The impact of Social Workers in Schools: A preliminary investigation using linked administrative data

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Disclaimer

Access to the data used in this study was provided by Statistics New Zealand under conditions designed to give effect to the security and confidentiality provisions of the Statistics Act 1975. The results presented in this study are the work of the authors, not Statistics NZ. The views expressed are those of the researchers. They do not necessarily reflect the position of MSD or those involved in the advisory or review processes. MSD has made every effort to ensure the information in this report is reliable, but does not guarantee its accuracy and does not accept liability for any errors.

Note on random rounding

All counts presented in this study have had Statistics New Zealand confidentiality rules applied. This includes the random rounding of all counts to base 3. Therefore, the sample counts presented are not exact, and in some cases aggregating sub-samples will not yield the exact population counts.

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Contents

Executive summary

The creation of linked administrative data in New Zealand has opened up new opportunities for impact evaluation of a range of programmes. While they do not allow all of the outcomes sought by programmes to be measured, impact evaluations using these data can form a useful part of the evidence-base on programme effectiveness.

This paper reports on a preliminary investigation of the impact of the government-funded Social Workers in Schools service (SWiS) which is available in selected primary and intermediate schools.

The investigation uses the Integrated Child Dataset (ICD) - linked data that foreshadowed the child-level data linkages now available through the Statistics New Zealand Integrated Data Infrastructure (IDI). Further study using the IDI is recommended.

The aim of SWiS is to see safe, healthy and socialised children with a strong sense of identity, who are fully engaged in school. Results sought include improved school attendance and engagement in school activities, and successful transitions from primary to intermediate and intermediate to high schools.

The SWiS service is not unique to New Zealand. In many other countries, social workers have been working for, and within, schools to improve educational and social outcomes of students. Existing reviews of the international published literature on the impact of these school-based social work services indicate some positive impacts and a positive estimated benefit-to-cost ratio. They also highlight many outcomes for which no positive impact is found, and the need to broaden the evidence base and improve the rigour of impact studies.

Previous evaluations of the New Zealand SWiS initiative have been undertaken. These have found indications of positive change for families. They have also identified challenges to successful operation that have informed the development of the programme. None of these previous evaluations have investigated outcomes for control populations of children who did not have access to the SWiS program.

The present analysis uses a quasi-experimental design to compare outcomes for children who attended SWiS schools that were part of an expansion of the service with similar children who attended similar schools that at the time were not part of the SWiS programme. Due to restricted data we focus on children who were enrolled in a SWiS school in school Years 7 or 8 (intermediate school years) prior to starting high school during 2009 and 2010 and compare them with matched children who were enrolled in similar schools at Year 7 and 8 that did not have access to SWiS.

Outcomes are measured in the first three to four years of high school (subsequent to departing their SWiS school). Outcomes able to be examined include the number of days of non-enrolment during their years at high school (a possible indicator of disengagement from schooling), achievement of the National Certificate of Achievement (NCEA) Level 1, achievement of NCEA Level 2, number of care and protection notifications to Child, Youth and Family (CYF) and number of youth justice referrals to CYF. The relatively large sample size allows the following sub-populations to be

analysed: girls, boys, Māori and/or Pacifica children, high-needs children overall, high-needs girls and high needs boys.

Some evidence of reductions in non-enrolment days is found for children overall and for girls. The effects sizes are quite large in some cases. The statistical significance of these reductions varies and on some measures there is no significant difference: for girls, the average number of non-enrolment days during the first year of high school drops by 3.2 days (95 percent confidence interval -5.4, -0.9) from 6.2 to three and the estimated effect is significant at the one percent level; for children overall, the reduction in the first two years of high school is proportionately smaller and significant at the five percent level.

We also estimate the average proportion of girls with NCEA Level 1 by the end of the year in which they turned 16 years of age increased from 63 percent to 68 percent, significant at the five percent level (a 4.8 percentage point increase, 95 percent confidence interval 0.1, 9.5). This effect increases in both magnitude and statistical significance for girls with high needs, identified by their benefit, CYF and primary caregivers' correction history by the year they turned five years old.

The analysis also finds reductions in CYF youth justice referrals in the first three years at high school, statistically significant at the 10 percent level only, for children overall, as well as boys and Māori and/or Pacifica.

While these results provide reason for optimism, this preliminary investigation is limited by the data available. Further work using the Integrated Data Infrastructure could and should be conducted to confirm the findings. In particular, the expansion of SWiS over 2012 and 2013 (2012-13) could be readily evaluated using more up-to-date data than was available for this analysis. Further study of the long-term impacts of SWiS taking into account the possible confounding effects of services available to students in high school and the expansion of Positive Behaviour for Learning and other initiatives is also recommended.

1. Introduction

The creation of linked administrative data in New Zealand has opened up new opportunities for impact evaluation of a range of programmes, including services aimed at improving outcomes for children. At the same time, the Government's Community Investment Strategy has increased demand for evidence that its investment in community-based social services makes a positive difference (MSD, 2015).

Linked administrative data do not allow all of the outcomes sought by social services to be measured. Nevertheless impact studies using these data form a valuable addition to the evaluative story and evidence base.

As part of a research programme undertaken jointly by the Ministry of Social Development (MSD) and academic researchers (mainly from Auckland University of Technology (AUT)), a series of retrospective impact evaluations have been undertaken using the Integrated Child Dataset (ICD)- linked data that foreshadowed the child-level data linkages now available through the Statistics New Zealand Integrated Data Infrastructure. Evaluations completed to date include a study of the impact of a home visiting social service programme, Family Start (Vaithianathan et al., 2016) and an examination of the impact of Teen Parent Units on the educational outcomes of young mothers (Vaithianathan et al., 2017).

The present paper reports on a third impact study using the ICD. It provides a preliminary investigation of the impact of Social Workers in Schools (SWiS), a government-funded community social work service available in selected primary and intermediate schools.

SWiS social workers are employed by contracted non-Government social service providers and work in partnership with schools. Services provided by the social workers include helping individual children referred to the service and their families and whānau, and organising group-based programmes for selected groups of children or the school as whole. Social workers are also responsible for community liaison and service coordination (MSD, 2015), with a strong emphasis on working in partnership with, and improving access to, other school-based and community services.

Participation by children and their families and whānau is voluntary. Together with the school setting for the service and the independence of the social worker from the school, the voluntary nature of the service provides a non-threatening point of access to social work services for families and whānau (Belgrave et al., 2002; MSD, 2015).

The broad features and aims of SWiS are similar to those of school-based social work services in other countries (Franklin et al., 2009; Allen-Meares et al., 2013) and "Integrated Student Supports" in the United States (Child Trends, 2014). Workers provide supports to children, families and schools with the aim of addressing barriers to learning and improving social outcomes. While within this broad framework the emphasis, practice, and content of programmes delivered varies, effective services would be expected to improve educational and social outcomes both for those children directly served by individual case work or group programmes, and for other children in the school via positive impacts school climate and teacher effectiveness - impact

evaluation should ideally examine outcomes both for individual children served, and for children in the school overall (Child Trends, 2014).

Existing linked administrative data do not permit us to examine outcomes for the individual children served by SWiS. We can establish whether a child attends a school where SWiS is available, but not whether they were the direct recipient of a SWiS service.

Given this constraint, this investigation examines outcomes for children in the school overall only. It uses a quasi-experimental design to compare outcomes for children who attended SWiS schools with those for similar children who attended a set of similar schools that at the time were not part of the SWiS program.

We focus on children who attended schools that newly received SWiS as a result of an expansion of the service announced in the Government's 2004 Budget. We do this for two reasons. First, the schools that received SWiS prior to 2004 were low decile[1] schools in areas of very high deprivation (Child, Youth and Family (CYF), 2004a). Finding a suitable set of comparison schools was expected to prove difficult. Second, we have good information on the selection process used for the 2004 expansion.[2] This information allows us to better understand the possible selection effects that could cause schools that received the SWiS service in that expansion to be different to those that did not. For a quasi-experimental study such as the present one, understanding the process of selection of schools into SWiS (ie "treatment") is crucial since we need to establish which untreated schools have children who can be considered good matched controls for children in the treated schools.

[1] School deciles indicate the extent to which schools draw their students from low socio-economic communities, and are used to inform levels of school funding. Decile 1 schools are the 10 percent of schools with the highest proportion of students from low socio-economic communities. Decile 10 schools are the 10 percent of schools with the lowest proportion of these students.

[2] See Appendix A.

