

i. What is already known about the topic?

1. Child behaviour problems are associated with poorer maternal mental health.
2. Child developmental problems including speech impairment and Down Syndrome are associated with lower maternal health-related quality of life (HRQoL) but it is not known whether child behaviour problems are similarly associated.

ii. What does the paper add to existing knowledge?

1. Child behaviour problems are associated with lower maternal HRQoL at child age 2 years.
2. Adjusting for maternal mental health attenuates the relationship between child behaviour problems and maternal HRQoL.

Abstract**Objectives:**

1. To examine the relationship between mothers' health-related quality of life (HRQoL) and child behaviour problems at age 2 years.
2. To investigate whether the relationship between maternal HRQoL and child behaviour problems is independent of maternal mental health.

Methods:

Design: Cross-sectional survey nested within a population-level, cluster randomised trial which aims to prevent early child behaviour problems.

Participants: 1160 mothers of two year old children, in nine Local Government Areas in Victoria, Australia.

Measures: HRQoL was measured using the Assessment of Quality of Life (AQoL-6D) and child behaviour was measured using the Child Behavior Checklist (CBCL/1.5-5 years). Maternal mental health was measured using the Depression Anxiety Stress Scale (DASS). Data were collected at child age 2 years; demographic data were collected at child age 8 months.

Results: HRQoL was lower for mothers with children that had borderline/clinical behaviour problems compared to those with children without problems (mean difference -0.14, 95% CI: -0.16 to -0.12, $p<0.001$). The finding did not markedly change when adjusting for household income, financial security, child gender, child temperament and intervention group status at child age 8 months (mean difference -0.12, 95% CI: -0.15 to -0.09, $p<0.001$), but did attenuate when additionally adjusting for concurrent maternal mental health (mean difference -0.03, 95% CI: -0.05 to -0.02, $p<0.001$).

Conclusions: Child behaviour problems were associated with lower maternal HRQoL. Child behaviour problems prevention programmes could consider this association with maternal HRQoL and be designed to improve and report both mothers' and their child's health and wellbeing.

Key words: mental health, health-related quality of life, children, behaviour problems

Introduction

The link between poor maternal mental health and child behaviour problems is well established¹ and managing child behaviour problems has been shown to improve maternal mental health.^{2,3} However, little is known about how maternal health-related quality of life (HRQoL) may be affected in the presence of child behaviour problems and whether any adverse effects persist when maternal mental health is taken into account. One of the reasons that HRQoL is of interest, rather than only maternal mental health *per se*, is that to conduct cost-effectiveness analysis of interventions, health economists need measures of life quality. Based on such measures, the number of gained or lost Quality Adjusted Life Years (QALYs) can be calculated. With the growing number of interventions available to manage child behaviour problems,⁴ it is becoming increasingly important to be able to compare the cost-effectiveness of different interventions, thereby providing policy-makers with a sound base for their decisions as to which interventions to implement.⁵ When the aim is to improve overall wellbeing or to prevent psychological disorders that constitute a diagnosis (such as depression) calculation of composite population health outcomes (QALYs or disability-adjusted life years) is warranted.⁶ It therefore seems useful to implement the use of standard HRQoL measurements in community-based trials to provide comparable outcome measures between different interventions and their ability to improve outcomes or prevent disease burden.

HRQoL is considered to be a multidimensional construct encompassing physical, mental and social facets of life.⁷ There are two basic approaches to HRQoL measurement: (i) generic instruments that include health profiles and generate so called health utilities and (ii) specific instruments that focus on problems associated with single disease states, patient groups, or areas of function.⁸ Health utility may be the best measure of HRQoL for economic analyses, since it incorporates both health status and length of life which allows for QALY calculation.⁹

