AUSPLAY: THIRD METHODOLOGY REPORT

Covering the data collection period July 1, 2017 to June 30, 2018

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Contents

List of Tables

1   Introduction

1.1   Survey overview

The AusPlay Survey (AusPlay) is a large scale national population tracking survey funded and led by the Australian Sports Commission (ASC). It fills a major gap in national sport and physical recreation data following the Australian Bureau of Statistics' (ABS) decision in June 2014 to cease funding for all sport and recreation data collection.

AusPlay is the first national survey in Australia to collect adult and children's sport and physical recreation participation data on the same annual survey vehicle. ORC International (ORC) was appointed by the ASC in 2015 to deliver AusPlay, following an open tendering process.

The three main objectives of AusPlay are to:

1. Provide insights to help sports grow participation and track trends

2. Provide data that informs government investment, policy and program delivery; and

3. Identify and describe links between sport participation and other influential factors.

1.2   Purpose of this report

AusPlay data collection commenced in October 2015. This third methodological report covers the: sample design; data collection; weighting; and margin of error calculations, as they relate to the survey data collected in from July 1, 2017 to June 30, 2018.

Separate documents with detailed information on the survey questions and key terms and definitions used in AusPlay reporting can be accessed on the Clearinghouse for Sport.

2 Sample Design

2.1 Target population

The target population for AusPlay is all Australian residents. Randomly selected Australian residents aged 15 years and over are interviewed directly in a CATI interview. Children aged 0-14 are covered by interviewing adult respondents, who are parents or guardians of at least one child in their household, about one randomly selected child.

2.2 Annual Sample Size

The AusPlay sample size was increased from 20,000 (aged 15 years and over) in 2017/18 to 21,000 in 2017/18 with an additional 1,000 sample being added to the SA landline strata. The sample was spread equally across the year. In the four quarters covered in this report the adult sample size achieved was 21,014 and the child sample size achieved was 3,318.

2.3 Stratification

The AusPlay sample is stratified into 14 geographic locations, i.e. 1 mobile sample stratum and 13 landline sample strata based on States and Territories with further splits of the NSW, Victoria, Queensland, South Australia and West Australia into the Greater Capital City Statistical Areas (GCCS) and the Rest of the State. These strata are set out in the table below.

Table 1: AusPlay Sample Strata

Stratum
Sydney
Rest of New South Wales
Melbourne
Rest of Victoria
Brisbane
Rest of Queensland
Adelaide
Rest of South Australia
Perth
Rest of Western Australia
Tasmania

Stratum
Northern Territory
Australian Capital Territory
Mobile

2.4 Overlapping dual frame design

An overlapping dual frame design is used, based on fixed line and mobile phone sample frames. The sampling frames are over-lapping because people with both a landline and a mobile phone are able to be selected and interviewed from either frame. This means that a large share of the target population (people with mobiles having access to a landline) are covered by both sample frames. This issue, which has the potential to bias the results, is accounted for in the weighting. The particular benefit of this design is that it provides access to those, who do not have a fixed landline and are contactable only via mobile, estimated to be around 42%[1] of the population.

2.5 Landline and Mobile share

Under the AusPlay design the overall sample is split 50/50 between the landline and mobile sample. This design was based on research conducted by ORC International into this issue which showed that for the current profile of telephone ownership in Australia (the percentage of the population who are landline only; mobile only and those with access to both a landline and mobile) the 50/50 design provides the lowest possible sample error for a given total sample size.

2.6 Allocation of sample to strata

The random digit dialling (RDD) mobile sample is a national sample with no geographic information and is thus unable to be controlled across the geographic strata. The random nature of the mobile sample means that the expected distribution across geographic strata is in approximate proportion to the mobile phone ownership proportions of the strata.

Given the above and the 50/50 split of the mobile and landline sample, the key sample design issue was the allocation of the landline sample to the strata, *given the expected mobile sample distribution by strata*.

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[1] Derived from ACMA-based data used in the production of population weighting data for AusPlay

In determining this sample allocation account was taken not only of the need for sound national estimates but also of the need for sound estimates for states and territories. These two design objectives have different optimum sample designs. The optimum design for national estimates is for state and territory sample sizes to be proportional to their respective populations. On the other hand, the optimum design for state and territory estimates is for an equal sample size across each state and territory. The sample design for AusPlay was a compromise between these two objectives.

In developing this compromise design account was also taken of the impact of the landline sample size on the margins of error *given the expected mobile phone sample size for each state/territory*. This analysis was required because of a particular feature of overlapping dual frame sample designs. In these designs the margin of error of a particular state/territory is strongly dependent on the degree of proportionality of the sample across the three phone ownership populations: landline only; mobile only; and access to both a landline and mobile. For a given sample size the margin of error is minimised if the resulting sample sizes for these three phone ownership groups are proportional to their respective population values. The margin of error increases as the sample becomes increasingly disproportional.