2. Background

2.1 Social Workers in Schools service

The SWiS service was first introduced in 1999 with six community providers who were funded to deliver social work services through 12 social work positions. In 2000 the programme was expanded to 66.5 social worker positions providing services in 171 schools. The programme was expanded by another 5.5 positions in 2001. Despite positive evaluation (Belgrave et al, 2000; Belgrave et al., 2002), a lack of social work labour force was a reason for no further expansion of the programme in the early 2000s (Quirke, 2003).

In 2004, a major expansion of the programme was announced and new schools began receiving SWiS in 2005 and 2006 (this expansion is described in more detail in section 2.2 and Appendix A). By 2010, 10 iwi providers were contracted to provide the service (English et al., 2011). In October 2011, the Minister of Social Development and Employment announced funding to further expand SWiS services to all decile 1-3 primary and intermediate schools from 2012-2013.[3] The programme currently has a $21 million annual spend and serves just over 700 schools.

The intended ratio of social workers to students is between 1:400 and 1:700. A single social worker works with a single school or a cluster of schools depending on roll size. Referrals can be made by children and their families and whānau (self-referrals), schools, statutory agencies (eg CYF) or health and community agencies working with families and whānau.

Partnering agreements set out the respective relationships and roles of the providers, schools and other stakeholders. Quarterly meetings involving principals, the Ministry of Education, MSD staff and provider representatives provide a forum to review service delivery, consider and resolve emerging concerns and conduct joint planning for the service (MSD, 2011; Davidson, 2007). Service specifications for the programme are centrally determined and reviewed and updated at regular intervals (CYF, 2005a; CYF, 2008; MSD, 2011; MSD, 2012a; MSD, 2012b; MSD, 2015).

Service specifications do not codify the caseload for social work with individual children and their families and whānau, or the number of group programmes to be run. However, guidance given to providers is that one social worker should work with between 10 and 20 individual children and their families and whānau at a time, with a caseload of 16 seen as optimal.[4] Group programmes vary widely in target group, content and intensity (Fitzpatrick, 2005; English et al., 2011). A review found social workers each ran an average of 7 programmes in a 12 month period, and each programme ran for an average of 8 weeks (Fitzpatrick, 2005).

The 2005 version of the service specifications for SWiS set out the outcomes for children that the service was intended to achieve at that time as follows:

[3] Existing SWiS schools with a decile rating of 4 and above that were already receiving the service continued to receive it.

[4] Personal correspondence, Community Investment, MSD.

- improved education, welfare and health
- fewer crisis interventions required
- improved personal and family/whanau circumstances (CYF, 2005a).

Later versions of the service specifications (MSD, 2011; MSD, 2012a; MSD, 2012b; MSD, 2015) provide a detailed description of the results sought:

- children attending school
- children making friends and maintaining positive relationships at school
- resilient children
- children able to manage difficult situations and know who to go to for help
- timely SWiS intervention to address child safety concerns
- schools able to identify abuse and neglect and respond appropriately
- parent/caregiver participation in school activities
- children making successful transitions from primary to intermediate and intermediate to secondary schools
- parents and caregivers are well connected to their communities
- appropriate referrals are made to services to provide specialised support to children and families/whānau
- collaboration between social services in the school and community, resulting in coordination of services to children and their families/whānau
- parents and caregivers have positive parenting strategies and skills (MSD, 2015).

There is no monitoring of progress in achieving these specific outcomes and results. Contract monitoring carried out by regional staff focuses on tracking quarterly provider reports on activities, volumes (relating to social work with children and their families and whānau, prevention and intervention group programmes, and community networking) and financial accounts (MSD, 2008, Appendix 5). Since 2011, providers have also been required to report on client and school satisfaction, and numbers of clients for whom the service has brought about positive change (MSD, 2011, Appendix 1). Contract managers also verify that casework is delivered in a manner consistent with the service specifications based on inspection of samples of case files.

2.2 2004 expansion

As noted, this study focusses on children who attended schools that newly received SWiS as a result the expansion of the service announced in 2004. Selection of schools for this expansion occurred in two stages.[5] At the first stage, eligible schools were required to register an expression of interest (CYF, 2004b). Schools were required to form themselves into clusters of neighbouring schools with a combined roll of between 400-700 Year 0-8 students. At least 60 percent of the roll for the cluster was to be drawn from decile 1-3 schools. Larger schools could register interest as their own cluster. The first stage attracted 101 expressions of interest from clusters of schools that met the

[5] Appendix A provides more details of the selection process.

eligibility criteria. Clusters combined schools that were strictly primary (ie Years 1 to 6), were primary and intermediate combined (ie Years 1 to 8), and intermediate (Years 7-8). A small number included composite schools (ie those that went from primary through to secondary).

At the second stage, eligible clusters were invited to complete a full application which required them to provide detailed information about how the school could be expected to benefit from SWiS, school capacity and commitment of resources, student needs, and existing initiatives and community linkages (CYF, 2004c). Clusters were required to describe the strengths of their proposals along the following dimensions.

- School capacity:
    - Existing relationships between the schools
    - Particular challenges to the successful implementation of SWiS
    - Property available, and commitment of resources
- School initiatives:
    - Identification of key social issues impacting on students
    - Expected SWiS contribution to student engagement and achievement
- Community linkages:
    - Predominant iwi and hapu affiliations and linkages
    - Pasifika community linkages
    - Links with social service organisations
- Other relevant information.

Information was also gathered from CYF (eg. the availability of CYF-approved service providers in the area, whether there was an isolated SWiS position in the area and benefit from another position being added) and from the Ministry of Education (eg. whether schools in the cluster were operating effectively and likely to be able to successfully participate in SWiS; whether they were already receiving Ministry of Education support or funding for other initiatives; whether there were any concerns about use of suspensions or exclusions).

Our record search identified 66 clusters that submitted full applications and went through the process of being considered for shortlisting, 29 of which were shortlisted for consideration by a selection panel. Criteria for shortlisting and selection mapped to the dimensions listed above. All but one of the shortlisted clusters were selected to receive SWiS as part of the expansion (CYF, 2005b). A small number of additional clusters were then added to the expansion drawing on both the funding allocated for the expansion and additional baseline funding that became available through equalisation of the unit rate for SWiS[6] (CYF, 2005c).

[6] Up to that time, the unit rate for SWiS had been higher for providers serving rural areas than for those serving urban areas. The rates were equalised in recognition that higher accommodation costs for urban providers counterbalanced lower transport costs.

2.3 Existing evidence base

Three previous evaluations of SWiS have been undertaken (Belgrave et al., 2000; Belgrave et al., 2002; Davidson, 2007). These, together with an investigation of the work of iwi SWiS providers (English et al., 2011), suggest that the service is valued by schools, children and family and whānau, and sufficiently flexible to allow iwi and Pacific providers to develop culturally responsive models of practice. Examination of quantitative data from a records system and in-depth case studies found indications of positive change for families involved with SWiS (Belgrave et al., 2002).

Evaluations have also documented a number of challenges to successful operation. The 2002 evaluation identified high turnover of social workers and difficulties with recruitment, difficulties associated with social workers working in isolation where a provider held a contract for only one social work position, a need for more Māori and Pacific providers and social workers, and issues with relationships between providers and schools, and within clusters of schools (Belgrave et al., 2002). These findings informed the development and expansion of SWiS. The 2004 expansion, for example, had a focus on reducing social worker isolation, increasing responsiveness to Māori and Pacific families and whānau, and promoting good working relationships (CYF, 2005b; Appendix A).

To date there has been no investigation of whether the intended positive impacts on child wellbeing are being achieved based on comparison with outcomes for control populations of children who did not have access to the SWiS program.

Existing reviews of the international published literature on the impact of school-based social work services indicate some positive impacts, and a recent meta-analysis estimated a positive benefit-to-cost ratio (Washington State Institute for Public Policy, 2016). But for many outcomes there is little or no evidence of positive impacts. Reviews highlight the need for more robust evidence (Franklin et al., 2009; Allen-Meares et al., 2013; Child Trends, 2014).

Child Trends conducted a recent literature review focussed on Integrate Student Supports (Child Trends, 2014). They restricted attention to randomised or quasi-experimental designs. All programmes were based in the United States. Programmes evaluated using quasi-experimental methods generally found positive impacts on student progress (eg. school drop-out, credit completion, and grade retention), school attendance (chronic absenteeism, absenteeism, and attendance rate), and performance in standardised tests. Programmes evaluated using randomised controlled trials were less likely to find positive effects. Non-academic outcomes such as conduct problems, social and emotional learning or life skills, and health and safety were also studied by some evaluations. The results for these domains demonstrated few positive impacts.