Several studies report that caregivers of persons with a physical or mental disorder experience lower HRQoL compared to the average population of their age and gender.^{10,11} Most studies investigating the mental health of parents who have a child with a physical or intellectual disability have found worse scores, especially for maternal depression, compared to control parents with typically developing children.¹² Hedov et al. indicated that a child's Down's syndrome might have a negative impact on a mother's HRQoL and her mental health.¹³ Similarly, Rudolph et al. found that mothers whose children have a speech impairment experience poorer HRQoL.¹⁴ Therefore, a child's disability or profound developmental delay may influence a mother's wellbeing and such mothers are expected to experience poorer mental

health and lower HRQoL.¹⁴⁻¹⁷ However, children's broader behavioural problems may likewise have an effect on maternal HRQoL, over and above the effects of a specific condition.¹⁶⁻¹⁸ In a study of children with significant delayed general development, child behavioural problems and not developmental status at age 3 years predicted maternal physical health when the child was 4 and 5 years old.¹⁹ The relationship between child behaviour problems and maternal health was moderated by parenting stress and mediated by depressive symptoms.¹⁹ Thus, at least in the mothers of children with developmental delay and behaviour problems, maternal mental health appears to play a key role in whether mothers experience of poorer HRQoL or not.

In summary, although it is intuitively clear that child behaviour problems could have implications for maternal HRQoL, and there is some support for this in the literature in groups of children with various developmental problems, there is very little knowledge about the relationship between behavioural problems in typically developing children and maternal HRQoL. If a relationship does exist, then programmes designed to improve child behaviour could also evaluate the impact on maternal HRQoL. The aims of this study therefore are to: (i) examine the relationship between mother's HRQoL and children's behaviour problems in a broad population-based sample, taking into account potential confounders identified a priori (including family socioeconomic status, child gender and temperament); and (ii) investigate whether the relationship is attenuated by poor maternal mental health.

Design

This paper draws upon data from the randomised control trial (RCT) Families in Mind, a three-armed RCT, which aims to prevent mental health problems in children prior to school entry. Methods for this trial have been reported elsewhere.²⁰ Briefly, the trial comprised Arm A (a combination of a universal, group parenting programme delivered from child age 15 to 24 months, followed by a targeted one-on-one programme for children at risk of behaviour problems after 24 months); Arm B (targeted programme only); and Arm C (usual care services in the community).

Data for this paper were drawn from the trial questionnaires completed at baseline (when their child was 8 months of age) and when their child was 2 years of age, by which time families in Arm A had received part or all of the universal parenting programme. The analysis in this paper uses HRQoL, child behaviour and DASS data from the questionnaire at child age 2 years, but relies on baseline data for socio-demographic variables used in adjusted models. Ethics approval from the Royal Children's Hospital (#29144) and Deakin University (#2010-156) Human Research Ethics Committees was obtained.

Setting and Participants

Families were recruited from the universal, well child Maternal and Child Health (MCH) service in 9 local government areas (LGAs) of greater metropolitan Melbourne, Australia. Three LGAs from each of the low, middle and high tertile-defined categories of 31 LGAs ranked by Socio-Economic Indexes for Areas (SEIFA) index of relative disadvantage were included. More than 80% of families attend this free service at infant age 8 months.²¹ Mothers of children with a major medical condition or disability and mothers with insufficient English to complete surveys were excluded. Of 1353 recruited families, 1340 (99%) completed the baseline questionnaire. Of these 1340 families, 1160 (87%) completed the AQoL-6D and CBCL at 24 months and were included in this study.

Measures

Details of variables used for the analyses were described in Table 1. *Child behaviour problems* were measured using the Child Behavior Checklist (CBCL) 1½-5 year old version.²² The CBCL consists of 99 validated items yielding raw scores for externalizing and internalizing behaviour problems. Raw scores were converted to standardised T-scores, which are reported in this paper. T-scores equal to or over 60 are considered in the borderline/clinical range for children aged 1-5 years.²³