The table below sets out the sample allocation to state and territory that was determined from the sample allocation analysis.

Table 2: Annual state and territory sample sizes

	Annual sample size
New South Wales (NSW)	5,200
Victoria (Vic)	4,200
Queensland (Qld)	3,600
South Australia (SA)	2,700
Western Australia (WA)	2,500
Tasmania (Tas)	1,200
Northern Territory (NT)	600
Australian Capital Territory (ACT)	1,000
Total	21,000

2.7 Random respondent selection

Adult Selection

For the landline sample an adult aged 15 years and over was randomly selected from all adults in the household using the last birthday method. The data collection design required up to 5 call-backs to be made to households to interview the selected adult. No substitutions were made if the selected adult was unable to be interviewed.

For the mobile phone sample the owner of the mobile was interviewed. For the mobile sample up to 5 call-backs were made to attempt to obtain an interview.

Child Selection

For each adult respondent who was a parent or guardian of at least one child in their household one child was selected using the last birthday method. The adult respondent completed the AusPlay questionnaire child section as it related to the selected child.

2.8 Sample Frames and Stratification

The sampling frames used for the over-lapping dual-frame approach (mobile and fixed landline) were provided by *SamplePages*.

The *SamplePages* fixed line RDD sample is derived from a database of all fixed line prefixes in Australia (maintained by the Australian Communications and Media Authority (ACMA)). Random suffixes are then generated and the resulting numbers pinged (rung silently at the exchanges) to determine if they are live.

The *SamplePages* pinged RDD mobile phone samples is obtained in a similar way to the fixed line sample through the ACMA-based list of all possible mobile phone prefixes in Australia and the generation of random suffixes. Unlike the landline sample, these randomly generated phone numbers can't be assigned to part-of-state (state and capital city/rest of state splits), as there is no geographic information attached to mobile numbers.

3 Data Collection

3.1 Interviewing

Interviewing was conducted from ORC International's dedicated CATI facility in Melbourne. The team of interviewers selected were briefed specifically on the project by the ORC International project team and ASC staff prior to the commencement of the fieldwork.

This report covers the fieldwork period from July 1, 2017 to June 30, 2018. In this period a total of 21,014 interviews were conducted amongst adults aged 15 years and over. Of these respondents 3,318 completed the AusPlay questionnaire child section for a randomly selected child aged 0-14 (selected using the last birthday method). Interviews were conducted continuously over the year.

Interviewing was carried out in compliance with ISO 20252 and membership requirements for Association of Market and Social Research Organisations (AMSRO) and the Australian Market and Social Research Society (AMSRS).

The table below shows the adult sample sizes achieved for the states and territories. There was some discrepancy between the targeted adult sample sizes by state and territory as shown in table 2 above and the actual sample achieved. This was because of the random way the responding mobile sample was distributed across states and territories.

Table 3: Adult and child sample achieved by state/territory: July 2017 - June 2018

State	Adult sample	Child sample
NSW	5,147	811
Vic	4,819	801
Qld	3,532	578
SA	2,458	308
WA	2,503	425
Tas	1,131	135
NT	530	110
ACT	894	150
Total	21,014	3,318

3.2 Response rates

The response rates for the landline sample and the mobile sample are set out on the following pages. The response rate calculation uses the internationally-recognised AAPOR

(American Association for Population Opinion Research) standard for calculating response rates.

Table 4: Response rates for the landline sample July 2017 – June 2018

				Response rate
		No answer	636	
		Answering machine	819	
		Engaged	9	
		Other non-contact	0	
A	Total Contact Not Made - Eligibility Unknown			1,464
		Disconnected / Invalid number - phone not connected	753	
		Business number/paging service	19,313	
		Incoming call restriction (blocks)	0	
		Fax / 'Killed' # Public phone	1,379	
B	Total Contact Not Made - Not Eligible			21,445
1) Total contact not made (A+B)				22,909

				Response rate
		Call back or appointment scheduled	324	
		Total language barrier	3,183	
		Refused - non-specified	42,268	
		Refused- Eligibility Unknown	346	
C	Total Contact Made - Eligibility Unknown			46,121
		Out of scope - Aged under 15	0	
		Out of scope - residency status	30	
		Refused - Age question	14	
		Refused - residency status	1	
		No usual residents	74	
		No-one of correct age	65	
D	Total Contact Made - Not eligible (out-of-scope)			184
E	Contact made - Eligible (completed interviews)			11,002
		Last birthday terminate at QRES1a or later	331	
		Not proceeding for other reason	216	
		Refused - Eligible	32	
		Refused or cannot identify LB person	0	
		Refused- parent refused for 15-17yo	45	
		LB person refused	0	
		All usual residents away 2+ weeks/ not available	342	
		Call-backs made without success	0	
		Total incapable	420	
F	Total Contact made - Eligible (non-complete)			1,386
2) Total contact made (C+D+E+F)				58,693