City Connects is an intervention that is similar to SWiS which runs in Boston elementary (primary) schools. At the core of the intervention is a full-time School Site Coordinator who is a trained counsellor or school social worker. The ratio of school site coordinators to student population is 1:400. The School Site Coordinator works with teachers to provide customised plans for each child's strengths and needs. They also develop close relationships with community agencies and connects children to these services. They may also provide school specific programmes such as anti-bullying classroom modules. Estimation of impacts using quasi-experimental methods suggests that children who came from City Connects schools were less likely to drop out when they reached high

school than children from comparison schools. They also performed better on standardised tests, and had lower rates of chronic absenteeism. Results are suggestive of a dosage effect where longer exposure to the programme has more effect on academic outcomes (Child Trends, 2014).

Communities in Schools is another United States school-based programme that includes an intensive case management service intended to connect at-risk children to community services. It is based in high schools rather than primary schools, so is slightly different to SWiS. It also has a strong focus on reducing drop-out rates. A recent report on the interim, one-year outcomes from a randomised field trial of the case management component of this programme found that surprisingly, case-managed students had a slightly higher rate of chronic absenteeism, and a similar rate of core course failures. There was no difference in school progress, behaviour and academic achievement after one year, or in most outcomes relating to interpersonal relationships and educational perspectives. However, case management had a positive impact on students' reports of having caring, supportive relationships with adults outside of home and school, the quality of their friendships, and their belief that education mattered for their future (Corrin, Parise et al., 2015).

3. Data sources

This study uses the MSD Integrated Child Dataset which was developed progressively from 2012 to 2014. The ICD foreshadows child-level data linkages that are now available and continuously updated in the Statistics New Zealand Integrated Data Infrastructure (IDI).

The "spine" of the study is constructed from the Ministry of Education's ENROL system which covers private, public, correspondence, denominational and special schools, that is, all registered schools. ENROL was introduced in 2006. Data coverage expanded from 2006 to the end of 2007 by which time it comprehensively covered all schools. The ENROL data provides information on enrolment episodes, with the start and finish dates of spells enrolled at each school.

Additional information from the Ministry of Education merged into this data includes the profile of the school (eg school roll, school decile ranking, type of school, school district etc.) and child (eg ethnic groups), as well as NZQA information about students' attainment of credits that count towards NCEA. The latter allows us to estimate whether the child gained NCEA Level 1 and 2 qualifications.

Education data linked to other data in the ICD includes:[7]

- MSD benefit data which provides data on the children's spells of inclusion in main welfare benefits (eg unemployment, disability and sole parent-related benefits) and child-caregiver relationships
- MSD CYF care and protection data which provides data on CYF care and protection notifications, CYF placements (usually in out-of-home care) and CYF youth justice referrals
- Corrections data on sentences served by caregivers (where a child-caregiver relationship can be established using MSD benefit records). [8]

Ethics approval for the study was granted by the Central Region Health and Disability Ethics Committee (Ethics Ref 15/CEN/39). Data were de-identified prior to analysis, and accessed by the research team through the secure Statistics New Zealand Data Lab and a secure server at MSD.

[7] The ICD data linkage that Ministry of Education data is added to is described in Appendix B of Vaithianathan et al., 2016.

[8] Appendix B and Box 2 below provide descriptions of key variables constructed for the study and where each is sourced from.

4. Evaluation strategy

As noted in the introduction, one of the challenges of this particular evaluation is that there is no client-level data. Recall that the SWiS social worker works with specific children and their families and whānau. Data on who is worked with and who attends group programmes are held by providers and are not currently centrally collated.[9] Therefore, we can only establish whether a child attends a SWiS school, not whether they received a SWiS service.

Another challenge is the restricted time period of observations. In particular, we need a longitudinal data set that follows cohorts long enough to measure meaningful outcomes but that also has a rich set of family and child characteristics to allow us to control for possible confounding factors.

We need to draw on a variety of administrative data sets in the ICD to build this longitudinal data set, but each of these data sets covers different time periods. Box 1 outlines the time window that each data set that we use for this study covers. The main challenge is that the period for which all data sources are available is fairly narrow: namely 2007 to Q4 2012. This means that we cannot study the expansion of SWiS implemented in 2012 and 2013 because many of the outcomes of interest that are available in the CYF data are only observed up to 2012.

Our central strategy is a child level propensity matched study. We estimate the average treatment effect on the treated children by matching children who were enrolled in a 2004 SWiS expansion school during their Year 7 and Year 8 schooling with similar children who attended a similar school that did not have SWiS. We study outcomes in the three to four years following (ie school Years 9 to 11 or 12). This strategy allows us to establish whether attending a SWiS school during the intermediate school years improved outcomes for children in the transition to high school.

[9] A SWiS database was in use in the mid-2000s (Fitzpatrick, 2005). However due to problems with its design and usability, providers were allowed to opt out of using it and it is no longer in existence (Personal correspondence, MSD).

Box 1: Data coverage of the data available for study

Source Data and Description	Study Variables	Data Coverage
ENROL and other data provide school level profile, individual child level enrolment, child's demographics and child's attainment of NZQA credits	Controls: Ethnicity, year of birth, urban status of school, school decile Outcomes: non-enrolment; NCEA attainment (estimated from credits)	2007 - Q1 2014
MSD Benefit data	Controls: Child included in a main income tested benefit Link between child and caregiver (primary benefit recipient) if child included in a benefit	1993 - Q4 2012
MSD CYF data	Controls: Whether child known to CYF; CYF care and protection placements Outcomes: CYF care and protection notifications; CYF youth justice referrals	1996 - Q4 2012
Corrections sentencing data	Controls: Corrections history of primary benefit recipient (only for children in benefit data)	1982 - Q4 2012

Within the restrictions placed on us by the data availability we are able to undertake analysis of two cohorts defined as those that start school Year 9 (their first year of high school) in 2009 or 2010 (see Box 2).[10] Note that during this period, most high schools did not have social workers.[11]

[10] To be included in our study, a child must enrol in a high school at Year 9. The number missing from the study because they did not enrol is expected to be small. When a student of compulsory school age has left a school and has not enrolled in another school within 20 consecutive school days, the school is required to make a notification via ENROL. In 2012, the proportions of 13 and 14 year olds for whom there was a non-enrolment notification that had been investigated and closed were 1 percent and 1.6 percent respectively. Across all age groups, the vast majority of notifications investigated and closed are resolved by the student returning to school or enrolling at an alternative education centre, and this occurs within three months.

[11] However a small number had social workers that were first introduced in nine high schools as part of the AIMHI initiative (Ministry of Health, 2009). From 2007, the number with social workers expanded to 17 under the Multi Agency Support Services in Secondary schools (MASSiSS) initiative. High schools with a MASSiSS social worker currently include: Mangere College,

Box 2: Cohorts used in the study

	Treatment Period (Intermediate school years)	**Outcome Period** (First 3-4 years of high school)[12]
Cohort 1 = start high school in 2009	2007 and 2008	2009-2011/2012
Cohort 2 = start high school in 2010	2008 and 2009	2010-2012/2013

Children are defined as treated if, in the two school years prior to entering high school at Year 9, they were enrolled in a school[13] that became part of the SWiS programme as a result of the 2004 expansion. That is, a typical treated child enters high school from an intermediate or primary school that was a 2004 SWiS expansion school.

Children are considered as untreated – and therefore potentially in the control group – if they never enrolled in a school served by the 2004 SWiS expansion in the two years prior to enrolling in high school, and never enrolled at Year 7-8 in one of the schools that had SWiS prior to 2004.

By focusing on the two cohorts starting school Year 9 in 2009 and 2010, we are able to have a reasonable post-treatment follow up period. We can observe them in the ENROL data for their first four full years in high school, and in CYF data for their first three full years. We examine the outcomes detailed in Box 3.

Data on school attendance and truancy are not available in the ICD, and school leaving age cannot be comprehensively examined for the cohorts of interest. Periods of non-enrolment are therefore used as a proxy for disengagement from school.[14] NCEA Level 1 attainment is estimated twice, once at the end of the year the cohorts turned 15 years of age, and once at the end of the year they turned 16 (by which time most in the cohort

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Manurewa High School, Tamaki College, James Cook High School, One Tree Hill College, Southern Cross Campus, De La Salle College, McAuley High School, Otahuhu College, Sir Edmund Hillary Collegiate, Tangaroa College, Papakura High School, Aorere College, Flaxmere College, Mana College, Porirua College, Bishop Viard College.

