AusPlay: Second Methodology Report

Covering the data collection period July 1, 2016 to June 30, 2017

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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 second 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, 2016 to June 30, 2017.

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 annual sample size for the AusPlay survey is 20,000 adults (aged 15 years and over) spread equally across the year, with 5,000 adult interviews being conducted each quarter. In the four quarters covered in this report the adult sample size achieved was 20,013 and the child sample size achieved was 3,412.

2.3 Stratification

The AusPlay sample is stratified in 13 geographic 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 (GCCSA) 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
Northern Territory
Australian Capital Territory

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 34%[1] of the population.

2.5 Landline and mobile sample 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*.

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.

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

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)	1,700
Western Australia (WA)	2,500
Tasmania (Tas)	1,200
Northern Territory (NT)	600
Australian Capital Territory (ACT)	1,000
Total	**20,000**

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 Sampling 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, 2016 to June 30, 2017. In this period a total of 20,013 interviews were conducted amongst adults aged 15 years and over. Of these respondents 3,412 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 with the exception of public holidays.

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 2016 - June 2017

State	Adult sample	Child sample
NSW	5,158	864
Vic	4,690	870
Qld	3,628	668
SA	1,558	211
WA	2,458	400
Tas	1,114	144
NT	540	109
ACT	867	146
Total	**20,013**	**3,412**

3.2 Response rates

The response rates for the landline sample and the mobile sample are set out below. 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 2016 – June 2017

	No answer	*4,695*	
	Answering machine	*2,279*	
	Engaged	*242*	
	Other non-contact		
A	**Total Contact Not Made - Eligibility Unknown**		**7,216**
	Disconnected / Invalid number - phone not connected	*8,246*	
	Business number/paging service	*10,212*	
	Incoming call restriction (blocks)	*111*	
	Fax / 'Killed' # Public phone	*2,922*	
B	**Total Contact Not Made - Not Eligible**		**21,491**
1) Total contact not made (A+B)			**28,707**

	Call back or appointment scheduled	*473*	
	Total language barrier	*1,824*	
	Refused - non-specified	*22,375*	
	Refused- Eligibility Unknown	*376*	
C	**Total Contact Made - Eligibilty Unknown**		**25,048**
	Out of scope - Aged under 15		
	Out of scope - residency status	*15*	
	Refused - Age question	*12*	
	Refused - residency status		
	No usual residents	*49*	
	No-one of correct age	*20*	
D	**Total Contact Made - Not eligible (out-of-scope)**		**96**
E	**Contact made - Eligible (completed interviews)**		**10,007**
	Last birthday terminate at QRES1a or later	*178*	
	Not proceeding for other reason	*131*	
	Refused - Eligible	*52*	
	Refused or cannot idenitfy LB person		
	Refused- parent refused for 15-17yo	*7*	
	LB person refused		
	All usual residents away 2+ weeks/ not available	*106*	
	Call-backs made without success		
	Total incapable	*371*	
F	**Total Contact made - Eligible (non-complete)**		**845**
2) Total contact made (C+D+E+F)			**35,996**

Total finalised outcomes (1+2)		**64,703**
G	Eligibility rate *	99%
H	Expected eligible from unknown	31,981
J	**Total estimated Eligible**	**42,833**
RR	**Response Rate**	**23%**

Table 5. Response rates for the mobile sample July 2016 – June 2017

	No answer	*3,897*	
	Answering machine	*5,833*	
	Engaged	*272*	
	Other non-contact		
A	**Total Contact Not Made - Eligibility Unknown**		**10,002**
	Disconnected / Invalid number - phone not connected	*5,009*	
	Business number/paging service	*1,315*	
	Incoming call restriction (blocks)	*721*	
	Fax / 'Killed' # Public phone	*655*	
B	**Total Contact Not Made - Not Eligible**		**7,700**
1) Total contact not made (A+B)			**17,702**

