SUBMISSION TO THE HOUSE STANDING COMMITTEE ON EDUCATION

Inquiry into the Factors Driving Educational Attainment

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Submitted by:

Professor Sally Cripps

Lead Chief Investigator and Director, Thrive: Finishing School Well (UTS)
Co-Director, Human Technology Institute
Professor of Mathematics and Statistics
University of Technology Sydney

Professor Rebekah Grace
Lead Chief Investigator and Director, Thrive: Finishing School Well (WSU)
Director, Centre for Transforming Early Education and Child Health (TeEACH)
Western Sydney University

Dr Gilad Francis
Program Director, Thrive: Finishing School Well (UTS)
Human Technology Institute
University of Technology Sydney

sally.cripps@uts.edu.au | thriveresearch.edu.au

ABOUT THE CONTRIBUTORS AND THRIVE: FINISHING SCHOOL WELL

This submission is made by Professor Sally Cripps, Professor Rebekah Grace and Dr Gilad Francis. Together, they lead Thrive: Finishing School Well, a globally leading research-in-action initiative funded by the Paul Ramsay Foundation (PRF) for 3.5 years.

Professor Cripps is an internationally recognised researcher in Bayesian machine learning, causal inference and adaptive decision-making. She leads the quantitative and computational arm of Thrive at UTS and has been instrumental in developing the causal machine-learning methods that sit at the international frontier of this field.

Professor Rebekah Grace is Director of the Centre for Transforming Early Education and Child Health (TeEACH) at Western Sydney University and leads the Thrive program at WSU. She is one of Australia's foremost experts in lived-experience research in education: hearing directly from young people, families, communities and educators about what finishing school well means to them and integrating those voices into the design of effective interventions.

Dr Gilad Francis serves as Program Director of Thrive at UTS, responsible for the operational integration of quantitative modelling, social science research and community co-design across the program.

A defining strength of Thrive is precisely this multidisciplinary composition. Educational disadvantage is not a problem that yields to any single type of evidence. Thrive's team was assembled to integrate all of the relevant information types: longitudinal datasets tracking individuals across childhood and adolescence; administrative datasets capturing system-wide patterns; expert knowledge from education practitioners and social scientists; and the lived experience of students, families and

communities. Each of these evidence streams captures aspects of the problem that the others cannot. Thrive brings together researchers from the University of Technology Sydney (UTS) and Western Sydney University (WSU), working in close educational partnership with the NSW Department of Education.

EXECUTIVE SUMMARY

Completing Year 12 is more than a milestone: it opens up opportunities that support long-term wellbeing. While the advantages associated with Year 12 completion are evident across all socioeconomic groups, they are particularly pronounced for lower socioeconomic groups. Thrive's analysis shows that young people who do not complete Year 12 are, on average, four times more likely to be disengaged from work, study or training. This disadvantage persists across their working life and is transmitted from one generation to the next.

Thrive's analysis of the Pathways for the Future dataset, drawn on in this submission, confirms that even partial completion pathways matter: students who complete Year 12 without a Higher School Certificate (HSC) but with a certificate have significantly better post-school engagement outcomes than those who complete Year 12 without any qualification. Completing Year 12 at all - regardless of credential - is associated with better outcomes than not completing. These findings have direct implications for Vocational Education and Training (VET) pathways and alternative credentials.

The structural barriers to completion are well known: socioeconomic inequality, geographic isolation, and lower engagement among Indigenous students, students from culturally and linguistically diverse backgrounds, and neurodiverse students. The Committee's terms of reference also highlight differences between boys and girls, a dimension that Thrive's causal framework is well positioned to address and that is identified here as a priority for further research.