Maternal HRQoL was measured using the Assessment of Quality of Life 6D (AQoL-6D), a 20-item measure of adult HRQoL.²⁴ The AQoL-6D yields six sub-scales: independent living (4 items), mental health (4 items), coping (3 items), relationships (3 items), pain (3 items), and senses (3 items). The AQoL is reported as a single weighted utility score, ranging from 1 (full health) through 0 (death equivalent-HRQoL), to a lower boundary of -0.04 (states worse than death). Weights were derived using the time trade-off technique among an Australian community-based sample.²⁵ AQoL scores of 0.35, 0.66, 0.80, 0.87 and 0.93 are considered to be poor, fair, good, very good and excellent, respectively.²⁶ A minimum clinically- or policy-significant difference on AQoL-6D is around 0.06 (95% CI 0.03-0.08).²⁶

Maternal mental health was measured using the Depression Anxiety Stress Scale (DASS),²⁷ a 21-item scale in which mothers indicated their endorsement to statements of emotional distress over the past week from 0 ("Not at all") to 3 ("Most of the time"). The DASS yields a total score (possible score range 0-63) and three subscales of depression, anxiety and stress (each seven items, possible score range 0 to 21). The DASS provides cut-point scores that indicate risk of depression (score >18), anxiety (score >14), and stress (score >14)²⁷.

Socio-economic status was measured using the SEIFA Index of Relative Disadvantage, in which each family was assigned a score based on the postcode of the recruiting MCH centre (Mean = 1000, SD = 100).²⁸

Infant temperament was measured using the Australian Temperament Project's global rating scale.²⁹ Participants were asked to respond to the statement "Compared to other children, I think my child is" on a 6-point Likert scale from "much easier than average" (1) to "much more difficult than average" (6). This single item correlates moderately ($r=0.51$) with the 30-item revised Australian Infant Temperament Questionnaire.³⁰

Analysis

Maternal and child baseline characteristics were described using percentages for categorical variables and means and standard deviations for continuous variables. The t -test and χ^2 test were used to compare the HRQoL between mothers of children with normal behaviour and mothers of children with clinical/borderline behaviour problems. Multiple linear regression was used to adjust this comparison for factors identified from the literature as potential confounders including household income, financial security, child gender, temperament and participants' trial arm status. A further regression model was fitted, adjusting additionally for maternal mental health. Data were analysed using Stata Version 12.0 (Texas, USA).³¹

Results

Baseline characteristics of mothers included in the analyses and those not (N=180) are presented in Table 2. Most of the analysed mothers were married (97.3%), and spoke English as the first language (94.9%). Infant mean (SD) age was 9.0 (1.0) months and half were boys (50.3%) and firstborn (52.1%). Few infants had a difficult temperament (6.2%). Compared to mothers included in the analyses, those who did not provide data at 24 months were less likely to speak English, had lower household income and lower socioeconomic status.

Maternal HRQoL and child behaviour problems

The mean (SD) AQoL scores of the study sample was 0.83 (0.14). HRQoL scores in each dimension for the study population were compared to the Australian female population norms aged 24-34 years³² (Figure 1). Compared to both our Victorian family study population and broader Australian population norms, mothers with 2-year-old children who had borderline/clinical behaviour problems had lower scores in all six AQoL-6D dimensions (independent living, relationships, mental health, coping, pain and sense) (Figure 1). Notably, 6% of mothers of children with borderline/clinical behaviour problems had poor HRQoL (utility score <0.44 ²⁶) compared to 1% of mothers of children without borderline/clinic behaviour problems ($p<0.001$).

Results of the regression models are presented in Table 3. The mean (SD) AQoL scores of mothers with and without children with borderline/clinical behaviour problems were 0.71 (0.17) and 0.85 (0.13), respectively, with a mean difference of -0.14, (95% CI -0.16 to -0.12, $p<0.001$). The finding did not change when we adjusted for income, socio-economic status, financial security, child gender, child temperament and participant group status (mean difference -0.12, 95% CI -0.15 to -0.09, $p<0.001$).

When adjusting for maternal mental health (DASS), the relationship between child borderline/clinical behaviour problems and maternal HRQoL was substantially attenuated but there was still evidence of a relationship (mean difference -0.03, 95% CI: -0.05 to -0.01, $p<0.001$).