Total finalised outcomes (1+2)				81,602
G	Eligibility rate *			99%

		Response rate	
H	Expected eligible from unknown		46,889
J	**Total estimated Eligible**		**59,277**
RR	Response Rate		19%

Table 5: Response rates for the mobile sample July 2018 – June 2018

		Response rate	
	No answer	*1,277*	
	Engaged	*7*	
	Other non-contact	*0*	
A	**Total Contact Not Made - Eligibility Unknown**		**5,410**
	Disconnected / Invalid number - phone not connected	*75*	
	Business number/paging service	*2,574*	
	Incoming call restriction (blocks)	*8*	
	Fax / 'Killed' # Public phone	*1,100*	
B	**Total Contact Not Made - Not Eligible**		**3,757**
	1) Total contact not made (A+B)		**9,167**

		Response rate	
	Call back or appointment scheduled	*573*	
	Total language barrier	*1,837*	
	Refused - non-specified	*26,010*	
	Refused- Eligibility Unknown	*103*	
C	**Total Contact Made - Eligibility Unknown**		**28,523**
	Out of scope - Aged under 15	*1*	
	Out of scope - residency status	*166*	
	Refused - Age question	*16*	
	Refused - residency status	*1*	
	No usual residents	*45*	
	No-one of correct age	*296*	
D	**Total Contact Made - Not eligible (out-of-scope)**		**525**
E	**Contact made - Eligible (completed interviews)**		**10,003**
	Respondent terminate at QRES1a or later	*4*	
	Not proceeding for other reason	*141*	
	Refused - Eligible	*49*	
	Refused or cannot identify LB person	*0*	
	Refused- parent refused for 15-17yo	*17*	
	Call-backs made without success	*0*	
	Total incapable	*92*	
F	**Total Contact made - Eligible (non-complete)**		**303**
	2) Total contact made (C+D+E+F)		**39,354**

Total finalised outcomes (1+2)			**48,521**

			Response rate	
G	Eligibility rate *			95%
H	Expected eligible from unknown			32,288
J	**Total estimated Eligible**			**42,594**
RR	**Response Rate**			**23%**

4   Weighting

Weights were calculated for each of the four quarterly sets of data. The weighting process was carried out as follows:

4.1 Weights for the adult sample

1. The initial probabilities of selection were calculated. For the landline sample the initial probabilities of selection were proportional to the inverse of the household size (persons aged 15+) to reflect the fact that the random respondent was selected from households selected from the landline sample. For the mobile sample the initial probabilities of selection were proportional to the number of active mobile phones used by the mobile phone respondent.
1. For both the landline and mobile sample, weighting cells were defined by (1) geographic strata x (2) gender x age. These weighting cells are shown in the tables below. The geographic strata and the gender by age weighting cells used were as follows:

Table 6: AusPlay geographic strata

Stratum
Sydney
Rest of New South Wales
Melbourne
Rest of Victoria
Brisbane
Rest of Queensland
Adelaide
Rest of South Australia
Perth
Rest of Western Australia
Tasmania
Northern Territory
Australian Capital Territory

Table 7: Age x gender weighting cells

Gender	Age
Female	15-24

Gender	Age
Female	25-34
Female	35-44
Female	45-54
Female	55-64
Female	65+
Male	15-24
Male	25-34
Male	35-44
Male	45-54
Male	55-64
Male	65+

1. The combination of 13 geographic strata with 12 age x gender weighting cells resulted in 13 x 12 = 156 weighting cells for both the landline and mobile samples.
    In order to avoid unduly large weights, weighting cells were collapsed if the sample size was less than 5. Weighting cells were collapsed across adjacent age groups but not across gender or geographic strata.

2. Estimated Resident Population (ERP) data classified by state x part of state x age by gender was available on a quarterly basis for the landline population (the population with access to a landline) and the mobile population (the population who use a mobile phone). The initial probabilities of selection were then pro-rated by a calibration weighting method so that they summed to the relevant weighting cell population totals for both the landline and mobile sample.

3. The resultant weights at this stage enabled the projection of the landline sample to the landline population and the mobile sample to the mobile population. A further adjustment was required to enable the sample to represent the *full population*. In this adjustment the weights of records from the landline sample with a mobile phone and the records from the mobile sample with a landline were underlined halved to account for the fact that both the mobile sample and the landline sample represented the population of people with both a landline and mobile phone number. In this way the double-counting of this overlap population was accounted for.