Despite around $3 billion annually in Commonwealth socio-educational disadvantage loading [1] and two decades of longitudinal data[2], the apparent retention rate [3](ARR) for government schools fell from 83.1% in 2018 to a low of 73.6% in 2023, before a partial recovery to 75.4% in 2025[4] - still nearly eight percentage points below its 2018 level. Thrive's diagnosis is that the analytical tools guiding investment have not been adequate. This submission identifies the upstream causal drivers of school completion and makes the following recommendations:

- **Recommendation 1 —** Invest in adaptive causal systems as a national capability.
- **Recommendation 2 —** Prioritise belonging and early anti-bullying programs as upstream causal investments.
- **Recommendation 3 —** Develop differentiated support strategies for neurodiverse students, including those not captured by the not captured by the Nationally Consistent Collection of Data on School Students with Disability (NCCD) framework.
- **Recommendation 4 —** Reorient performance monitoring to include upstream causal drivers alongside proximal indicators.
- **Recommendation 5 —** Adopt adaptive, community-centred intervention design - including VET and alternative credentialing pathways.
- **Recommendation 6 —** Fund gender-disaggregated causal analysis to identify differential pathways for boys and girls.

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[1] Australian Government Department of Education. (2026). *Schooling Resource Standard*.

[2] Department of Social Services. (2024). *Growing Up in Australia: The Longitudinal Study of Australian Children*.

[3] Apparent retention rates offer a cohort-level measure of progression through schooling. See Australian Bureau of Statistics, Schools, 2025, for the formal definition and latest national data.

[4] Australian Bureau of Statistics. (2026). *Schools, 2025*. ABS.

THE PROBLEM: TWO DECADES OF DATA, RIGOROUS METHODS — AND FALLING APPRANENT RETENTION RATES

Australia has invested heavily in both data collection and research on school completion. The Longitudinal Study of Australian Children (LSAC), commenced in 2003, provides more than two decades of nationally representative data tracking children from infancy through to early adulthood. Yet the apparent retention rate (ARR) for Australian government school students from Year 7/8 to Year 12 fell from 83.1% in 2018 to a low of 73.6% in 2023 - a decline of nearly 10 percentage points in five years (ABS Schools, 2025). There has since been a partial recovery, with the ARR rising to 74.1% in 2024 and 75.4% in 2025, though this remains well below the 2018 level. The gap between sectors remains wide: independent school retention now stands at 99.1%, more than 23 percentage points above government schools. In the Northern Territory, the rate falls below 52%. The $3 billion socio-educational disadvantage loading has not reversed the long-run decline, and the causes of both the decline and the recent partial recovery remain poorly understood.

This paradox - more data, more investment, worse outcomes - demands an explanation. Thrive's diagnosis is that the tools used to guide that investment were not fit for purpose. Traditional regression models make structural assumptions that are too restrictive for the complexity of educational disadvantage. Predictive machine-learning models can make excellent predictions, but they do not tell policymakers what works best, for which student, or why. Neither method distinguishes between factors that are causally upstream and those that are merely downstream indicators.

A second limitation is that conventional quantitative research has not been well integrated with qualitative evidence: the expert knowledge of teachers and, above all, the lived experience of young people and their families. Thrive's multidisciplinary architecture was designed specifically to integrate all of these evidence streams.

The post-school consequences of non-completion are severe and persistent. Young Australians who do not complete Year 12 are, on average, four times more likely to be disengaged from education, employment or training[5] (NEET). The disadvantage is intergenerational. The lifetime fiscal cost of each early school leaver is approximately $335,000 [6](Lamb & Huo, 2017). With approximately 200,000 students entering Australian government schools at Year 7 annually, a one-percentage-point improvement in national government school completion rates implies fiscal savings of approximately $670 million per cohort - making upstream causal investment one of the highest-return policy levers available.

POST-SCHOOL TRANSITIONS: NEW EVIDENCE FROM PATHWAYS FOR THE FUTURE

The Committee's terms of reference specifically include transitions from school to tertiary education, into the workforce and into broader society. Thrive's analysis of the Pathways for the Future dataset - tracking EET status (engagement in education, employment or training) at age 23 by school-completion outcome - provides directly relevant evidence.

The analysis classified students into four completion categories: (1) Year 12 completed with HSC; (2) Year 12 completed, no HSC but a certificate obtained; (3) Year 12 completed, no HSC and no certificate; (4) No Year 12 completion. Three findings are statistically significant and policy-relevant:

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[5] OECD reports NEET as a standard youth labour-market indicator by age group and gender. See OECD, Youth not in employment, education or training (NEET).

