

**Peer And Statistical Review Of The Report: 'Final Report On The Feasibility Of Using  
Predictive Risk Modelling To Identify New-Born Children Who Are At High Risk Of  
Future Maltreatment' And The 'Companion Technical Report'**

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## **Overview and Purpose**

Like our previous report, the intent of this peer review is to provide input to New Zealand Ministry of Social Development (MSD) regarding the final Predictive Risk Model (PRM) report. In order to complete this review the authors have read the final report and the technical report. In preparing our report we have not repeated the descriptions of our understanding of the approach or our previous comments, but focus on summarizing prior concerns and our sense of how those concerns were addressed, or not, in the final PRM report. In addition, while acknowledging that our mandate for the review is limited in that no further analysis are possible in the context of the PRM report, we do offer some suggestions for additional information that we believe would be helpful at some stage, and some suggestions for implementation given our understanding of the analysis and our more limited understanding of conditions in New Zealand. Finally we do not offer any recommendations regarding whether MSD should proceed with trials of the PRM in the field owing to the our lack of knowledge regarding the nature of what would be put in place and not having had an opportunity to evaluate the recognized ethical issues for implementation.

## **Summary of the PRM Approach<sup>1</sup>**

The contractors developing the PRM organized data from multiple administrative data sources including care and protection (CYF) data, benefit data, corrections, and birth data beginning with administrative data available as early as 1993. These data

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<sup>1</sup> This is the same description from our prior review of the interim PRM report.

were linked through matching procedures to prepare a set of variables that are believed to statistically relate to children who are ultimately substantiated by CYF at some later point. Annual birth cohorts beginning with 2007 through 2010 were assembled based on birth records with up to two years follow-up with the CYF subsequent substantiation event data.

**Assessment of the Response to our Review of the Interim Report Statistical Approach and Execution in Final Report**

Table 1 depicts our prior comments from the earlier review interim PRM Report and our assessment of the response by the authors of the final PRM report. Almost all of our initial comments were addressed and in some cases thoroughly, and our remaining concerns with the analysis may have to do with difficulties in navigating and interpreting the reports. In this regard we might benefit from more direct communication with the authors.

<b>Table 1 – Prior Comments on the Interim Report</b>		
	<b>Brief Description of Comment</b>	<b>Brief Assessment of Author’s Response</b>
1	Matching and Linking of Administrative Data Systems	There is a much more detailed discussion of the relative advantages and disadvantages of alternative matching procedures; a helpful presentation of information given that a range of matching procedures are available.
1a	Resolving matches	We understand that the authors were attempting a “conservative match” method in the interim report, and have since investigated and tested other matching approaches. We view this as positive development in the formation

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	<b>Brief Description of Comment</b>	<b>Brief Assessment of Author's Response</b>
		of the model.
1b	Data linkage approaches	See above comments, plus recognition that the authors are investigating other approaches to implementing matching algorithms.
2	Variables in the model	
2a	Concerns about substantiated maltreatment as a criteria	The authors address and provide a comprehensive and interesting analysis. We include more comments in the next section.
2b	Age of mother at birth of first child	Our understanding was that including this variable was not feasible at this time, however, we could not readily define a mention of the variable in the main report.
2c	Mesh block characteristics not defined	Much more detail was provided. We also have some additional comments in the next section.
2d	A difficulty with using prior maltreatment reports involving older siblings or other endogenous variables to CPS.	The authors provide a good analysis of the topic. More comments also follow.
2e	Inclusion of police violence notifications for DV	An appropriate and comprehensive analysis was provided on these topics. However, it appears that incorporating these data are contribute only marginally, and are difficult to incorporate from an implementation standpoint.
2f	Inclusion of health information particularly substance abuse	Incorporating these data are apparently not feasible at this time, however, an analysis was performed to determine if such variables would contribute the PRM. The results yielded marginal improvements.
2g	Inclusion of variables to improve specificity (e.g, receipt of benefits)	Whether the parent received a substance abuse benefit was tested, however, we were hoping for a test of