4. A rim-weighting process was then used to ensure consistency of the weights with two sets of Australian Bureau of Statistics (ABS) Estimated Resident Population (ERP) based population data. The first set of population data used was the ERP totals classified by

telephone ownership (mobile only; landline only; both landline and mobile) x state/territory. The second set of population data used was the ERP-based totals for the 156 weighting (geographic strata x gender x age).

5.   Rim weighting operates in an iterative fashion. The weights are firstly pro-rated so that their sum for the first set of rim weighting cells is equal to the ERP values of those cells. The weights obtained from this process are then pro-rated so that their sum for the second set of rim weighting cells is equal to the ERP values of those cells. This process then re-commences with the weights being pro-rated again to the first rim-weighting totals and then to the second set of rim-weighting totals. This continues until the weights are consistent with both sets of rim weighting totals. Five rim weighting iterations are used in the AusPlay weighting in order to ensure the convergence of the weights. These weights were the final weights for the adult sample.

4.2 Weights for the child sample

The starting point for the child weights was the adult weight for respective adult respondents. The probability of selection of children is inversely proportional to the number of children aged 0-14 in the household. In order to account for this probability of selection the adult weight was multiplied by the number of children aged 0-14 in the household. A further weight adjustment was made which divided the child weight by the number of adults in the household who could have reported the selected child. This adjustment accounts for the fact that the adult weights project to all adults in the population, not just the selected adults.

The final child weights were calculated by a rim-weighting process using two ABS ERP rim values: (1) the quarterly ERP values by age (0-4, 5-8, 9-11, and 12-14) x gender at the national level; and (2) the quarterly ABS child (0-14) ERP values for states and territories. This ensured the weighted child estimates were identical to the two ABS ERP rim values. This form of rim-weighting for child weights was used for the first time in the September, 2017 weight calculations. The previous approach was a rim-weight using only the quarterly child ABS ERP age ranges (0-4, 5-8, 9-11, 12-14) x gender totals. This revised approach was introduced to reduce the variability in state and territory child estimates across time.

4.3 Using the weights

The weights for each quarter were designed so that any quarter's sample could be projected to the full population of Australia. One consequence of this is that the sum of the adult weights equals the ERP adult value for that quarter.

This means, however, that the sum of the adult weights for the combined first four quarters of data will equal four times the average ERP adult value for Australia for that period. The

weights provided by ORC International for the combined first four quarters of data were divided by 4 to account for this issue.

This principle should be used whenever quarterly data is combined to form multi-quarter data. In general if q quarters of weighted data are to be combined for analysis of that combined time period the quarterly weights should all be divided by q.

5 Sample error estimates

5.1 Standard errors

The AusPlay results are based on a sample and are therefore subject to sample error. Sample error is measured by the standard error (SE) and the margin of error (MOE). Knowledge of the standard error, or the margin of error, enables the 95% confidence intervals to be constructed around survey results and also enables statistical significance testing to be carried out.

The 95% confidence interval for a survey result is calculated as the survey result plus or minus 1.96 x the standard error. For example, if a survey result of 100,000 has a standard error of 10,000 then the 95% confidence interval is 100,000 +/- (1.96 x 10,000) = 100,000 +/- 19,600 = (80,400 – 119,600).

The standard error of a survey result divided by the survey result, expressed as a percentage, is called the relative standard error (RSE).The standard errors and the relative standard errors of a range of AusPlay adult and child results are summarised in the four tables below.

The following example demonstrates the use of these tables. Consider a survey result for NSW of 200,000 from the adult sample. The table below shows that the standard error for this result is 18,800. This means the 95% confidence interval for the survey result is 200,000 +/- 1.96 x 18,800 = 200,000 +/- 37,600 = (163,400 - 236,800).

Table 8: Standard errors for adult estimates

Size of estimate	NSW (no.)	Vic (no.)	Qld (no.)	SA (no.)	WA (no.)	Tas (no.)	NT (no.)	ACT (no.)	Australia (no.)
1,000	1,300	1,200	1,300	1,100	1,300	1,200	1,300	900	1,300
2,000	1,900	1,700	1,800	1,600	1,800	1,600	1,800	1,300	1,800
5,000	3,000	2,700	2,800	2,500	2,900	2,600	2,800	2,100	2,800
10,000	4,200	3,800	4,000	3,600	4,000	3,700	4,000	3,000	4,000
20,000	6,000	5,400	5,600	5,100	5,700	5,200	5,600	4,200	5,600
50,000	9,400	8,600	8,900	8,000	9,000	8,200	8,900	6,600	8,900
100,000	13,300	12,100	12,600	11,300	12,800	11,600	12,500	9,400	12,600
200,000	18,800	17,100	17,800	16,000	18,000	16,400	17,700	13,200	17,800
500,000	29,800	27,100	28,200	25,300	28,500	-	-	-	28,100
800,000	37,700	34,300	35,600	32,000	36,100	-	-	-	35,600
1,000,000	42,100	38,300	39,800	35,800	40,300	-	-	-	39,800
1,500,000	51,600	46,900	48,800	-	49,400	-	-	-	48,700
2,000,000	59,600	54,200	56,300	-	57,000	-	-	-	56,300
5,000,000	94,200	85,700	-	-	-	-	-	-	89,000
8,000,000	-	-	-	-	-	-	-	-	112,500