[6]Lamb, S. and Huo,S. Counting the cost of lost opportunity in Australian Education. Mitchell Institute repo No 02/2017. Mitchell institute, Melbourne Australia

- **The HSC credential matters.** Students who completed Year 12 and obtained an HSC have significantly higher probabilities of being engaged in education, employment or training at age 23 than those who completed Year 12 but obtained only a certificate. A credential beyond Year 12 completion makes a measurable difference.
- **Qualifications within Year 12 matter.** Students who completed Year 12 and obtained a certificate - but not an HSC - have significantly better post-school engagement than those who completed Year 12 with no qualification at all. This has direct implications for VET pathways: alternative credentials deliver real post-school benefits and should be actively supported rather than treated as second-order pathways.
- **Completing Year 12 itself matters, even without a credential.** Students who completed Year 12 but obtained neither an HSC nor a certificate had significantly better post-school engagement than those who did not complete Year 12 at all. This confirms that retention to Year 12 - even without formal credentialing - is independently valuable, and that policies focused narrowly on HSC attainment may understate the case for keeping students in school.

Taken together, these findings argue for a policy framework that values and supports the full range of senior secondary pathways - including VET in schools, alternative credentials and supported completion - rather than optimising only for HSC attainment.

Disability and post-school engagement

Thrive's analysis of the Pathways data also confirms that disability is a powerful independent factor in post-school disengagement, consistent with the Committee's focus on NCCD representation:

- **Disability doubles disengagement risk.** Across all four completion categories, students with disability are approximately twice as likely to be disengaged from work, study or training at age 23. This effect is consistent regardless of completion level.
- **The NCCD boundary matters.** Students with uncategorised disability - those whose disability is not captured within standard NCCD categories - have markedly worse EET outcomes than those within NCCD categories. This suggests that the NCCD classification system may be leaving a significant group of students without appropriate support, and that expanding NCCD scope or improving identification of uncategorised disability should be a policy priority.

GENDER-DISAGGREGATED ANALYSIS: A PRIORITY FOR CAUSAL RESEARCH

The Committee's terms of reference foreground differences between boys and girls across all dimensions of educational attainment - from school readiness through to tertiary participation and workforce engagement. This is an important and underserved area of causal research.

Existing correlational research has documented that boys are more likely to disengage earlier in secondary schooling[7], have lower rates of tertiary participation, and are overrepresented in NEET statistics in certain age groups. Girls, conversely, face specific barriers in STEM subject selection and certain VET and apprenticeship pathways that affect post-school options. However, documenting these differences is not the same as understanding the causal mechanisms behind them.

Thrive's causal machine-learning framework is directly suited to this question. Rather than asking whether boys and girls have different outcomes, it can identify whether the causal pathways to completion operate differently by gender - for example, whether the belonging-to-performance pathway has different strength or direction for boys and girls, or whether bullying victimisation at Year 7 has differential downstream effects. These are questions that correlational analysis cannot

[7] Social Ventures Australia / Real Insights, *"New national study surfaces hidden early warning signs of Australian student disengagement"*

answer, and that have direct implications for whether interventions should be designed or targeted differently by gender.

Thrive's current causal estimates draw on datasets that include gender as a variable, but given the timeframe for this submission we have not yet been able to produce gender-specific causal estimates. We identify gender-disaggregated causal analysis of school-completion pathways as a priority for the next phase of Thrive research and recommend that the Committee specifically support funding for this work.

A NEW ANALYTICAL APPROACH: EMBRACING COMPLEXITY AND UNCERTAINTY

Thrive's internationally leading methodology was developed in direct response to the limitations of correlational analysis. It required overcoming four simultaneous challenges, each of which has seen significant advances in recent years - and in some cases, advances made within Thrive itself.

The first challenge is integration. Thrive's Bayesian framework is designed to systematically combine quantitative data with qualitative evidence - including expert elicitation and the lived experience of communities - and formal causal-discovery methods, assigning probabilities to different theories of change and updating those probabilities as new evidence arrives. The result is a methodology that returns a distribution over the full space of plausible causal structures, making uncertainty explicit and usable rather than hiding it behind false precision. To Thrive's knowledge, this systematic integration of formal causal models with lived experience and expert elicitation is a global first.