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		broader indicators of whether parents were receiving public financial support, or participating in other psycho-social and behavioral health programs. The concept was that these types of services might be preventative.
3	Relative risk and ROC not presented	Our error as this was provided, however, the information presentation is much better and more refined in the final reports
4	Modeling: Multi-level modeling	The authors did provide some explanation of efforts taken to address this and their results, but we found it difficult to evaluate the information provided, so are not entirely sure that the approach taken addresses our concerns. Unfortunately, the information contained in the technical report was not organized in a way that allowed us to fully evaluate what was done. Perhaps some discussion about it with the author would help to clarify the approach for us.
5	Stability of estimates and overrepresentation of minorities, especially Maori populations	Considerable effort was expended to develop a model that was tuned specifically for Maori populations, and it appears that the authors recommend continuing to address this concern.
6	Improvement of data linkage at the point of implementation	Analysis of multiple alternative matching approaches were provided in the final report which can help to provide some sense of what the challenges are in case level data linkage and the implications for possible implementation.

## Conclusions and Recommendations

We would assess that the overall improvement from the interim report is considerable, and reflects a very comprehensive analysis. On the other hand, we remain concerned that local contextual factors will remain important and likely more so if trials of the model are implemented. We hesitate to suggest that the model may need fine-tuning for various locales once testing starts on the ground since it would be ideal if all at risk children had an equal probability to be included in a preventative response. Nevertheless, we anticipate such fine-tuning will be necessary, if for no other reason than the likely role of the endogenous independent variables in the PRM. For example, multi-level risk adjustment might be important when considering local pilot testing to help identify locales where the PRM models may be less effective. We would urge MSD to evaluate local level variability especially with endogenous variables like prior history and consider this when testing the PRM.

Recommendation 1: While the PRM model appears to function slightly better for the substantiated maltreatment group, the relative improvement is marginal. We would urge consideration of the notifications and/or investigations as a basis for implementation testing as well. Among other concerns, since all three dependent variable outcomes are subject to shifts in policy (Mansell et al., 2011), use of a single indicator may make it difficult to evaluate PRM effectiveness over the long run. Furthermore, depending on the target for intervention and the resources available broadening the at risk population could be important. This recommendation also appears to be consistent with the findings of the authors.

Recommendation 2: We believe that MSD should continue to pursue the analysis of the data that was used in the PRM analysis in order to consider how best to allocate preventative resources. The authors of the PRM report clearly articulate that the purpose drives the method, and that causality and explanation is not a primary concern (despite this the authors rightly do address possible causal connections) when it come to identifying the pool of at risk children. Clearly, the focus of the PRM is to offer a tool that staff in the field can apply in targeting resources for specific children before they are referred or substantiated.

However, we believe these resources should be prioritized geographically, consistent with areas where there are more children at risk. Obviously, the approach we are suggesting would focus more on population based resource allocations compared to individual allocations in the form of referrals. Further analysis aimed at improving decision making, and other system factors through exploiting the data to derive more causal and evaluative analysis of system performance would seem to us be worthwhile, especially now that the feasibility of having linked data has been demonstrated.

Recommendation 3: What is really unclear and troubling is whether the MSD has services that will ameliorate the risk – in other words, if they refer children and the services don't work – because the services are ineffective – and the family “fails” to respond to treatment – to what extent will that then form the basis for a more deep end service like removal? For this reason we think it will be important for MSD to view the service and underlying resource allocation of a prevention system that might be tied to the model from an evidence based approach; testing the actual services to be provided

in the context of the model. That is, what services and in what contexts will they work best to achieve the overall MSD goals with respect to prevention while avoiding other unintended consequences?

## **References**

**Mansell, J., Ota, R., Erasmus, R., & Marks, K. (2011). Reframing child protection: A response to a constant crisis of confidence in child protection. *Children & Youth Services Review, 33*(11), 2076-2086. doi:10.1016/j.childyouth.2011.04.019.**