Discussion

To our knowledge, this is the first study assessing the relationship between young children's behaviour problems and maternal HRQoL. Mothers of toddlers with a borderline/clinical behaviour problem had lower mean AQoL scores indicating lower mean HRQoL than mothers of children in the normal range for behavioural symptoms. The difference in mothers' AQoL scores of 0.14 is considered to be clinically meaningful.^{26,33} We also found that the relationship between young children's behaviour problems and maternal HRQoL was statistically independent of maternal mental health to some degree. Thus, the size of the difference between mothers in the two groups remained clinically significant once maternal mental health was adjusted for, albeit attenuated. This might be explained by the construct overlap between the AQoL and the DASS instrument, both of which measure depression, anxiety, and stress symptoms. In other words, HRQoL in mothers with poorer mental health is likely to be lower than those with normal or good mental health. However, young children's behaviour problems

were associated with maternal HRQoL over and above a pure measure of maternal mental health problems.

The mean utility scores of our sample were comparable to the AQL-6D population norms³² (mean = 0.83, 0.20). Compared to the Australian female population in the same age group, mothers in our study had better mental health, although lower independent living scores. Sample scores for mothers' relationships, coping, pain and senses were comparable to Australian population norms. The clinically meaningful difference in mothers' utility scores in the present study indicated that AQL is able to detect small changes over time, as has been reported in other studies.³⁴ As this is the first study examining the relationship of young children's behaviour problems and maternal HRQoL in a population-based sample, a direct comparison to other studies is not possible. However, an indirect comparison with studies on child developmental problems might be of interest. The relationship between child significant general developmental delay (eg high-functioning autism, speech impairment, cerebral palsy) and parents' HRQoL has been reported in previous studies.^{14,35,36} These reported that mothers with children who had significant general developmental delay had poorer mental health and lower HRQoL. In prior studies, however, these findings were not converted into utilities, and therefore no direct comparison is possible. Routine inclusion of standard measures for HRQoL in studies could therefore be desirable.

Strengths of the present study included a large population-based sample with a broad socio-demographic range, the use of a multi-attribute utility measure that allows for QALYs calculation,³⁷ and the adjustment for potential confounders of the relationship between child borderline/clinical behaviour problems and maternal HRQoL.

Limitations include that data are cross-sectional so we cannot infer causality. The socio-demographic variables the models were adjusted for came from measurement at child age 8 months and might have changed over 16 months. Second, the inclusion of mothers with complete data who were more likely to speak English at home, had higher socioeconomic status and household income may limit the extent to which we can generalise our results to low income or non-English-speaking families. Third, the use of maternal report for both child behaviour problems and maternal mental health may lead to responder bias since there is a systematic relationship between maternal depression and mothers' rating of their children on the CBCL.^{38,39} Nevertheless, the CBCL is a widely used and effective screening instrument for child behaviour problems with evident external validity⁴⁰ and DASS has demonstrated excellent internal consistency and sound construct validity in both clinical and non-clinical populations.^{41,42} More structured instruments using observation or face-to-face diagnostic

interviews to assess mother and child's mental health would strengthen the robustness of the results, but are not practical in population-based studies.

Evidence for the association between maternal mental health and child behaviour problems at 2 years has been reported.⁴³ The study findings reported here provide evidence for the relationship between child behaviour problems and maternal HRQoL. Policy makers could evaluate the impact of child behaviour problem prevention programmes on the wellbeing of the whole family and consider maternal HRQoL as an outcome in programmes designed to prevent or treat child behaviour problems. Clinicians could also be aware that although many toddler behaviour problems improve with time, they can impact adversely on HRQoL for some mothers and as such, families could be offered evidence-based support and interventions.⁴⁴

Conclusion

This study adds to the literature on child behaviour problems and maternal HRQoL. Maternal mental health and wellbeing should be considered when designing and evaluating child behaviour problems prevention programmes.