Table 9: Relative standard errors of adult estimates

Size of estimate	NSW (%)	Vic (%)	Qld (%)	SA (%)	WA (%)	Tas (%)	NT (%)	ACT (%)	Australia (%)
1,000	130.0%	120.0%	130.0%	110.0%	130.0%	120.0%	130.0%	90.0%	130.0%
2,000	95.0%	85.0%	90.0%	80.0%	90.0%	80.0%	90.0%	65.0%	90.0%
5,000	60.0%	54.0%	56.0%	50.0%	58.0%	52.0%	56.0%	42.0%	56.0%
10,000	42.0%	38.0%	40.0%	36.0%	40.0%	37.0%	40.0%	30.0%	40.0%
20,000	30.0%	27.0%	28.0%	25.5%	28.5%	26.0%	28.0%	21.0%	28.0%
50,000	18.8%	17.2%	17.8%	16.0%	18.0%	16.4%	17.8%	13.2%	17.8%
100,000	13.3%	12.1%	12.6%	11.3%	12.8%	11.6%	12.5%	9.4%	12.6%
200,000	9.4%	8.6%	8.9%	8.0%	9.0%	8.2%	8.9%	6.6%	8.9%
500,000	6.0%	5.4%	5.6%	5.1%	5.7%	-	-	-	5.6%
800,000	4.7%	4.3%	4.5%	4.0%	4.5%	-	-	-	4.5%
1,000,000	4.2%	3.8%	4.0%	3.6%	4.0%	-	-	-	4.0%
1,500,000	3.4%	3.1%	3.3%	-	3.3%	-	-	-	3.2%
2,000,000	3.0%	2.7%	2.8%	-	2.9%	-	-	-	2.8%
5,000,000	1.9%	1.7%	-	-	-	-	-	-	1.8%
8,000,000	-	-	-	-	-	-	-	-	1.4%

Table 10: Standard errors of child estimates

Size of estimate	NSW (no.)	Vic (no.)	Qld (no.)	SA (no.)	WA (no.)	Tas (no.)	NT (no.)	ACT (no.)	Australia (no.)
1,000	1,800	1,500	1,700	1,500	1,700	1,800	1,600	1,100	1,700
2,000	2,500	2,100	2,400	2,100	2,400	2,600	2,200	1,600	2,400
5,000	4,000	3,300	3,800	3,300	3,700	4,100	3,500	2,600	3,700
10,000	5,700	4,700	5,400	4,700	5,300	5,800	5,000	3,600	5,300
20,000	8,100	6,700	7,700	6,600	7,400	8,200	7,000	5,100	7,400
50,000	11,700	9,700	11,200	9,600	10,800	11,900	10,300	7,500	10,800
100,000	18,000	14,900	17,100	14,800	16,600	-	-	-	16,600
200,000	25,500	21,100	24,200	20,900	23,500	-	-	-	23,500
500,000	40,300	33,400	38,300	-	37,200	-	-	-	37,200
800,000	50,900	42,300	48,500	-	-	-	-	-	47,000
1,000,000	56,900	47,300	54,200	-	-	-	-	-	52,600
1,500,000	-	-	-	-	-	-	-	-	64,400
2,000,000	-	-	-	-	-	-	-	-	74,400

Table 11: Relative standard error of child estimates

Size of estimate	NSW (%)	Vic (%)	Qld (%)	SA (%)	WA (%)	Tas (%)	NT (%)	ACT (%)	Australia (%)
1,000	180.0%	150.0%	170.0%	150.0%	170.0%	180.0%	160.0%	110.0%	170.0%
2,000	125.0%	105.0%	120.0%	105.0%	120.0%	130.0%	110.0%	80.0%	120.0%
5,000	80.0%	66.0%	76.0%	66.0%	74.0%	82.0%	70.0%	52.0%	74.0%
10,000	57.0%	47.0%	54.0%	47.0%	53.0%	58.0%	50.0%	36.0%	53.0%