[12] First three years for outcomes sourced from MSD CYF data. CYF outcomes are measured regardless of whether or not the child attends high school.

[13] If the child enrolled in more than one school during the two years prior to high school Year 9, we select the school in which they were enrolled the longest in order to determine their treatment status.

[14] Compulsory schooling ends when the child turns 16 years of age. However, parents of 15-year-old students may apply to the Ministry of Education for an exemption from schooling on the basis of educational problems, conduct, or the unlikelihood of the student benefiting from attending available schools. Between 2006 and 2014 the early leaving exemption rate dropped from 65.3 to 6.5 early leavers per 1,000 15-year-old students (MoE, undated). Non-enrolment we observe may be explained by a range of outcomes that include formal withdrawal from schooling (leaving school at age 16+ years or exemption at age 15 years), gaps in enrolment associated with transience, expulsion (if aged 16+ years), informal disengagement, or absence from New Zealand.

would have reached the school year in which Level 1 credits generally begin to be gained).[15] Due to data censoring, NCEA Level 2 attainment is only able to be measured at the end of the year the cohorts turned 16 years (by which time only some would have reached the school year in which Level 2 credits generally begin to be gained).

Box 3: Outcomes

Outcome	Description and source
Non-enrolment days in first four years of high school	Count of number of days within official school terms that children are not enrolled for each year in the four years after entering Year 9. From Ministry of Education ENROL data.
NCEA Level 1 by year turned 15 years old NCEA Level 1 by year turned 16 years old	Sufficient credits for a NCEA Level 1 qualification (at least 80 credits at Level 1 or above) by the end of the year in which turned 15 years and the end of the year in which tuned 16 years of age. Estimated from NZQA data held by the Ministry of Education.
NCEA Level 2 by year turned 16 years old	Sufficient credits for a NCEA Level 2 qualification (at least 80 credits at Level 1 or above of which at least 60 were at Level 2 or above) by the end of the year in which turned 16 years of age. Estimated from NZQA data held by Ministry of Education.
CYF care and protection notifications in first three years of high school	Count of care and protection notifications to CYF in the three years after entering Year 9.[16] From MSD CYF data.
CYF Youth Justice referrals in first three years of high school	Count of youth justice referrals to CYF in the three years after entering Year 9.[17] From MSD CYF data.

[15] We estimate that NCEA Level 1 has been attained where the young person has gained at least 80 credits at Level 1 or above. We estimate that NCEA Level 2 has been attained where the young person gained at least 80 credits at Level 1 or above of which at least 60 were at Level 2 or above. Note these measures are proxies for attainment of NCEA qualifications because: (i) we do not consider literacy and numeracy credit requirements (so as to avoid the discontinuity created by the change in literacy and numeracy credit requirements in 2013); (ii) some students may have the required credits, but may not have been officially given the qualification; and (iii) some credits gained by students would be excluded when credit exclusion rules are applied to ensure that credits from similar standard assessing similar skills are excluded.

[16] A notification is a contact made to CYF's national contact centre or a site by a concerned member of the public or partner agency about the safety or wellbeing of a child or young person (for more detail see Modernising Child, Youth and Family Expert Panel, 2015, pp.53-56).

[17] These are cases where a child or young person is referred to CYF by the Police because of youth offending. Most apprehensions by the Police are dealt with by caution or warnings, or by the Police Youth Aid Section, and involve no contact with CYF. This reflects an emphasis on diverting young offenders who commit lower level offences away from formal youth justice processes where possible (for more detail see Modernising Child, Youth and Family Expert Panel, 2015, pp. 65-66).

We are also able to match to benefit, CYF and Corrections data and thereby obtain a rich history of risk factors. Moreover, we can observe these risk factors by the year the children turned five years of age, ensuring that these are largely prior to (and therefore independent of) their school attendance.

Our evaluation strategy requires us to find "similar children in similar schools". To obtain these matched children, we undertake a two–stage matching process. The first stage finds "similar schools". The second stage finds "similar children" in similar schools.

4.1 First stage: Finding similar schools

First we find "similar schools" by matching schools based on a calculated "propensity" (ie likelihood) to be treated. Ideally we would like to calculate this propensity using characteristics observed at the time that the decision was made on which schools would be part of the 2004 SWiS expansion (ie 2004-05).

Unfortunately, the only variable which is contemporaneous with this decision-making period is the 2004 decile ranking of the school in the Ministry of Education's school profile data. However, we know from a review of the policy documents that the level of needs of the enrolled children was also an important consideration in the treatment decision. Our ENROL data gains comprehensive coverage in 2007 and this is the earliest period for which we can generate the profile of children enrolled in the school. While this is not ideal, school profiles tend to change slowly, and we believe that this is a close approximation of the profile of the children enrolled in the school during 2004-05 (when the treatment decision was being made).

We therefore develop a comprehensive profile of the children enrolled in the school in 2007 based on risk factors able to be identified using ICD data. Appendix B provides details of the variables constructed.

We then estimate a propensity model at the school level as follows:

$$Pr(SWIS_i = 1|X_i) = F(\beta_0 + \beta_1 X_i) \qquad \text{(Model 1)}$$

where *i* denotes the school. *SWISi* is an indicator variable which equals one if school *i* was selected to receive SWiS as part of the 2004 expansion and zero otherwise. X_i is a set of school level variables including student risk factor profile (provided in the Appendix B) and decile of the school (observed in 2004), Territorial Local Authority dummies, ethnicity dummies, school roll, and the count of unique children enrolled in 2007. Model 1 is estimated as a probit, and estimated coefficients allows us to predict a "propensity to be treated" for each school. We rank all schools, treated and untreated, according to this risk score, and calculate a decile score where 10 means the school is in the top 10 percent of probability of being treated. We call this calculated score the *Treatment Risk Decile*.

The sample for this first stage analysis is all primary and intermediate schools that existed in 2004 and were still in existence in 2009. We exclude from our analysis any schools that went beyond school Year 8. Table 1 provides the share of these schools that were treated in each of the Treatment Risk Deciles.[18] The data suggests that almost all

[18] Note that due to random rounding to base 3, sample counts presented are not exact.

of the treated schools are in the top three Treatment Risk Deciles (7-10). However, there are also 459 untreated schools in these top three deciles. These latter schools provide a useful set of control schools for the 93 treated schools in the top three deciles. Of course, this raises the question as to why these apparently similar schools were not treated. We return to this issue in Section 6 of this document.

Table 1: Share of schools treated in each treatment risk decile (all schools in study sample)

Treatment Risk Decile	Count of schools	Share treated
1	183	-
2	183	0.005
3	183	-
4	183	-
5	183	-
6	183	-
7	183	0.027
8	183	0.054
9	183	0.120
10	183	0.332
Total	1842	

Of those 459 untreated schools in the top 3 Treatment Risk Deciles, only 294 schools had Year 7 or 8 students in 2009. This is because some of these schools were primary schools that did not go beyond Year 6 whilst other schools were closed by 2009. This leaves us with only 294 schools that can provide controls. For the same reasons we have to drop some of the 93 treated schools in the top three Treatment Risk Deciles, leaving 63 schools which had children enrolled in Year 7 and 8 in 2009. Appendix C provides detail on the estimation and results of this first stage of the matching.

4.2 Second stage: Finding similar children in similar schools

Having identified schools that are similar in likelihood of treatment in the 2004 expansion, the second stage of our strategy finds "similar children" in similar schools.

To do this, and to calculate the estimated treatment effect, we use stata *teffects nnmatch* command.[19] We exact match children on the following attributes: gender (boys vs. girls), ethnicity (Māori and/or Pacifica vs. other), Treatment Risk Decile (10 vs. 8 vs.

[19] This method uses a set of variables to impute the potential (but unknown) outcome in the absence of treatment for each treated child by using an average of the outcomes of matched children who were untreated. Similarity between the children who are matched to one another is established based on a weighted function of a set of variables for each. The method also allows exact matching on a sub-set of characteristics (eg to ensure girls are always matched with girls). The average treatment effect on the treated is computed by taking the average of the difference between the observed and imputed potential outcomes for each treated child.

9) and year of birth. Additional variables used to find a nearest neighbour are: the percentage of time the child was registered on a benefit by the year they turned five years of age, the count of CYF placement events greater than 28 days in duration by the year they turned five, the count of CYF care and protection notifications by the year they turned five, the count of any CYF events by the year they turned five, whether there was a benefit caregiver with a Corrections history by the year they turned five, whether an Unsupported Child Benefit[20] was paid in respect of the child by the year they turned five, and urban status, total school roll and decile of the high school.[21] One treated child can have one or several matched control children, and one control child can be matched to one or several treated children.