The second challenge is algorithmic. Estimating causal structure from observational data requires statistical algorithms that can search an astronomically large space of possible causal graphs, quantify uncertainty across that space, and return results that are statistically valid and computationally feasible. Thrive researchers have contributed directly to advances in this area, developing new Bayesian methods for uncertainty-aware causal graph estimation.

The third challenge is accessibility. The output of Thrive's analysis is not a single causal diagram but a distribution over many thousands of plausible causal graphs, each representing a slightly different account of how the relevant factors interact. Making this information usable for policymakers, educators and other non-specialist audiences requires more than visualising any individual graph or summarising its headline results: it requires methods for distilling the patterns that recur consistently across the full space of plausible structures - which relationships are robust, which are uncertain, and which depend on particular assumptions - and presenting these in plain language that supports decision-making without overstating confidence. Thrive has invested in software engineers to develop these translation methods alongside the underlying causal models themselves. The same software-engineering investment also allows Thrive's models to be run on high-performance computing infrastructure, reducing analyses that would take years on a standard laptop to a matter of days.

The fourth challenge is computational. The causal models needed to represent the true complexity of educational systems - with many interacting variables, feedback effects and context-specific pathways - require computational power that was simply unavailable to earlier generations of researchers.

THRIVE RESEARCH FINDINGS: CAUSAL PATHWAYS TO SCHOOL COMPLETION

Data and analytical methods

The initial causal analysis draws on the LSAC Cohort K, Wave 5 (2012), covering 1,286 students aged 12-13, with school-completion outcomes measured at age 19. Bayesian directed acyclic graph (DAG) learning methods are applied to estimate a posterior distribution over plausible causal

structures, making uncertainty explicit and actionable. The resulting causal network, shown in Figure 1, provides a visual summary of the most probable relationships identified through this analysis.

The Thrive Cycle

Thrive's work is structured around three interrelated phases: Understanding What Matters (working with young people, communities and schools); Discovering What Works (applying causal machine-learning models); and Accelerating What Changes (co-designing and implementing initiatives, evaluating them in real time, and updating as new evidence emerges). The findings below reflect the Discovering What Works phase.

Finding 1 — Belonging[8] and academic performance are the two most central nodes

The two most central variables in Thrive's estimated causal network are sense of school belonging and academic performance. Both are strongly connected to upstream factors - family context, health, peer relationships and bullying - and both are upstream of school completion through multiple pathways.

Critically, the estimated causal direction runs from belonging to academic performance, not the reverse. Programs that seek to improve academic outcomes without addressing belonging may be working against the grain of the causal system.

Finding 2 — Bullying at Year 7 is an early, modifiable leverage point

Victimisation by bullying in Year 7 is one of the earliest school-relevant modifiable factors in the estimated causal graph, operating both directly and indirectly through belonging, academic performance, conduct problems and depression. Eliminating severe bullying cases is estimated to increase school completion by approximately one percentage point - around 2,000 fewer early school leavers and $670 million in fiscal savings per cohort.

Finding 3 — Family factors operate through interconnected pathways

Family income, parental education and family cohesion all influence completion through interconnected pathways rather than through simple direct effects. Income support or parental education programs alone are unlikely to be sufficient. Effective intervention must address the mechanisms through which family disadvantage translates into disengagement, motivating Thrive's emphasis on community co-design and place-based approaches.

Finding 4 — Neurodiverse students face distinct causal pathways

Students with ADHD or autism show less favourable pathways to school completion, and including or excluding neurodiverse students materially changes the estimated causal structure. Interventions designed for the general school population may not be effective for neurodiverse students and could be counterproductive. Thrive's analysis of Pathways for the Future data (above) adds to this: disability - including disability not captured within NCCD categories - doubles post-school disengagement risk, confirming the need for further investigation.

