Another Pandora's box? Some pros and cons of predictive risk modeling

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ABSTRACT

Early intervention, promoted as being important to the prevention of child maltreatment, is challenged by the difficulty of identifying at risk families before patterns of abuse are established. A way of identifying these families before they reach the radar of statutory systems of child protection is through predictive risk modeling (PRM). Using large datasets PRM tools are able to use algorithms with significant capacity to ascertain and stratify children's risk of experiencing maltreatment in the future. In the process, however, they also identify families who may well benefit from support but are not on a maltreatment trajectory — the so called 'false positives' who would not be among those families later identified as mistreating their children. Whilst early identification of families through the use of PRM has the potential to offer opportunities to provide supportive services that could ameliorate future harm to children, it is clear that it also has the potential to mistakenly target and label families as potential child abusers. This article discusses challenges and opportunities associated with the use of PRM in child protection. It briefly discusses the development of PRM in New Zealand, and traverses some of the complex issues as systems attempt to better target limited resources in the context of fiscal restraint.

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1. Introduction

Deciding which children are 'really' at risk is an abiding problem for professionals with a child protection mandate. In a field pervaded by uncertainty they must repeatedly make complex decisions about children's safety (Mansell, 2006; Munro, 2011). Such decisions are made in the knowledge that maltreatment can result in long-term emotional problems, serious injury or even death, whilst at the same time knowing that intervention can also be disruptive and harmful — to be undertaken only when strictly necessary. It is clear that in staying focused on prompt, responsible action, professionals perform a tricky balancing act (Shlonsky & Friend, 2007), concerned about overlooking signs that children are unsafe, or overreacting when children actually are safe. Agencies reflect this tension where 'a preoccupation with risk and its management has engulfed public sector services' (Macdonald & Macdonald, 2010, p. 1174). In reporting high-profile child maltreatment cases the media have at times exacerbated these issues, evoking outrage and sometimes subjecting practitioners to public vilification (Jagannathan & Camasso, 2011; Kemshall, 2002). In the context of this risk-focused paradigm it is perhaps not surprising that agencies worked to tighten control, making child protection practice a closely scrutinised activity directed and monitored by bureaucratic procedures (Munro, 2005). The introduction of a range of consensus and actuarial risk assessment models has not, however, significantly

fortified confidence in child protection decision-making (Schwartz, Kaufman, & Schwartz, 2004).

Early intervention has consistently been promoted as an important way forward when responding to vulnerable children and their families (ARACY, 2008; Department for Education, 2003; Dubowitz et al., 2011; Reynolds, Mathieson, & Topitzes, 2009). A key message of the final report on Munro's review of child protection in England is that 'preventative services will do more to reduce abuse and neglect than reactive services' (Munro, 2011, p. 69). The desirability of providing preventive services raises the question of how to ensure that families who need such services actually get them. Recognising that research has shown that the aetiology of child maltreatment is complex, involving not only characteristics and experiences of children, their parents and families but also of features of the community and society in which they live, Dubowitz et al. (2011) undertook a prospective longitudinal study of children from low-income families where the children had no prior involvement with child protective services. The rationale for the study was that, although living on a low income makes child maltreatment more probable, most families in this situation do not abuse or neglect their children. On the understanding that resources seldom permit intervening with everyone (Dubowitz et al., 2011, p. 101) the researchers looked for factors that could be identified by child health professionals or other professionals who routinely see children. Discussing their finding that there are indeed a number of factors that professionals should look out for, including mothers with depression, substance abuse or a low level of education as well as a larger number of siblings in a family and an assessment that a young child has a lower than normal score on a standardized scale of mental development, Dubowitz

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et al. (2011) suggest that screening families could make it possible to deliver preventive services to those families who most need them. Ideally, they say (Dubowitz et al., 2011, p. 101), 'such a strategy would complement universal policies and programs, such as those that combat poverty and help support families'.