The balance between the treatment group and the control group used for all children matched is reported in Table 2. This table compares the sample averages between the treatment group (ie students enrolled in schools that received SWiS in the 2004 expansion) and the control group (ie untreated students who are ever used for a nearest neighbour match).

The hypothesis of equal means between the two groups can be easily rejected at better than a one percent significance level for most of the covariates and the comparison indicates children enrolled in schools that received SWiS prior to high school have relatively worse backgrounds. By age five, those in the treated group spent more time on benefit, had more CYF events, care and protection notifications in particular, and a greater proportion were in the care of a primary benefit recipient with a Corrections history. They were also more likely to enrol in a non-main urban area high school and/or a smaller sized high school.

This imbalance between the treated group and control group suggests any positive effects of SWiS found in this study are likely to be underestimated; and any negative effects are likely to be overstated.

[20] Unsupported Child Benefit indicates out-of-home care.

[21] Māori, Pacific and Asian are included as separate ethnicity groups. Percentile of the treatment risk score was also included as a variable in the nearest neighbour calculation.

Table 2: Balance between the treatment group and control group for all children in nearest neighbour match

Variables	Control Group Mean	Treatment Group Mean	p-values for t Test of Equal Means
Proportion of time supported by benefit by age 5	0.234	0.300	0.00
CYF events by age 5 (count)	0.264	0.365	0.01
CYF care and protection notifications by age 5 (count)	0.143	0.197	0.00
CYF placement events by age 5 (count)	0.034	0.051	0.22
Whether primary benefit caregivers with Corrections history by age 5	0.141	0.193	0.00
Whether Unsupported Child Benfit paid in respect of child by age 5	0.011	0.012	0.67
Whether Year 9 high school in a main urban area	0.688	0.576	0.00
Total roll as at 2014 of Year 9 high school	1062	862	0.00
Decile as at 2014 of Year 9 high school	4.4	4.0	0.00
Whether identified as Māori	0.364	0.428	0.00
Whether identified as Pacific	0.133	0.176	0.00
Whether identified as Asian	0.114	0.056	0.00
Treatment risk score percentile of the school in which child had the longest enrolment in the 2 years prior to starting Year 9 high school	88.7	90.4	0.00
Sample Size	*Control Group*	2,622	
	Treatment Group	3,114	

4.3 Study sub-populations

We estimate the effects of SWiS on all the children enrolled in SWiS schools who go on to enrol in a high school. We also estimate effects for the following sub-populations: all boys; all girls; Māori and/or Pacifica children.

Ideally, we would also like to evaluate the impact of SWiS on children who actually received SWiS services at the treated schools. As already noted, there are no data available to us recording the identity of children who were referred to the social worker or attended group programmes, and we cannot identify exactly who was treated. However, we are able to explore impacts for sub-populations we expect to be the most likely to be direct recipients of SWiS services. With this in mind, we also estimate the effects of attending a SWiS school on:

- high needs children (defined as being either known to CYF, with a CYF care and protection placement or with a benefit caregiver with a Corrections history by the year they turned five years of age)
- high needs boys
- high needs girls.

5. Results

In Tables 3-5, we show the estimated average treatment effect on the treated children (ATET) – the effect of enrolling in a 2004 expansion SWiS school at Year 7-8 – for the different outcomes considered.

5.1 Non-enrolment

We measure non-enrolment as the number of school days that the student is not registered with any school. Table 3 shows the estimated effect, the p-value, the 95 percent confidence interval and the mean days of non-enrolment over the different follow-up windows in the untreated matched sample of children. Those effects that are statistically insignificant at the 10 percent level (ie where p-value is greater than 0.1) are greyed out.

There is a statistically significant reduction in the number of days that children are not enrolled in school in their first four years of high school. This estimated effect is larger for girls than boys. In the first year of high school, children who arrive at high school from a SWiS school have an average of 1.5 fewer days not enrolled than children who arrive from a non-SWiS school, statistically significant at the 10 percent level but not the five percent level. By the end of the second year, the difference is 5.8 days and by the end of the fourth year the difference is 12.8 days. Only the 5.8 days reductions in non-enrolment during first two years of high school is significant at the five percent level, and the corresponding confidence interval indicates this average effect is estimated to be somewhere between 10.7 and 0.9 fewer days.

When compared to the average baseline days of non-enrolment in the untreated sample, the estimated effect sizes are reasonably large. For example, treatment seems to reduce non-enrolment in the first year for girls by 3.2 days (95 percent confidence interval -5.4, -0.9) – lowering average non-enrolment days from 6.2 to 3.0 days – and the reduction is significant at the one percent level.

The effect seems to fade over the four years. In the four-year window, while the average baseline days of non-enrolment is higher, the effect size is smaller when compared with the average baseline than in the first year. This pattern is consistent with the impact of SWiS exposure fading over the child's high school years.

While for boys the estimated treatment effects are also negative, the effect size is considerably smaller and not statistically significant at even the 10 percent level. For children who are Māori and/or Pacifica, the impact is also negative but estimated with less precision so only the two year follow-up period shows reduction in non-enrolment days which is significant at the 10 percent level only.

5.2 NCEA achievement

Table 4 provides the estimated effect on children's NCEA achievement (this is measured as achieving sufficient credits to obtain NCEA Level 1 or Level 2 by the end of the year in which the child turned 15 or 16 years).

The effect is only significant for girls. The treatment effect for achieving NCEA Level 1 by the end of the year girls turned 16 years old is an increase of 4.8 percentage points.

Given that the baseline rate for matched untreated girls is 63 percent, this is a reasonable effect size, marginally significant at the five percent level. There is a more significant impact on NCEA achievement of high needs girls. The estimated effect size is large and significant at the one percent level for achieving NCEA Level 1 by the year the girls turned 16 years. Treatment is associated with an 11.2 percentage point increase. Given the low baseline rates of achievement, this represents a substantial impact on their NCEA achievement.

5.3 CYF care and protection notifications and CYF youth justice referrals

Table 5 provides the estimated effect on the average count of CYF care and protection notifications per child in the first three years of high school. Overall, and across all the sub-groups, there is no statistically significant impact. However, for all children, boys, and Māori and/or Pacifica children, we do find a reduction in the count of CYF youth justice referrals. This is significant at the 10 percent level, but not the five percent level. Given that the baseline mean count for untreated boys is 0.2 over the first three years of high school, the average reduction of 0.125 referrals per student is qualitatively large and represents a substantial reduction in the average frequency of youth justice referrals. A similar size effect is found for Māori and/or Pacifica children.

Table 3: Estimated treatment effect on children of enrolment in SWiS school in Year 7 or 8 on non-enrolment days during high school (nearest neighbour matching child level analysis, only schools in top three treatment risk deciles, all children and selected sub-groups)

Outcomes		All	Girls	Boys	Māori Pacific	High Needs	High Needs Boys	High Needs Girls
Non-enrolment Days in First 4 Years of High School	*ATET*	-12.8*	-14.8	-8.9	-12.7	4.1	22.6	-12.7
	p-value	0.09	0.11	0.44	0.23	0.76	0.29	0.47
	95% C.I.	(-27.5, 1.9)	(-32.8, 3.2)	(-31.2, 13.4)	(-33.6, 8.1)	(-21.2, 29.5)	(-18.7, 63.9)	(-46.4, 21.1)
	Untreated Mean	116.7	104.3	128.5	150.9	196.7	215.8	176.6
Non-enrolment Days in First 3 Years of High School	*ATET*	-8.2*	-12.3**	-3.2	-7.53	0.2	12.8	-14.3
	p-value	0.07	0.02	0.65	0.24	0.98	0.37	0.23
	95% C.I.	(-17.0, 0.6)	(-23.1, -1.6)	(-16.4, 10.0)	(-20.0, 4.9)	(-16.0, 16.4)	(-14.7, 40.3)	(-37.5, 8.9)
	Untreated Mean	49.0	44.9	52.9	65.7	84.2	92.1	75.9
Non-enrolment Days in First 2 Years of High School	*ATET*	-5.8**	-7.1**	-4.7	-5.7	-1.6	4.8	-8.5
	p-value	0.02	0.01	0.25	0.10	0.77	0.59	0.18
	95% C.I.	(-10.7, -0.9)	(-12.8, -1.4)	(-12.5, 3.2)	(-12.5, 1.2)	(-11.6, 8.4)	(-12.1, 21.7)	(-21.0, 3.9)
	Untreated Mean	20.5	19.0	21.8	27.9	35.8	38.7	32.7
Non-enrolment Days in First Year of High School	*ATET*	-1.5*	-3.2***	-0.001	-0.8	-0.03	3.7	-3.5
	p-value	0.1	0.01	1.00	0.50	0.99	0.34	0.20
	95% C.I.	(-3.3, 0.3)	(-5.4, -0.9)	(-1.6, 1.6)	(-3.0, 1.5)	(-4.1, 4.1)	(-3.9, 11.3)	(-8.9, 1.8)
	Untreated Mean	6.8	6.2	7.3	9.2	12.9	13.7	12.0
Sample Size	*Treated*	3,117	1,521	1,596	1,836	759	372	387
	Untreated	19,047	9,279	9,771	10,434	3,828	1,959	1,869
	Total	22,164	10,800	11,367	12,270	4,587	2,331	2,256