Finding 5 — Uncertainty awareness changes intervention conclusions

A single best-estimate causal model and an uncertainty-aware analysis can point to different intervention priorities. Across the full distribution of plausible causal models, school belonging is consistently identified as a robust upstream ancestor of completion - a finding that single-model

[8] LSAC measures school belonging using an adapted version of the Psychological Sense of School Membership (PSSM) scale developed by Goodenow (1993). The LSAC measure uses a 12-item version of Goodenow's original 18-item scale. It captures students' sense of belonging at school, including the extent to which they feel accepted, valued, included and supported by teachers and peers.

analyses would underweight. This is the methodological difference that earlier models, with their restrictive assumptions, could not capture.

The Thrive causal network

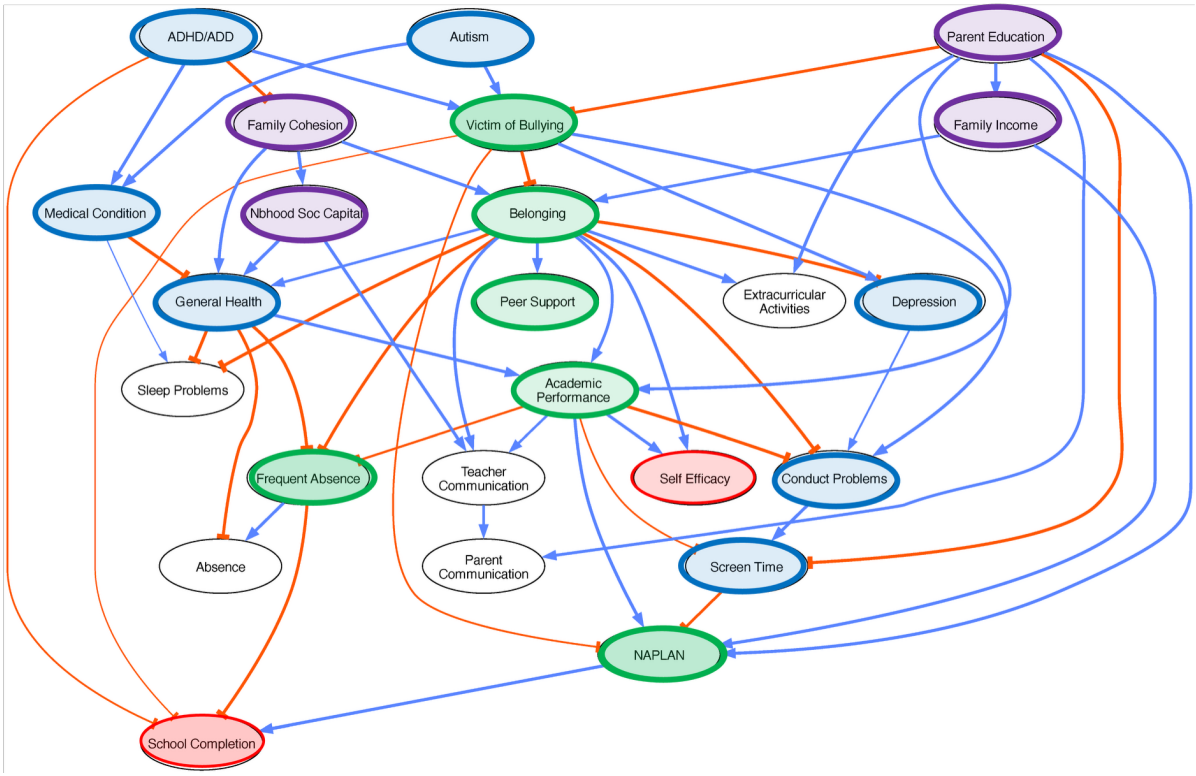

Figure 1 illustrates the estimated causal network from Thrive's Bayesian DAG analysis. Green nodes represent school factors, purple represents family and community factors, blue represents student factors, and red represents outcome nodes. Blue arrows indicate that an increase in one factor is associated with an increase in the other; orange arrows indicate that an increase in one factor is associated with a decrease in the other. These colours describe the direction of the relationship, not whether the effect is desirable. For example, an increase in belonging is associated with an increase in academic performance (blue arrow), and also with a decrease in frequent school absence (orange arrow) - both positive outcomes for the student. This estimate is based on analysis of the top 100 million candidate DAGs and represents the most probable pairwise causal directions. Based on Thrive working paper "Beyond the best graph: posterior uncertainty reshapes causal conclusions about school completion" to be submitted to Nature Machine Intelligence.