ACKNOWLEDGEMENTS

We would like to acknowledge Professor Daniel Shaw, Bibi Gerner, Amelia Hicks, Daisy Grinter, Amy Loughman and Kate Lycett for their help to commence this study in 2010, and their contribution to data collection and intervention delivery. We would also like to thank all the maternal child health nurses from the nine participating LGAs (City of Casey, Bayside City Council, Darebin City Council, Hobsons Bay City Council, City of Port Phillip, Mornington Peninsula Shire, Manningham City Council, Knox City Council and Yarra Ranges Shire Council) and the families taking part. We would like to thank the parenting experts at the Parenting Research Centre who co-facilitate the Toddlers Without Tears parenting groups. Murdoch Childrens Research Institute research is supported by the Victorian Government's Operational Infrastructure Support Programme and funded by Australian National Health and Medical Research Council (NHMRC) Partnership 46525 and community partners: Victorian Department of Education and Early Childhood, Victorian Department of Health and the Municipal Associations of Victoria. The researchers acknowledge support of the Australian NHMRC for salary support through Early Career Fellowship 1035100 (LG), Career Development Awards 607351 (HH) and 546405 (MW) and Capacity Building Grants 425855 (LG) and 436914 (HH, JB and OU). OU is supported by the National Institute for Health Research (NIHR) Collaboration for Leadership in Applied Health Research and Care (CLAHRC) for the South West Peninsula at the Royal Devon and Exeter NHS Foundation Trust. The views expressed in this publication are those of the authors and not necessarily those of the NHS, the NIHR or the Department of Health in England.

An earlier version of this paper was presented at the Australian Health Economics (AHES) conference in September, 2014 in Adelaide, South Australia, Australia.

References

1. Elgar FJ, McGrath PJ, Waschbusch DA, Stewart SH, Curtis LJ. Mutual influences on maternal depression and child adjustment problems. *Clinical psychology review*. Aug 2004;24(4):441-459.
2. Hutchings J, Appleton P, Smith M, Lane E, & Nash S. Evaluation of two treatments for children with severe behaviour problems: Child behaviour and maternal mental health outcomes. *Behavioural and Cognitive Psychotherapy*. 2002;30:279-295.
3. DeGarmo DS, Patterson GR, Forgatch MS. How do outcomes in a specified parent training intervention maintain or wane over time? *Prevention Science*. 2004;5(2):73-89.
4. Barlow J, Smailagic N, Huband N, Roloff V, Bennett C. Group-based parent training programmes for improving parental psychosocial health. *The Cochrane database of systematic reviews*. 2012;6:CD002020.
5. Mihalopoulos C, Carter R, Pirkis J, Vos T. Priority-setting for mental health services. *Journal of mental health (Abingdon, England)*. Apr 2013;22(2):122-134.
6. Haby MM, Carter R, Mihalopoulos C, et al. Assessing Cost-Effectiveness--Mental Health: introduction to the study and methods. *The Australian and New Zealand journal of psychiatry*. Aug 2004;38(8):569-578.
7. Bullinger M. Health-related quality of life and subjective health: a survey of research on a new assessment criterion in medicine. *Psychother Psychosom Med Psychol*. 1997;47:76-91.
8. Guyatt GH, Feeny DH, Patrick DL. Measuring health-related quality of life. *Annals of internal medicine*. 1993;118(8):622-629.
9. Sung L, Petrou S, Ungar WJ. Measurement of health utilities in children. 2010.
10. Gräsel E. When home care ends—changes in the physical health of informal caregivers caring for dementia patients: a longitudinal study. *Journal of the American Geriatrics Society*. 2002;50(5):843-849.
11. Weigl V, Rudolph M, Eysholdt U, Rosanowski F. Anxiety, depression, and quality of life in mothers of children with cleft lip/palate. *Folia phoniatica et logopaedica*. 2005;57(1):20-27.
12. Veisson M. Depression symptoms and emotional states in parents of disabled and non-disabled children. *Social Behavior and Personality: an international journal*. 1999;27(1):87-97.

