authors appear to be essentially

subscribing to an opposing poles conceptualisation under the guise of assessing "main effects". This definition was one of the most used, with 23 studies reporting or implying use of a main effects model. Main effects models state that protective factors have a direct influence on the outcome variable that is unique from the influence contributed by risk factors. While this model is typically reported to be conceptually distinct from an opposing poles definition, further examination suggests that it is not, with many studies in practice measuring the same variable twice. A clear example of this is seen in Fergusson et al.'s (2007) use of weak parental attachment as a risk factor and strong parental attachment as a compensatory (protective) factor. Additionally, when included protective factors did not appear to be the reverse of items already assessed as risk factors, the items could simply be reframed as risk factors and the distinction would likely disappear. The decision to frame these variables as protective factors, rather than risk factors, is essentially arbitrary and does not provide convincing justification for including them in risk assessment.

In comparison to a main effects model, interaction models state that protective factors are separate, distinct variables that exert their effects through an interaction with risk factors. In this view, protective factors have a buffering or moderating relationship with risk level. If protective factors act as moderators there is a differential relationship between risk level and the outcome variable. If protection is absent or low, there is a positive linear relationship between the two. However if protection is high, the relationship is markedly reduced, indicating an interaction. Because such factors influence outcomes in very different way from risk factors, a distinction between them is satisfied and the creation of a new concept is justified. Of the 23 studies that claimed to use a moderator/interaction conceptualisation, six did

not test for an interaction between risk and protective effects. Of those who did test for interactions, eight did not find any significant results.

Finally, there were five studies which reported to use a trichotomization/direct protective approach. In this model protective factors can have a direct effect on the outcome variable (as seen in a main effects model), can moderate the relationship between risk and the outcome variable (as seen in interaction models), or can do both. The difference in this conceptualisation of protective factors is how they are identified and assessed. This involves measuring variables above a dichotomous level and assessing the linearity of their relationship with the outcome variable. This approach "makes sense" of the opposing poles view by dividing a single dimension in two, and asking about the effect of deviating from the norm in either direction, thus emphasizing the importance of the "norm". Only 12% of the bivariate analyses employed in these studies showed significant effects that were uniquely protective (pure protective effects). Furthermore, at the multivariate level, only one variable (school attachment) was shown to act as a pure direct protective factor (Herrenkohl et al., 2012).

Detailed review found a large degree of variation within the above conceptualisations in terms of the background theory, definition, and assessment processes used. Unfortunately this lack of agreement is not always acknowledged or addressed within the literature and does not appear to be of significant concern. Such discrepancy over what constitutes a protective factor is problematic for a number of reasons, and needs to be properly addressed before any forward progress can be made. Thus, one of the main hopes for the current research is to bring attention to the extent of this disparity and the need for a consensus to be reached within the field before any progress can be made. Given that risk factors are already a firmly established concept

the onus is on the side of protective factors for proving that additional information is gained by creating another concept. Upon reviewing the existing literature, it appears that an interaction model of protective factors provides a strong justification for the construct. Unfortunately, the research in this area is inconsistent and there are several issues that would need to be addressed for this model to be adopted. Specifically, scoring for assessment measures will need to be much more complex than it currently is, as interactions will depend on the protective factor's relationship with values on other variables. Additionally, further attention is needed in regards to the statistical analyses which are appropriate, whether to test interactions for individual protective factors or composite scores (or both), and, once again, the variations in terminology used. The trichotomization model also shows promise as a conceptualisation of protective factors that ensures they represent something separate from risk, although it too has a number of issues that need to be dealt with. In addition to the issues detailed below, there is also the issue that some of the "protective" factors identified by this method are not uniquely protective, a fact that the trichotomization process does not change. Under the model's current definition, variables showing a linear relationship with the outcome are said to have a protective effect (as well as a risk effect). Such variables do not support the creation of a new concept. Given that only a very few variables showed uniquely protective effects in the CDC studies, it may be that while this model makes theoretical sense it does not provide enough empirical evidence for its use.

Thus, both the interaction and the trichotomization models show the *potential* to identify protective factors that are truly conceptually distinct from existing risk factors and therefore show that it is not a redundant concept. However, the number of studies which have actually produced significant results using these methods (and

thereby identified variables that meet “acceptable” definitions of protective) are so far unimpressive.

Future research directions

As illustrated by the current research, the most pressing area for future development involves the need for a consensus within the field regarding the definition of protective factors and how they are assessed and measured. It is extremely difficult to assess whether the creation of a new concept is justified when there are multiple definitions for this proposed construct being used in the literature, with little (if any) attention being brought to this issue.

Through the use of simulations this research has also demonstrated that the trichotomization method should not be used for anything but a general population sample, otherwise results may be affected and lead to false conclusions. Thus, trichotomization research will require general population study groups to further knowledge of this model. It will also require a greater quantification of test variables (above the dichotomous level). As with an interaction model, this will likely require more in-depth and complex assessment measures than are currently employed. Future research may therefore need to assess whether the additional information gained justifies this increased complexity.

If, and *only if*, protective factors can be distinguished from risk factors, there are a number of areas for future research. As has occurred within the area of risk factors for offending, there may be many different avenues for more specified exploration. For example, the difference between static and dynamic protective factors, and how these affect risk assessment. Research into protective factors for different types of offending would also be necessary. Another area of interest would be how different variables may only exert significant protective effects at certain age ranges or developmental stages. This may only be an issue in younger offender

populations; however there is also the possibility that such variance may occur over the course of an offending 'career'. Thus further research into general risk and protective factors as well as the age ranges in which they have the most influence will be needed for this model. Such knowledge could be used to individualise assessment and treatment, but would require large amounts of research, potentially of a longitudinal design to develop these as well as refine categorisation, ranges and cut offs. Nonetheless, these areas should only be researched if it is shown that protective factors are truly something different from risk factors.

Conclusions

The question of whether protective factors should be included in risk assessment is still unclear. What is clear however is the need for a consensus to be reached within this area, a task that is unfortunately well beyond the scope of the present research. It is not my argument that so-termed "protective" processes do not occur, as it is clearly evident that certain variables do have the power to affect positive outcomes. Rather, the important question is whether elevating these to a separate concept provides any added information. Until a conclusive answer is reached, the topic remains at an impasse. This field already has a long history regarding the development of how risk factors are defined and assessed, including issues relating to the use of clinical judgement and face validity. As a profession it is important that we learn from previous mistakes, especially given the serious consequences that may eventuate from errors in risk assessment. Thus, it is crucial to address these concerns as they relate to protective factors instead of blindly accepting the use of such variables with no true empirical backing.

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