Size of estimate	NSW (%)	Vic (%)	Qld (%)	SA (%)	WA (%)	Tas (%)	NT (%)	ACT (%)	Australia (%)
20,000	40.5%	33.5%	38.5%	33.0%	37.0%	41.0%	35.0%	25.5%	37.0%
50,000	23.4%	19.4%	22.4%	19.2%	21.6%	23.8%	20.6%	15.0%	21.6%
100,000	18.0%	14.9%	17.1%	14.8%	16.6%	-	-	-	16.6%
200,000	12.8%	10.6%	12.1%	10.5%	11.8%	-	-	-	11.8%
500,000	8.1%	6.7%	7.7%	-	7.4%	-	-	-	7.4%
800,000	6.4%	5.3%	6.1%	-	-	-	-	-	5.9%
1,000,000	5.7%	4.7%	5.4%	-	-	-	-	-	5.3%
1,500,000	-	-	-	-	-	-	-	-	4.3%
2,000,000	-	-	-	-	-	-	-	-	3.7%

5.2 Margins of error

As described above, the 95% confidence interval for a survey result is calculated as the survey result plus or minus 1.96 times the standard error. The amount 1.96 times the standard error is called the margin of error.

This term enables the calculation for a 95% confidence interval to be re-expressed as follows: the 95% confidence interval for a survey result is calculated as the survey result plus or minus the margin of error.

The relative margin of error (RMOE) for a particular survey result is 1.96 x the relative standard error or the margin of error divided by the survey result, expressed as a percentage

The margins of error and the relative margins of error of AusPlay adult and child estimates are summarised in the four tables below. It can be seen that the margin of error values in the tables below is 1.96 times the equivalent standard error values (rounded to the nearest hundred).

The following example demonstrates the use of these tables. Consider a survey result for NSW of 200,000 from the adult sample. The table below shows that the margin of error for this result is 36,800. This means the 95% confidence interval for the survey result is 200,000 +/- 36,800 = (163,200 – 236,800). This is the same 95% confidence interval that was calculated in the same example above, using the standard error tables.

Table 12: Margins of error for adult estimates

Size of estimate	NSW (no.)	Vic (no.)	Qld (no.)	SA (no.)	WA (no.)	Tas (no.)	NT (no.)	ACT (no.)	Australia (no.)
1,000	2,500	2,400	2,500	2,200	2,500	2,400	2,500	1,800	2,500
2,000	3,700	3,300	3,500	3,100	3,500	3,100	3,500	2,500	3,500
5,000	5,900	5,300	5,500	4,900	5,700	5,100	5,500	4,100	5,500
10,000	8,200	7,400	7,800	7,100	7,800	7,300	7,800	5,900	7,800
20,000	11,800	10,600	11,000	10,000	11,200	10,200	11,000	8,200	11,000

Size of estimate	NSW (no.)	Vic (no.)	Qld (no.)	SA (no.)	WA (no.)	Tas (no.)	NT (no.)	ACT (no.)	Australia (no.)
50,000	18,400	16,900	17,400	15,700	17,600	16,100	17,400	12,900	17,400
100,000	26,100	23,700	24,700	22,100	25,100	22,700	24,500	18,400	24,700
200,000	36,800	33,500	34,900	31,400	35,300	32,100	34,700	25,900	34,900
500,000	58,400	53,100	55,300	49,600	55,900	-	-	-	55,100
800,000	73,900	67,200	69,800	62,700	70,800	-	-	-	69,800
1,000,000	82,500	75,100	78,000	70,200	79,000	-	-	-	78,000
1,500,000	101,100	91,900	95,600	-	96,800	-	-	-	95,500
2,000,000	116,800	106,200	110,300	-	111,700	-	-	-	110,300
5,000,000	184,600	168,000	-	-	-	-	-	-	174,400
8,000,000	-	-	-	-	-	-	-	-	220,500