From a policy perspective, making services available to those who need them most requires an approach that will target families and ensure that they have access to services they need without alienating them by stigmatising them. 'Proportionate universalism' or 'cascading service delivery' (see for example OECD, 2009) has been proposed as a way of achieving this objective. In this model, services designed to promote the well-being of all children, such as free maternity and infant health care, are used as a way of introducing more intensive or more specialized services for children and families deemed to be at greater risk. For instance, O'Donnell, Scott, and Stanley (2008, p. 329) make a case for a preventive approach based on universal services for all children and families, asserting that universal services must be able 'to identify vulnerable families early enough to change risky behaviours and avoid pathways to abuse'. Few would argue with this, yet professionals working with high risk populations may find it challenging to identify those families who are particularly 'vulnerable' and thus in special need of the extra support (Dubowitz et al., 2011). There is evidence that many children are not identified as at risk even after they have actually suffering harm, especially when the harm is caused by neglect or emotional abuse (Gilbert et al., 2009) nor is there an obvious answer to the question of the best ways in which to accomplish the reorientation of families towards more positive pathways. Reviewing evaluations of a range of preventive programs, Reynolds et al. (2009) found that, whilst some programs appear to have some success in reducing the incidence of certain types of maltreatment, there is relatively weak evidence for the efficacy of preventive programs in preventing the spectrum of harm that results from child maltreatment. For example, a randomized control trial of the New Zealand home visiting program Early Start showed a lower incidence of serious physical assault on children perpetrated by parents taking part in the trial compared with the control group, but no corresponding effect on other types of maltreatment (Fergusson, Grant, Horwood, & Ridder, 2006). Moreover, family level outcomes were in fact better in some respects for the control group in the Early Start trial, including a lower rate of mothers being assaulted than in the group who participated in the program (Fergusson et al., 2006). This is a worrying finding given the concerning emotional impact of witnessing family violence. Recognising that child maltreatment is a 'wicked problem' that is not necessarily responsive to linear problem-solving, Devaney and Spratt (2009) nevertheless emphasize the critical importance of identifying and supporting young children likely to have poor outcomes and providing support early. This very early intervention would, it is argued, help agencies to get closer to meeting what O'Donnell et al. (2008, p. 326) describe as a 'moral obligation' to ensure that intervention does no harm to children and an even greater obligation to prevent the harm of abuse and neglect occurring in the first place. It is this aim of preventing child abuse from occurring in the first place that has spurred the development of predictive risk modeling (PRM) tools that are able to use algorithms with significant capacity to ascertain and stratify children's risk of experiencing maltreatment in the future. This article will now discuss the development of PRM in New Zealand, and consider some of the issues inherent in its use. It will not describe in any detail the technical aspects of the model (for a full description see Vaithianathan et al., 2012 and Vaithianathan, Maloney, Putnam-Hornstein, & Jiang, 2013). Rather, our purpose is to discuss some of the broader imperatives influencing the development of the PRM initiative, and offer some reflections about the challenges and opportunities of using this technology in the identification of children at risk.

1.1. Predictive risk modeling as a tool for early intervention

Like many English-speaking jurisdictions, New Zealand has experienced persistently high rates of maltreatment (Duncanson, Smith, &

Davies, 2009; UNICEF, 2003) and concerning rates of infant death by maltreatment (Child, & Youth Mortality Review Committee, 2009; Connolly & Doolan, 2007). Like many other countries, New Zealand has been looking at ways in which data can be used to better understand children at risk and as a way to better target limited child protection resources (Mansell, 2006). In 2012 the New Zealand Government commissioned a study, the Vulnerable Children Study, to explore whether it is possible to use administrative data held by government to identify children at risk of maltreatment. The study was undertaken by a cross-university team of researchers based at the University of Auckland's Centre for Applied Research in Economics (Vaithianathan et al., 2012). Under strict confidentiality agreements, the researchers had access to a dataset that linked administrative records from the income maintenance service, and the child protection service, both agencies under the auspices of the Ministry of Social Development (MSD). Both services hold information that is collected on a nationwide basis. A literature review was undertaken, including an extensive international grey literature search, to scope child protection risk assessment generally and previous applications of PRM in particular. This review found only one researcher studying computational intelligence techniques to predict future maltreatment (Schwartz, Jones, Schwartz, & Obradovic, 2008). The researchers then proceeded to develop an algorithm that could be used to predict future harm for children identified within the databases.

The New Zealand study sample comprised children born between January 2003 and June 2006 and whose family received a main benefit (intended to cover basic living costs) for any length of time (termed a 'benefit spell') between the child's birth and fifth birthday. The dataset extended to mid-2011, enabling the researchers to retrospectively 'follow' children to establish whether or not they had a substantiated finding of maltreatment during their first five years. The data supplied by MSD is routinely collected, relatively easily retrievable and contains much detail, including information about parents' own history of child maltreatment as well as recent information suggesting problems, for example imprisonment, mental health issues or addictions. This detail enabled the researchers to select 132 variables, relating to both the past and the present, for inclusion in the algorithm. It is important to note that the variables are not causal. In devising the algorithm the aim was not to ask 'What contributes to maltreatment?' but rather 'What variables can help us best discriminate between spells that are high risk and spells that are low risk?' (Vaithianathan et al., 2012). The algorithm was applied at the start of any new 'benefit spell'; that is, whenever the benefit system recorded alterations in a family's circumstances, such as the arrival or departure of a partner or a shift from one benefit to another. A steep increase in risk rating in succeeding spells signals that problems are escalating. The research question asked whether administrative data could be used to produce a PRM tool capable of correctly assessing the likelihood that a child will have a substantiated maltreatment finding at some future time. The study showed that this was indeed possible. The combined datasets produced a very high 'capture rate' in that the families of 57,986 children born between January 2003 and June 2006 received a main benefit. There was a substantiated finding of maltreatment for 11,878 of all children born in this period (5.4%) and the data indicate that the families of 9816 of these children (83%) received an income support benefit before the child turned two. Of these children, 13% were maltreated by age five. Of children whose families did not receive a benefit by the child's second birthday, 1.4% were maltreated by age five. The Vulnerable Children Study model also sorted the children into deciles according to how likely they were to be maltreated during a particular spell and showed that, whilst only 5% of an annual birth cohort will be identified in the top 20% of risk, this group of children accounts for 37% of all children who had substantiated maltreatment by age 5. This was indicative of a very vulnerable group where families were experiencing significant adversity. The study confirmed the disturbing scale of maltreatment in New Zealand.