POLICY RECOMMENDATIONS

The following recommendations are grounded in Thrive's research findings, using data from LSAC and Pathways for the Future, and address the inquiry's terms of reference on evidence-based solutions, differential outcomes by socioeconomic status, disability and gender, and the effectiveness of current policy approaches.

Recommendation 1 — Invest in adaptive causal systems analysis as a national capability

The Australian Government should fund the development and national application of adaptive causal machine-learning methods - of the kind developed by Thrive's internationally leading quantitative and qualitative team - to combine existing longitudinal datasets and administrative school records with the voices of experts and people with lived experience. Without this, correlational and predictive tools will continue to generate evidence of limited policy utility, and qualitative research will not reach the scale required for national impact.

Recommendation 2 — Prioritise school belonging and Year 7 anti-bullying as upstream investments

Both are identified as early, modifiable causal leverage points with high estimated fiscal returns. Anti-bullying interventions at the Year 7 transition should be treated as academic investments - not welfare supports - with belonging programs held to the same standards of evidence as academic interventions.

Recommendation 3 — Develop differentiated support strategies for neurodiverse students, including those outside NCCD

Dedicated research is needed to understand the distinct causal pathways facing students with ADHD and autism, and design support strategies accordingly. The Pathways evidence also indicates that students with uncategorised disability - those not captured within standard NCCD categories - face significantly worse post-school outcomes. Expanding NCCD scope or improving identification of these students is a complementary priority. These findings concern the effectiveness of support strategies and identification systems, not the educational setting in which they are delivered; Thrive's analysis does not address and should not be read as evidence for or against, inclusive or segregated education environments.

Recommendation 4 — Reorient performance monitoring to include upstream causal drivers

Policy evaluation should complement proximal indicators, such as NAPLAN and attendance, with upstream measures - including belonging and bullying incidence - that are more directly causally linked to completion.

Recommendation 5 — Support the full range of senior secondary pathways, including VET and alternative credentials

The Pathways for the Future findings demonstrate that qualifications obtained within Year 12 - including certificates through VET - significantly improve post-school engagement outcomes relative to unqualified Year 12 completion. Policy should actively support VET in schools and alternative credentialing pathways, not treat them as fallbacks. Thrive's model - piloting with rigorous real-time measurement, updating as evidence accumulates, co-designing with communities, and scaling what works in specific contexts - should be adopted as the standard for educational intervention design nationally.

Recommendation 6 — Fund gender-disaggregated causal analysis of school-completion pathways

The Committee's terms of reference foreground differences between boys and girls throughout. Thrive's causal framework can identify whether completion pathways operate differently by gender - a question that correlational analysis cannot answer. Dedicated funding for gender-disaggregated causal modelling of school completion would provide a rigorous evidential foundation for targeted, gender-responsive intervention design.

CONCLUSION

The central argument of this submission is simple: Australia has had the data, and it has had rigorous researchers. What it has lacked are analytical frameworks and tools capable of modelling the true complexity of educational disadvantage - and as a result, two decades of investment have not reversed the decline in school completion rates.

Thrive: Finishing School Well represents a step change in that capability. Its internationally leading team has developed causal machine-learning methods that embrace complexity and uncertainty, and integrate, for the first time, the full range of relevant evidence: longitudinal datasets,

administrative data, expert knowledge, and the lived experience of young people and their communities.

Thrive's analysis of Pathways for the Future data strengthens the case further: every rung on the completion ladder matters for post-school engagement, disability doubles disengagement risk across all rungs, and students with uncategorised disability are being missed by current identification frameworks. Gender-disaggregated causal analysis is the logical next step, and one Thrive is positioned to undertake.

The Committee is invited to consider how this new generation of analytical frameworks and tools, and the findings they generate, can underpin a more effective national approach to educational attainment. The Thrive team would welcome the opportunity to brief the Committee in person.

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