13. Hedov G, Annerén G, Wikblad K. Self-perceived health in Swedish parents of children with Down's syndrome. *Quality of life Research*. 2000;9(4):415-422.
14. Rudolph M, Kummer P, Eysholdt U, Rosanowski F. Quality of life in mothers of speech impaired children. *Logopedics Phoniatrics Vocology*. 2005;30(1):3-8.
15. Eisenhower A, Blacher J, Baker BL. Mothers' perceived physical health during early and middle childhood: relations with child developmental delay and behavior problems. *Research in developmental disabilities*. Mar 2013;34(3):1059-1068.
16. Witt WP, Litzelman K, Spear HA, et al. Health-related quality of life of mothers of very low birth weight children at the age of five: results from the Newborn Lung Project Statewide Cohort Study. *Quality of life research : an international journal of quality of life aspects of treatment, care and rehabilitation*. Nov 2012;21(9):1565-1576.
17. Romeo DM, Cioni M, Distefano A, et al. Quality of life in parents of children with cerebral palsy: is it influenced by the child's behaviour? *Neuropediatrics*. Jun 2010;41(3):121-126.
18. Allik H, Larsson JO, Smedje H. Health-related quality of life in parents of school-age children with Asperger Syndrome or High-Functioning Autism. *Health and quality of life outcomes*. 2006;4:1.
19. Eisenhower AS, Baker BL, Blacher J. Children's delayed development and behavior problems: impact on mothers' perceived physical health across early childhood. *Soc Sci Med*. Jan 2009;68(1):89-99.
20. Hiscock H, Bayer JK, Lycett K, et al. Preventing mental health problems in children: the Families in Mind population-based cluster randomised controlled trial. *BMC public health*. 2012;12(1):420.
21. Department of Education and Early Childhood Development Maternal and Child Health Services Annual Report 2010-2011. Melbourne: Victorian government; Available at: <https://www.eduweb.vic.gov.au/edulibrary/public/earlychildhood/mch/report11annualstatewide.pdf>
22. Achenbach T, Rescorla L. Child Behavior Checklist for ages 1 1/2-5. Achenbach system of empirically based assessment. Burlington VT: University of Vermont. 2000.
23. Achenbach TM, Rescorla LA. Manual for the ASEBA Preschool Forms & Profiles. Burlington, VT: University of Vermont, Research Center for Children, Youth, & Families. 2000.

24. Allen J, Inder K, Lewin T, Attia J, Kelly B. Construct validity of the Assessment of Quality of Life - 6D (AQoL-6D) in community samples. *Health and quality of life outcomes*. 2013;11(1):61.
25. Hawthorne G, Richardson J, Osborne RH. The Assessment of Quality of Life (AQoL) instrument: a psychometric measure of health-related quality of life. *Qual Life Res*. 1999;8:209 -224.
26. Hawthorne G, Osborne R. Population norms and meaningful differences for the Assessment of Quality of Life (AQoL) measure. *Australian and New Zealand journal of public health*. 2005;29(2):136-142.
27. Lovibond SH, Lovibond PF. *Manual for the Depression Anxiety Stress Scales*. (2nd. Ed.) Sydney: Psychology Foundation. ed1995.
28. Australian Bureau of Statistics. Socio-economic indexes for areas. Australian Bureau of Statistics. 2006.
29. Oberklaid F, Sanson A, Pedlow R, Prior M. Predicting preschool behaviour problems from temperament and other variables in infancy. *Pediatrics*. 1993;91(1):113-120.
30. Sanson A, Prior M, Garino E, Oberklaid F and Sewell J. The Structure of Infant Temperament: Factor Analysis of the Revised Infant Temperament Questionnaire. *Infant Behavior and Development*. 1987;10:97-104.
31. StataCorp. 2012. Stata: Release 12. Statistical Software. College Station TSL.
32. Assessment of quality of life website. AQoL-6D Population norms. 2014; Available at: http://www.aqol.com.au/documents/AQoL-6D/6D_Population_Norms_021209.pdf.
33. Drummond M. Introducing economic and quality of life measurements into clinical studies. *Annals of medicine*. 2001;33(5):344-349.
34. Hawthorne G, Osborne R. Population norms and meaningful differences for the Assessment of Quality of Life (AQoL) measure. Wiley - Blackwell; 2005.
35. Romeo D, Cioni M, Distefano A, et al. Quality of life in parents of children with cerebral palsy: is it influenced by the child's behaviour? *Neuropediatrics*. 2010;41(3):121.
36. Allik H, Larsson J-O, Smedje H. Health-related quality of life in parents of school-age children with Asperger syndrome or high-functioning autism. *Health and quality of life outcomes*. 2006;4(1):1-8.
37. Gerdtham U-G, Johannesson M. Income-related inequality in life-years and quality-adjusted life-years. *Journal of Health Economics*. 2000;19(6):1007-1026.