*** Statistically significant at a 1% level; ** Statistically significant at a 5% level; * Statistically significant at a 10% level

Table 4: Estimated treatment effect on children of enrolment in SWiS school in Year 7 or 8 on NCEA achievement (nearest neighbour matching child level analysis, only schools in top three treatment risk deciles, all children and selected sub-groups)

Outcomes		All	Girls	Boys	Māori Pacific	High Needs	High Needs Boys	High Needs Girls
NCEA Level 1 by Year Turned 15	*ATET*	-0.007	0.007	-0.019	-0.006	0.025	0.004	0.043
	p-value	0.57	0.68	0.31	0.67	0.23	0.88	0.17
	95% C. I.	(-0.032, 0.017)	(-0.024, 0.037)	(-0.057, 0.018)	(-0.034, 0.021)	(-0.015, 0.065)	(-0.044, 0.052)	(-0.018, 0.104)
	Untreated Mean	0.18	0.21	0.16	0.14	0.11	0.09	0.14
NCEA Level 1 by Year Turned 16	*ATET*	0.023	0.048**	0.002	0.010	0.029	-0.058	0.112***
	p-value	0.21	0.05	0.93	0.69	0.34	0.2	0.01
	95% C. I.	(-0.013, 0.060)	(0.001, 0.095)	(-0.048, 0.052)	(-0.036, 0.056)	(-0.030, 0.089)	(-0.148, 0.031)	(0.032, 0.192)
	Untreated Mean	0.59	0.63	0.55	0.49	0.37	0.33	0.42
NCEA Level 2 by Year Turned 16	*ATET*	0.007	0.015	-0.002	0.011	0.030	0.006	0.051
	p-value	0.57	0.40	0.92	0.48	0.15	0.83	0.10
	95% C. I.	(-0.018, 0.033)	(-0.020, 0.051)	(-0.036, 0.032)	(-0.019, 0.042)	(-0.011, 0.071)	(-0.045, 0.057)	(-0.011, 0.113)
	Untreated Mean	0.18	0.21	0.16	0.15	0.11	0.09	0.13
Sample Size	*Treated*	3,117	1,521	1,596	1,836	759	372	387
	Untreated	19,047	9,279	9,771	10,434	3,828	1,959	1,869
	Total	22,164	10,800	11,367	12,270	4,587	2,331	2,256

*** Statistically significant at a 1% level; ** Statistically significant at a 5% level; * Statistically significant at a 10% level

Table 5: Estimated treatment effect of on children of enrolment in SWiS school in Year 7 or 8 on CYF notifications and youth justice referrals (nearest neighbour matching child level analysis, only schools in top three treatment risk deciles, all children and selected sub-groups)

Outcomes		All	Girls	Boys	Māori Pacific	High Needs	High Needs Boys	High Needs Girls
CYF Care and Protection Notifications in First 3 Years of High School (count)	*ATET*	0.001	-0.017	0.005	-0.05	0.027	0.12	-0.081
	p-value	0.96	0.79	0.91	0.36	0.83	0.45	0.65
	95% C. I.	(-0.068, 0.071)	(-0.134, 0.100)	(-0.078, 0.089)	(-0.156, 0.056)	(-0.194, 0.247)	(-0.185, 0.424)	(-0.416, 0.254)
	Untreated Mean	0.4	0.4	0.4	0.5	1.2	1.1	1.2
CYF Youth Justice Referrals in First 3 Years of High School (count)	*ATET*	-0.074*	-0.009	-0.125*	-0.124*	-0.037	-0.057	-0.013
	p-value	0.05	0.65	0.08	0.05	0.65	0.71	0.84
	95% C. I.	(-0.150, 0.001)	(-0.047, 0.029)	(-0.267, 0.016)	(-0.249, 0.001)	(-0.191, 0.117)	(-0.350, 0.235)	(-0.131, 0.106)
	Untreated Mean	0.1	0.1	0.2	0.2	0.4	0.6	0.2
Sample Size	*Treated*	3,117	1,521	1,596	1,836	759	372	387
	Untreated	19,047	9,279	9,771	10,434	3,828	1,959	1,869
	Total	22,164	10,800	11,367	12,270	4,587	2,331	2,256

*** Statistically significant at a 1% level; ** Statistically significant at a 5% level; * Statistically significant at a 10% level

6. Testing for potential bias

In this section, we return to the question of why the matched similar schools were not among the schools selected to be treated. A key concern is that schools that received SWiS in the 2004 expansion might be different to the matched schools that did not in ways that our study has not accounted for, and that this might bias our estimates of impact upwards.

Recall that schools were required to form themselves into clusters and work together to apply for SWiS. Schools that would have in any case had students with better outcomes might have been more likely to apply. They might have had more motivated and well organised principals or Boards of Trustees, more collaborative relationships with surrounding schools, lower levels of underlying student need, or better community linkages and better access to existing services for children experiencing difficulties - all factors that we are unable to observe and control for.

One way to assess whether there was selection on such unobserved variables is to use nearest neighbour matching at the child level and test whether children in schools which applied but were turned down had better outcomes than children in schools that are similar on observed characteristics that didn't apply. Since neither of the two groups of schools actually got treated over the period we consider, the difference in student outcomes between these schools lies in variables that we are unable to observe that led to an application being initiated or not. If the children enrolled in schools that applied and were rejected had better outcomes than the matched children in schools that did not apply this suggests that there is positive selection on these unobserved variables. This would bias us towards finding positive impacts when we estimate the impact of enrolling in a school that received SWiS in the expansion.

Table 6 reports on the results of the test. It shows that there is no evidence that those children enrolled in schools that applied and were rejected had better outcomes than matched children enrolled in similar schools that did not apply. Indeed, the heightened counts of CYF care and protection notifications and CYF youth justice referrals in the follow-up suggest that the schools that made a full application actually had students with higher underlying needs.

Of course, given that we are looking at children enrolled a number of years after the school elected whether or not to apply for SWiS as part of the 2004 expansion, school principals and boards and student needs might have changed.

Table 6: Estimated treatment effect of applying for SWiS vs. not applying (nearest neighbour matching child level analysis, only schools in top three treatment risk deciles that applied and were rejected or did not apply)

Outcomes	*ATET*	*p-value*	*95% C.I.*	
Non-enrolment Days in First 4 Years of High School	1.135	0.871	-11.587	13.856
Non-enrolment Days in First 3 Years of High School	-0.135	0.973	-7.212	6.943
Non-enrolment Days in First 2 Years of High School	-1.231	0.559	-5.245	2.782
Non-enrolment Days in First Year of High School	-1.134	0.195	-2.844	0.576
NCEA Level 1 by Year Turned 15	0.005	0.656	-0.015	0.024
NCEA Level 1 by Year Turned 16	0.006	0.719	-0.025	0.037
NCEA Level 2 by Year Turned 16	-0.002	0.876	-0.021	0.018
CYF Care and Protection Notifications in First 3 Years of High School (count)	0.078 ***	0.004	0.025	0.131
CYF Youth Justice Referrals in First 3 Years of High School (count)	0.060 ***	0.004	0.019	0.101
Sample Size	*Applied but Rejected*	5,205		
	Not Applied	13,833		

*** Statistically significant at a 1% level

7. Discussion, limitations and conclusion

Our results are consistent with SWiS having had a positive effect on children's transitions to high school. Results suggest that there is reason to be cautiously optimistic about the programme. In particular, the statistically significant reduction in average days of non-enrolment is consistent with the evidence of positive impacts on attendance from the Boston City Connects programme (Child Trends, 2014).