Table 13: Relative margins of error for adult estimates

Size of estimate	NSW (%)	Vic (%)	Qld (%)	SA (%)	WA (%)	Tas (%)	NT (%)	ACT (%)	Australia (%)
1,000	250.0%	240.0%	250.0%	220.0%	250.0%	240.0%	250.0%	180.0%	250.0%
2,000	185.0%	165.0%	175.0%	155.0%	175.0%	155.0%	175.0%	125.0%	175.0%
5,000	118.0%	106.0%	110.0%	98.0%	114.0%	102.0%	110.0%	82.0%	110.0%
10,000	82.0%	74.0%	78.0%	71.0%	78.0%	73.0%	78.0%	59.0%	78.0%
20,000	59.0%	53.0%	55.0%	50.0%	56.0%	51.0%	55.0%	41.0%	55.0%
50,000	36.8%	33.8%	34.8%	31.4%	35.2%	32.2%	34.8%	25.8%	34.8%
100,000	26.1%	23.7%	24.7%	22.1%	25.1%	22.7%	24.5%	18.4%	24.7%
200,000	18.4%	16.8%	17.5%	15.7%	17.7%	16.1%	17.4%	13.0%	17.5%
500,000	11.7%	10.6%	11.1%	9.9%	11.2%	-	-	-	11.0%
800,000	9.2%	8.4%	8.7%	7.8%	8.9%	-	-	-	8.7%
1,000,000	8.3%	7.5%	7.8%	7.0%	7.9%	-	-	-	7.8%
1,500,000	6.7%	6.1%	6.4%	-	6.5%	-	-	-	6.4%
2,000,000	5.8%	5.3%	5.5%	-	5.6%	-	-	-	5.5%
5,000,000	3.7%	3.4%	-	-	-	-	-	-	3.5%
8,000,000	-	-	-	-	-	-	-	-	2.8%

Table 14: Margins of error for child estimates

Size of estimate	NSW (no.)	Vic (no.)	Qld (no.)	SA (no.)	WA (no.)	Tas (no.)	NT (no.)	ACT (no.)	Australia (no.)
1,000	3,500	2,900	3,300	2,900	3,300	3,500	3,100	2,200	3,300
2,000	4,900	4,100	4,700	4,100	4,700	5,100	4,300	3,100	4,700
5,000	7,800	6,500	7,400	6,500	7,300	8,000	6,900	5,100	7,300
10,000	11,200	9,200	10,600	9,200	10,400	11,400	9,800	7,100	10,400
20,000	15,900	13,100	15,100	12,900	14,500	16,100	13,700	10,000	14,500
50,000	22,900	19,000	22,000	18,800	21,200	23,300	20,200	14,700	21,200
100,000	35,300	29,200	33,500	29,000	32,500	na	na	na	32,500
200,000	50,000	41,400	47,400	41,000	46,100	na	na	na	46,100

Size of estimate	NSW (no.)	Vic (no.)	Qld (no.)	SA (no.)	WA (no.)	Tas (no.)	NT (no.)	ACT (no.)	Australia (no.)
500,000	79,000	65,500	75,100	na	72,900	na	na	na	72,900
800,000	99,800	82,900	95,100	na	na	na	na	na	92,100
1,000,000	111,500	92,700	106,200	na	na	na	na	na	103,100
1,500,000	na	na	na	na	na	na	na	na	126,200
2,000,000	na	na	na	na	na	na	na	na	145,800

Table 15. Relative margins of error for child estimates

Size of estimate	NSW (%)	Vic (%)	Qld (%)	SA (%)	WA (%)	Tas (%)	NT (%)	ACT (%)	Australia (%)
1,000	350.0%	290.0%	330.0%	290.0%	330.0%	350.0%	310.0%	220.0%	330.0%
2,000	245.0%	205.0%	235.0%	205.0%	235.0%	255.0%	215.0%	155.0%	235.0%
5,000	156.0%	130.0%	148.0%	130.0%	146.0%	160.0%	138.0%	102.0%	146.0%
10,000	112.0%	92.0%	106.0%	92.0%	104.0%	114.0%	98.0%	71.0%	104.0%
20,000	79.5%	65.5%	75.5%	64.5%	72.5%	80.5%	68.5%	50.0%	72.5%
50,000	45.8%	38.0%	44.0%	37.6%	42.4%	46.6%	40.4%	29.4%	42.4%
100,000	35.3%	29.2%	33.5%	29.0%	32.5%	na	na	na	32.5%
200,000	25.0%	20.7%	23.7%	20.5%	23.1%	na	na	na	23.1%
500,000	15.8%	13.1%	15.0%	na	14.6%	na	na	na	14.6%
800,000	12.5%	10.4%	11.9%	na	na	na	na	na	11.5%
1,000,000	11.2%	9.3%	10.6%	na	na	na	na	na	10.3%
1,500,000	na	na	na	na	na	na	na	na	8.4%
2,000,000	na	na	na	na	na	na	na	na	7.3%

5.3 Usability of the survey results

It is common practice to describe the usability of survey results as follows:

- Results with RMOE values less than 50% are broadly reliable for most purposes;

- Results with RMOE values between 50% and 100% are able to be used with caution;

- Results with RMOE values greater than 100% are unreliable for general use.

A literal translation of this rule, given the result that the RMOE value is 1.96 x the RSE values, is as follows:

- Results with RSE values less than 25.5% are broadly reliable for most purposes;

- Results with RSE values between 25.5% and 51% are able to be used with caution;

- Results with RSE values greater than 51% are unreliable for general use.