38. Friedlander S, Weiss DS, Traylor J. Assessing the influence of maternal depression on the validity of the Child Behavior Checklist. *Journal of Abnormal Child Psychology*. 1986;14(1):123-133.
39. Najman JM, Williams GM, Nikles J, et al. Bias influencing maternal reports of child behaviour and emotional state. *Social psychiatry and psychiatric epidemiology*. 2001;36(4):186-194.
40. Nøvik T. Validity of the Child Behaviour Checklist in a Norwegian sample. *European child & adolescent psychiatry*. 1999;8(4):247-254.
41. Crawford JR, Henry JD. The Depression Anxiety Stress Scales (DASS): Normative data and latent structure in a large non-clinical sample. *British Journal of Clinical Psychology*. 2003;42(2):111-131.
42. Antony MM, Bieling PJ, Cox BJ, Enns MW, Swinson RP. Psychometric properties of the 42-item and 21-item versions of the Depression Anxiety Stress Scales in clinical groups and a community sample. *Psychological Assessment*. 1998;10(2):176.
43. Gao W, Paterson J, Abbott M, Carter S, Iusitini L. Maternal mental health and child behaviour problems at 2 years: findings from the Pacific Islands Families Study. *Australasian Psychiatry*. 2007;41(11):885-895.
44. Bayer J, Hiscock H, Scalzo K, et al. Systematic review of preventive interventions for children's mental health: what would work in Australian contexts? *Australian and New Zealand Journal of Psychiatry*. 2009;43(8):695-710.

Table 1: Description of variables used for the analyses

Variables	Collected time points	Collection tools	Explanation of data in the analyses
Maternal HRQoL	2 years	AQoL-6D	Continuous
Child behavior problems	2 years	Parent reported child behavior checklist (CBCL)	Categorical: (1) Normal range (T scores < 60), (2) Borderline/Clinical range (T-scores ≥ 60)
Maternal mental health	2 years	Parent reported DASS	Continuous
Infant temperament	8 months	Parent reported Australian Infant Temperament Questionnaire	Categorical: (1) difficult (more or much more difficult than average), (2) easy/average (easier than average or average)
Child gender	8 months	Parent report of their child gender	Categorical: (1) Female, (2) Male
Household income	8 months	Parent report of household income	Categorical: (1) less than \$26,000, (2) \$26,000 - \$51,999, (3) 52,000 - 88,400, (4) more than \$88,400
Financial security	8 months	Parent report of their financial security	Dichotomous: yes/no
Socioeconomic status	8 months	SEIFA score derived from current postcode of residence reported by parents	Continuous