Testing for positive selection into applying to receive SWiS as part of the 2004 expansion shows that there was no apparent evidence that better quality schools or schools with lower needs students had applied for SWiS. Indeed, there is some evidence that the students in schools that applied had higher needs. This provides some assurance that there were no unobserved selection effects that might bias the estimates upwards.

This preliminary investigation has a number of important limitations, however, and further study is recommended before firm conclusions are drawn.

We estimate impacts on children potentially exposed to SWiS by virtue of their attendance at a school with a SWiS social worker. This has the benefit of capturing potential spillover effects to children who do not receive individual case work or group programmes (eg. through improved school environment). However it does not provide estimates of the effect of SWiS on those who directly received services. A possible direction for further investigation, subject to ethics approval, is to bring into the IDI client-level data held by providers to allow researchers to exactly identify which children received services. This would provide the basis for estimation of more precise treatment effects than the broader "intention to treat" effects estimated in the present study.

The present study commenced before the full IDI was available and used a precursor to that data linkage, the ICD. The ICD has more limited time coverage and a narrower range of data than the IDI. Study in the IDI would allow examination of a wider range of outcomes, including stand-downs and suspensions (not available in the ICD), teenage births, and school leaving age. It would also permit account to be taken of periods in which children were not resident in New Zealand. The IDI would also allow examination of the impact of the expansion of SWiS to all decile 1-3 schools implemented 2012-13. An event study at the school level, and a pre- and post-matched study at the child level could be explored. Such a study could examine short-term outcomes such as suspensions and stand-downs and care and protection notifications to CYF to test whether the introduction of the SWiS programme had an effect on these more contemporaneous events. Previous research has suggested that care and protection notifications to CYF could potentially be increased in the short term as a result of SWiS (Davidson, 2007).

Like primary and intermediate schools, high schools have increasingly been seen as a site for intervention to improve children's health, behaviour and wellbeing (Ministry of Education, 2013; Ministry of Health, 2009; Auckland Youth Support Network, 2006; Prime Minister's Youth Mental Health Project Fact Sheet, no date). Since 2010, the Ministry of Education has led the implementation of Positive Behaviour for Learning and related initiatives (Ministry of Education, 2013). Further study of the long-term impacts of SWiS, controlling for the services available to students in high school and the expansion of Positive Behaviour for Learning and related initiatives, is recommended. A

potential area for investigation is testing for a dosage effect of access to school-based social work and other services, looking across children's primary, intermediate and high schooling.

There are several limitations that apply to the present ICD analysis that would also apply to any future work in the IDI: data linking is probabilistic and some errors are inevitable; the data capture only information collected or generated in the process of administering government services, and inevitably embody any errors in measurement, reporting and recording that occur in those processes; and these administrative data allow only some of the outcomes for children that are of interest to be examined.

We should also note that the standard errors were not corrected for the fact that the propensity score used in the matching process was a generated regressor. However, because correcting for this two-stage methodology would lead to smaller absolute size of the standard error, our conclusions are conservative in the sense that we are more likely to infer that an estimated effect is statistically insignificant when it is not (Abadie and Imbens, 2009).

The results from this study suggest that SWiS had some positive effects on the outcomes able to be measured. We also find no evidence that this is due to positive selection into the SWiS service on unobservable characteristics. Further study in the IDI is recommended.

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Appendix A: Selection process for the 2004 expansion

In 2005 and 2006 three major tranches of schools newly received SWiS, one tranche in February 2005, a second tranche in July 2005 and the last tranche in July 2006.[22] At the time, the service was funded by CYF. The expansion was implemented by CYF in partnership with the Ministry of Education, and with input from Te Puni Kōkiri.

Selection of schools for the expansion occurred in two stages. At the first stage, 101 expressions of interest from clusters of schools that met the eligibility criteria were received. At the second stage, eligible clusters were invited to complete a full application (CYF, 2004c).

Our record search identified 66 clusters that submitted full applications and were considered for shortlisting. On the basis of the information gathering, 29 of the 66 clusters were shortlisted to be considered by a selection panel. We have found no information on the shortlisting process, other than that it involved scoring against criteria that mapped to the dimensions of the information gathering template described in section 2.2. At the time, it was noted that "[t]hrough the expression of interest process higher numbers of clusters have applied than the number of positions available. There have also been a number of schools, individually and in clusters, who have been lobbying for SWiS positions who will not meet the decile criteria. The management of this risk is through having clear, transparent criteria and selection process and a sound communication strategy" (CYF, 2004c).

A six member panel comprised of representatives from Child, Youth and Family, the Ministry of Education and Te Puni Kōkiri considered the 29 shortlisted clusters in late 2004 (CYF, 2004c). Panel members each scored the shortlisted clusters drawing on the information gathering against selection criteria that mapped to the dimensions of the information gathering template. A combined weighted score ranging from 284 to 358 was assigned to each cluster.

Available documentation indicates that shortlisted clusters "were selected on their capability to successfully participate in the SWiS programme and then allocated resources according to needs priorities … Those selected for 2004/05 [the February 2005 tranche] are considered to be in a good position to establish the service effectively and immediately while those selected for 2005/06 [the July 2005 tranche] will allow for preparation work to be undertaken with the cluster … The remaining pool of eligible clusters which were not successful at full panel assessment will be reviewed for allocation in the 2006/07 year [the July 2006 tranche]" (CYF, 2004c).

Twenty of the 29 shortlisted clusters were confirmed for the February and July 2005 tranches. In late 2004, unsuccessful schools were advised that the remaining pool of eligible clusters would be reviewed against the selection criteria for allocation in the later tranche, with the nine already short-listed clusters being given priority status. In 2005, the nine short-listed clusters were contacted and provided updated information where

[22] In addition, two clusters of schools began to receive the service from January 2006.

necessary. CYF and the Ministry of Education reviewed the short-listed clusters and confirmed eight to receive services in the July 2006 tranche (CYF, 2005b).[23]

A small number of additional clusters were then added to the expansion drawing on both the funding allocated for the expansion and additional baseline funding that became available through equalisation of the unit rate for SWiS. Selection of clusters in this final stage does not appear to have involved re-contacting the full list of clusters that had submitted expressions of interest, or any systematic scoring. Rather, it was determined through a process of reviewing the wider pool of applicants with a focus on finding opportunities to boost resources in areas where a SWiS social worker was working in isolation (CYF, 2005b). It also involved creating new clusters to address the impact of school mergers which had raised school rolls above the 700 maximum in some schools already receiving SWiS (CYF, 2005c).

[23] The one shortlisted cluster that did not proceed to receive services included a large decile 7 school and it appears that the cluster was not prioritised for this reason (Email from Ministry of Education to CYF dated 6 July 2005).

Appendix B: Variable definitions

School-level variables	Description and source
Share no benefit by five years of age	Share of students not on benefit by the year they turned age five. From MSD benefit data.
Share short-term benefit by five	Share of students on benefit no more than 1/3 of the time by the year they turned five. From MSD benefit data.
Share medium-term benefit by five	Share of students on benefit no more than 2/3 of the time by the year they turned five. From MSD benefit data.
Share long-term benefit by five	Share of students on benefit no less than 2/3 of the time by the year they turned five. From MSD benefit data.
Mean CYF notifications by five	Mean number of CYF care and protection notifications by the year they turned five per student. From MSD CYF data.
Share with no CYF notifications by five	Share of students without CYF care and protection notifications by the year they turned five. From MSD CYF data.
Mean CYF placements by five	Mean number of CYF placement events>28 days by the year they turned five per student. From MSD CYF data.
Share with no CYF placements by five	Share of students without CYF placement events by the year they turned five. From MSD CYF data.
Share with caregiver Corrections history by five	Share having a primary caregiver with Corrections history by the year they turned five, obtained by checking across all the primary caregivers associated with the child on benefit before that time. From MSD benefit data and Department of Corrections data.
Mean CYF events by five	Mean number of any CYF events by the year they turned five per student (includes a range of event types including notifications, investigations, placements, and Family Group Conferences). From MSD CYF data.
Share with no CYF events by five	Share of students without any CYF events by the year they turned five (includes a range of event types including notifications, investigations, placements, and Family Group Conferences). From MSD CYF data.
Share supported by Unsupported Child Benefit by five	Share of students on Unsupported Child Benefit by the year they turned five (indicates out-of-home care). From MSD Benefit data.