Noting the approximation involved in these rules this could be approximated as follows:

- Results with RSE values less than 25% are broadly reliable for most purposes;

- Results with RSE values between 25% and 50% are able to be used with caution; and

- Results with RSE values greater than 50% are unreliable for general use.

The two tables below applies these rules to show the ranges of results that are (1) **Broadly reliable** (RMOE <50%, RSE <25%); (2) **Should be used with caution** (50% <RMOE < 100%, 25% < RSE <50%); and (3) **Unreliable for general use** (RMOE > 100%, RSE >50%) for each state and territory, for adult and child results.

An example is the use of these tables is as follows. Consider a result of 20,000 for Queensland from the adult sample. This estimates is in the range 6,100 to 24,400 and thus should be used with caution.

Table 16. Reliability rules for adult estimates

	Broadly reliable (RMOE less than 50%, RSE less than 25%)	Use with caution (RMOE between 50% and 100%, RSE between 25% and 50%)	Not reliable for general use (RMOE greater than 100%, RSE greater than 50%)
NSW	Greater than 27,300	Between 6,800 and 27,300	Less than 6,800
Vic	Greater than 22,600	Between 5,600 and 22,600	Less than 5,600
Qld	Greater than 24,400	Between 6,100 and 24,400	Less than 6,100
SA	Greater than 19,700	Between 4,900 and 19,700	Less than 4,900
WA	Greater than 25,000	Between 6,200 and 25,000	Less than 6,200
Tas	Greater than 20,600	Between 5,200 and 20,600	Less than 5,200
NT	Greater than 24,100	Between 6,000 and 24,100	Less than 6,000
ACT	Greater than 13,500	Between 3,400 and 13,500	Less than 3,400
Australia	Greater than 24,300	Between 6,100 and 24,300	Less than 6,100

Table 17. Reliability rules for child estimates

	Broadly reliable (RMOE less than 50%, RSE less than 25%)	Use with caution (RMOE between 50% and 100%, RSE between 25% and 50%)	Not reliable for general use (RMOE greater than 100%, RSE greater than 50%)
NSW	Greater than 49,800	Between 12,400 and 49,800	Less than 12,400
Vic	Greater than 34,300	Between 8,600 and 34,300	Less than 8,600
Qld	Greater than 45,200	Between 11,300 and 45,200	Less than 11,300
SA	Greater than 33,700	Between 8,400 and 33,700	Less than 8,400
WA	Greater than 42,400	Between 10,600 and 42,400	Less than 10,600
Tas	Greater than 51,200	Between 12,800 and 51,200	Less than 12,800
NT	Greater than 38,200	Between 9,500 and 38,200	Less than 9,500
ACT	Greater than 20,300	Between 5,100 and 20,300	Less than 5,100
Australia	Greater than 42,500	Between 10,600 and 42,500	Less than 10,600

5.4 Margins of error of proportions

The above margin of error tables enable the margins of error to be calculated for estimates of total (e.g. 200,000 adults play golf). These tables may also be used to calculate the margins of error of estimates of proportions (e.g. 18% of adults play golf). To calculate the margins of error of survey proportions the steps needed to be taken are shown by means of an (imaginary) example.

Consider an example in which 10% of adults in a particular category in NSW play golf:

1. Step 1 – determine the numerator and denominator values which give rise to the estimate of proportion. For example, if there are an estimated 200,000 NSW adults in the category of interest and of those 20,000 (10%) play golf.

2. Use the adult tables for relative margin of error to determine the relative margins of error of the numerator and denominator totals. From table 13 above it can be seen that the relative margin of error of the numerator (20,000) is 59.0% and for the denominator (200,000) is 18.4%

3. The relative margin of error of the proportion (10%) is then calculated by squaring the two relative margin of error values (18.4%^2= 0.0339 and 59.0^2 =0.3481) and subtracting the value for the denominator (0.0339) from that of the numerator (0.3481) to get 0.3142 (0.3481-0.0339).

4. Finally the relative margin of error of the proportion is the square root of the final figure obtained (0.3142) which is 0.561 or 56.1%. This figure is the relative margin of error of the estimate of 10%. The margin of error of the estimate of 10% is then 56.1%/10% = 5.6% (since the margin of error is the relative margin of error divided by the estimate).

5. From the above we can then conclude that the 95% confidence interval for the estimate of 10% is 10% +/- 5.6% = (4.4% -15.6%).

5.5 The need to update published measures of sample error

The adult sample size for 2017/18 was 1000 greater than for 2016/17 which has led to some small changes in the measures of sample error relative to 2016/17. It is thus recommended that the published measures of sample error for adult estimates and child estimates be updated.