Table 2: Characteristics at baseline

Characteristics	Analysed (N =1160)	Non-analysed (N = 180)
Child		
Age in months, mean (SD)	9.0 (1.0)	9.3 (1.1)
Male, %	50.3	53.4
First born child, %	52.1	39.9
Child has difficult temperament, %	6.2	6.2
Primary caregiver		
Age in years, mean (SD)	33.9 (4.6)	33.4 (4.9)
Ethnicity, Anglo-Australian, %	82.5	71.5
Relationship status, Married/defacto, %	97.3	86.0
Language, English, %	94.9	85.0
Education status, Tertiary degree or higher, %	55.8	45.6
SEIFA, mean (SD)	1041.3 (39.9)	1034.6
Household income		
Less than \$26,000, %	1.8	5.7
\$26,000 - \$51,999, %	11.5	15.5
\$52,000 - \$88,400, %	28.5	24.4
More than \$88,400, %	48.0	36.8
Feel financial security, %	83.3	65.8
Health care card, %	13.8	21.8
Primary caregiver wellbeing		
Depression, mean (SD)	3.4 (4.3)	4.4 (5.8)
Stress, mean (SD)	8.4 (6.3)	8.7 (6.2)
Anxiety, mean (SD)	2.0 (2.9)	2.2 (3.6)
HRQoL (AQoL-6D), mean (SD)	0.8 (0.1)	0.8 (0.1)

SD: Standard deviation

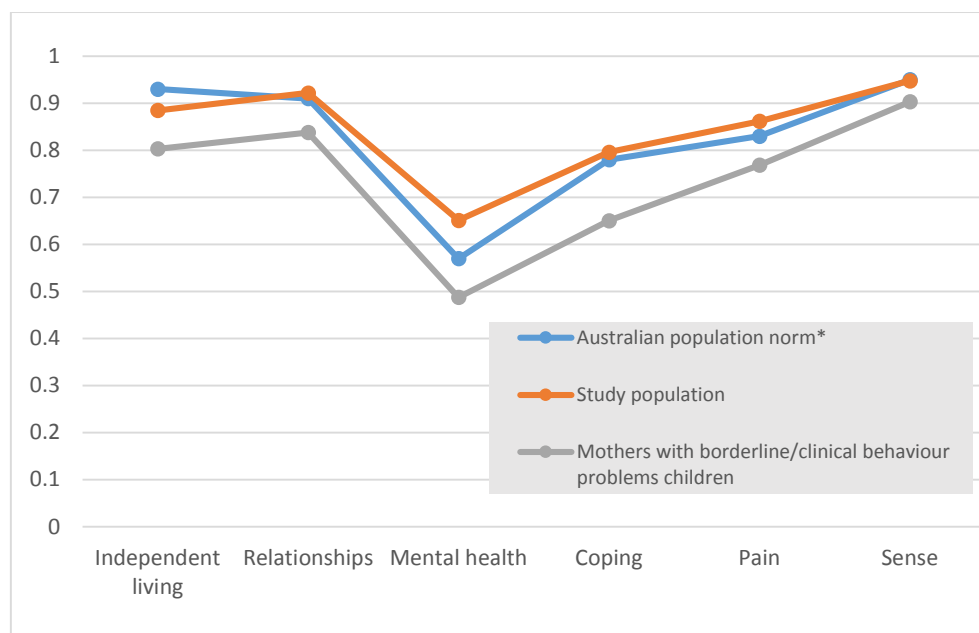
Table 3. Unadjusted and adjusted mean differences for maternal HRQoL when children have borderline/clinical behaviour problems.

	Unadjusted AqoL				Model 1: Adjusted AqoL [†]			Model 2: Model 1 + DASS Adjusted AqoL [‡]		
	N	Mean (SD)	Mean difference (95% CI) N= 1160	P value	N	Mean difference (95% CI) N=1024	P value	N	Mean difference (95% CI) N=1023	P value
Child behaviour (CBCL)										
Normal range	1028	0.85 (0.13)			901	-	-	900	-	-
Borderline/Clinical range	132	0.71 (0.17)	-0.14 (-0.16, -0.12)	<0.001	123	-0.12 (-0.15, -0.09)	<0.001	123	-0.03 (-0.05 -0.02)	<0.001

[†] Model 1 - Adjusted for household income, financial security, child gender, temperament and intervention group status (A vs. B/C)

[‡] Model 2 - As per Model 1 plus maternal mental health (DASS).

Figure 1: AQL-6D dimension scores in comparison to Australian norms



*Norms for Australian population aged 25-34, female, N=654.³²