Appendix C: Predicting treatment

In this appendix, we provide details of the first stage of the matching - calculating a school level propensity to be treated. Recall that the sample for this first stage analysis is all primary and intermediate schools that existed in 2004 and were still in existence in 2009. We exclude from our analysis any schools that went beyond school Year 8. There are 1,845 schools in the sample with 99 treated in the 2004 expansion and 1,746 untreated.[24] Table C1 compares the profiles of the two groups.

Table C1: Descriptive statistics (all schools in study sample)

	Untreated schools N = 1746		Treated schools N = 99	
	mean	standard deviation	mean	standard deviation
Roll (from school profile data)	222	190	211	126
Unique students in 2007	239 *	205	214 *	136
Share female	0.49	0.07	0.48	0.07
Share Māori	0.26 ***	0.25	0.47 ***	0.28
Share Pacific	0.07 ***	0.14	0.13 ***	0.17
Share Asian	0.06 **	0.10	0.04 **	0.06
Share other ethnic group	0.02 *	0.04	0.02 *	0.02
Share European	0.68 ***	0.27	0.44 ***	0.27
Share no benefit by 5	0.67 ***	0.17	0.45 ***	0.12
Share short-term benefit by 5	0.11 ***	0.05	0.15 ***	0.04
Share medium-term benefit by 5	0.09 ***	0.07	0.15 ***	0.05
Share long-term benefit by 5	0.12 ***	0.09	0.25 ***	0.11
Mean CYF notifications by 5	0.17 ***	0.16	0.35 ***	0.19
Mean CYF placements by 5	0.03 ***	0.20	0.06 ***	0.06
Mean CYF events by 5	0.30 ***	0.53	0.61 ***	0.35
Share with no CYF notifications by 5	0.91 ***	0.07	0.84 ***	0.07
Share with no CYF placements by 5	0.99 ***	0.03	0.98 ***	0.02
Share with no CYF events by 5	0.91 ***	0.07	0.84 ***	0.07
Share supported by UCB by 5	0.01 ***	0.01	0.02 ***	0.02
Share with caregiver Corrections history by 5	0.10 ***	0.09	0.22 ***	0.10

*** Means are significantly different from each other at a 1% level

** Means are significantly different from each other at a 5% level

* Means are significantly different from each other at a 10% level

Treated schools have a higher share of children who are Māori (47 percent vs. 26 percent) or Pacifica (13 percent vs. seven percent). As expected given the targeting of relatively deprived schools, the children in treated schools are also more likely to have been supported by a benefit for some time by the year they turned five years of age, and those who had been supported by benefit had a longer history. They are more likely to have had some CYF care and protection involvement (16 percent vs. nine percent) by the year they turned five. The children in treated schools are also more likely to have

[24] To be included in the untreated group, schools could not have been part of the SWiS programme prior to 2004.

had a benefit caregiver with a Corrections history by the year they turned five compared to children in untreated schools.

Table C2 reports on the probit regression results from estimating the first stage school level matching propensity model for these schools (Model 1). All standard errors are robust. The pseudo R-square is 0.351 which suggests a reasonably good model fit. Recall that this is simply an exercise in predicting treatment, and the individual coefficients are not directly interpretable. The more interesting statistic is the degree to which the model is able to classify treatment correctly. We use the Area under the ROC curve (AUR) which is a standard strength of classification test to establish whether the model is good at correctly classifying treated and untreated schools. The AUR is 0.91 [95 percent c.i of 89 percent, 94 percent] which indicates good predictive power. As expected, deciles of the schools (as observed in 2004 when the decisions about which schools would newly receive SWiS were being made) are predictive. Other attributes of the enrolled population that are predictive are the ethnicity of the school roll, regions, and share of the school roll that was supported by benefit by the year they turned five years.

Recall that we use the estimated coefficient from the model to predict a "propensity to be treated" for each school, rank according to this risk score, and then calculate Treatment Risk Deciles. Table C3 compares the profile of treated and untreated schools in the top three Treatment Risk Deciles with Year 7 and 8 students which are the focus of the study. Compared to the comparisons in Table C1, the profiles of the two sets of schools are much more similar.

Table C2: Predicting treatment (probit regression, all schools in study sample)

	Coef.	Std. error	z	P>	[95% Confidence Interval]	
Decile 1 school	2.176	0.448	4.85	0.000	1.297	3.054
Decile 2 school	2.283	0.4	5.71	0.000	1.500	3.066
Decile 3 school	1.956	0.347	5.64	0.000	1.276	2.636
Decile 4 school	1.244	0.341	3.64	0.000	0.575	1.912
Decile 5 school	0.941	0.344	2.74	0.006	0.267	1.614
Composite school	-0.418	0.344	-1.22	0.223	-1.092	0.255
Contributing school	-0.166	0.144	-1.15	0.250	-0.449	0.117
Intermediate School	-0.257	0.275	-0.94	0.350	-0.795	0.281
State integrated school	-0.396	0.248	-1.60	0.111	-0.883	0.090
Waikato region	0.779	0.181	4.30	0.000	0.424	1.135
Manawatu-Wanganui region	0.928	0.218	4.25	0.000	0.500	1.357
Bay of Plenty region	0.446	0.209	2.14	0.033	0.037	0.855
Gisborne region	1.230	0.35	3.51	0.000	0.543	1.917
Canterbury region	0.469	0.227	2.07	0.038	0.025	0.913
Unique students in 2007	0.000	0.000	-0.06	0.951	-0.001	0.001
Share female	-0.777	0.865	-0.90	0.369	-2.472	0.917
Share Māori	-1.629	0.389	-4.19	0.000	-2.392	-0.867
Share Pacific	-0.405	0.455	-0.89	0.373	-1.296	0.486
Share Asian	1.326	0.688	1.93	0.054	-0.022	2.674
Share other ethnic group	-1.371	1.381	-0.99	0.321	-4.078	1.336
Share no benefit by 5	-2.745	0.896	-3.06	0.002	-4.502	-0.988
Share short-term benefit by 5	-0.290	1.272	-0.23	0.819	-2.784	2.203
Share medium-term benefit by 5	-3.713	1.283	-2.89	0.004	-6.228	-1.198
Share with no CYF notifications by 5	1.489	1.904	0.78	0.434	-2.243	5.221
Mean CYF notifications by 5	1.006	0.685	1.47	0.142	-0.337	2.349
Share supported by UCB by 5	-3.589	4.023	-0.89	0.372	-11.47	4.296
Share with caregiver corrections history by 5	1.515	1.436	1.05	0.291	-1.300	4.330
Constant	-1.949	2.118	-0.92	0.357	-6.100	2.202
N= 1,845						
Wald $chi^2(27)$ = 159.28						
Prob > chi^2 = 0.0000						
Pseudo R^2 = 0.3508						

Table C3: Descriptive statistics (untreated and treated schools in top three treatment risk deciles which enrolled children in school Years 7 and 8 in 2009)

	Untreated schools N = 294		Treated schools N = 63	
	mean	standard deviation	mean	standard deviation
Roll (from school profile data)	209.87	196.54	199.73	126.85
Unique students in 2007	217.56	206.66	201.75	132.30
Share female	0.48	0.06	0.47	0.05
Share Māori	0.48	0.31	0.50	0.28
Share Pacific	0.13	0.22	0.11	0.16
Share Asian	0.05 ***	0.10	0.03 ***	0.04
Share other ethnic group	0.02 ***	0.03	0.01 ***	0.02
Share European	0.43	0.31	0.42	0.27
Share no benefit by 5	0.50 ***	0.14	0.45 ***	0.12
Share short-term benefit by 5	0.14 *	0.05	0.15 *	0.04
Share medium-term benefit by 5	0.14	0.06	0.14	0.04
Share long-term benefit by 5	0.22	0.10	0.23	0.08
Mean CYF notifications by 5	0.27 **	0.18	0.33 **	0.18
Mean CYF placements by 5	0.05	0.06	0.06	0.06
Mean CYF events by 5	0.46 ***	0.33	0.58 ***	0.32
Share with no CYF notifications by 5	0.88 ***	0.07	0.82 ***	0.06
Share with no CYF placements by 5	0.99 ***	0.02	0.95 ***	0.01
Share with no CYF events by 5	0.88 ***	0.07	0.82 ***	0.06
Share supported by UCB by 5	0.02	0.02	0.02	0.02
Share with caregiver Corrections history by 5	0.19	0.10	0.21	0.09

*** Means are significantly different from each other at a 1% level

** Means are significantly different from each other at a 5% level

* Means are significantly different from each other at a 10% level