	Call back or appointment scheduled	*1,067*	
	Total language barrier	*1,271*	
	Refused - non-specified	*14,246*	
	Refused- Eligibilty Unknown	*230*	
C	**Total Contact Made - Eligibilty Unknown**		**16,814**
	Out of scope - Aged under 15	*73*	
	Out of scope - residency status	*138*	
	Refused - Age question	*28*	
	Refused - residency status	*1*	
	No usual residents	*50*	
	No-one of correct age	*213*	
D	**Total Contact Made - Not eligible (out-of-scope)**		**503**
E	**Contact made - Eligible (completed interviews)**		**10,008**
	Respondent terminate at QRES1a or later	*18*	
	Not proceeding for other reason	*67*	
	Refused - Eligible	*68*	
	Refused or cannot idenitfy LB person		
	Refused- parent refused for 15-17yo	*13*	
	Call-backs made without success		
	Total incapable	*83*	
F	**Total Contact made - Eligible (non-complete)**		**249**
2) Total contact made (C+D+E+F)			**27,574**

Total finalised outcomes (1+2)		**45,276**
G	Eligibility rate *	95%
H	Expected eligible from unknown	25,562
J	**Total estimated Eligible**	**35,819**
RR	**Response Rate**	**28%**

* Excludes disconnected / paging numbers (B)

4 Weighting

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

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.

2. 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 table 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
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+

3. 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.

4. 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.

5. 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.

6. 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 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.

7. 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).

8. 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.

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. Finally the child weights were pro-rated to the relevant quarterly child (0-14) ABS ERP age x gender totals at the national level. These weights were the final weights for the child sample.

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 18,700. This means the 95% confidence interval for the survey result is 200,000 +/- 1.96 x 18,700 = 200,000 +/- 36,700 = (163,300 - 236,700).

Table 8. Standard errors for adult estimates

Standard errors									
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	1,200	1,300	1,000	1,100	900	1,300
2,000	1,900	1,700	1,800	1,600	1,800	1,400	1,500	1,300	1,800
5,000	3,000	2,800	2,800	2,600	2,800	2,200	2,400	2,100	2,800
10,000	4,200	3,900	4,000	3,600	4,000	3,100	3,400	2,900	4,000
20,000	5,900	5,500	5,600	5,100	5,600	4,400	4,900	4,100	5,600
50,000	9,300	8,700	8,900	8,100	8,900	6,900	7,700	6,600	8,900
100,000	13,200	12,300	12,600	11,500	12,600	9,800	10,900	9,300	12,500
200,000	18,700	17,400	17,800	16,300	17,800	13,900	-	13,100	17,700
500,000	29,500	27,500	28,100	25,700	28,200	-	-	-	28,000
800,000	37,300	34,800	35,600	32,600	35,600	-	-	-	35,400
1,000,000	41,700	38,900	39,800	36,400	39,800	-	-	-	39,600
1,500,000	51,100	47,700	48,700	-	48,800	-	-	-	48,500
2,000,000	59,000	55,100	56,300	-	56,300	-	-	-	56,000
5,000,000	93,300	-	-	-	-	-	-	-	88,600
8,000,000	-	-	-	-	-	-	-	-	112,000

Table 9. Relative standard errors of adult estimates

Relative standard errors									
Size of estimate	NSW (%)	Vic (%)	Qld (%)	SA (%)	WA (%)	Tas (%)	NT (%)	ACT (%)	Australia (%)
1,000	130.0%	120.0%	130.0%	120.0%	130.0%	100.0%	110.0%	90.0%	130.0%
2,000	95.0%	85.0%	90.0%	80.0%	90.0%	70.0%	75.0%	65.0%	90.0%
5,000	60.0%	56.0%	56.0%	52.0%	56.0%	44.0%	48.0%	42.0%	56.0%
10,000	42.0%	39.0%	40.0%	36.0%	40.0%	31.0%	34.0%	29.0%	40.0%
20,000	29.5%	27.5%	28.0%	25.5%	28.0%	22.0%	24.5%	20.5%	28.0%
50,000	18.6%	17.4%	17.8%	16.2%	17.8%	13.8%	15.4%	13.2%	17.8%
100,000	13.2%	12.3%	12.6%	11.5%	12.6%	9.8%	10.9%	9.3%	12.5%
200,000	9.4%	8.7%	8.9%	8.2%	8.9%	7.0%	-	6.6%	8.9%
500,000	5.9%	5.5%	5.6%	5.1%	5.6%	-	-	-	5.6%
800,000	4.7%	4.4%	4.5%	4.1%	4.5%	-	-	-	4.4%
1,000,000	4.2%	3.9%	4.0%	3.6%	4.0%	-	-	-	4.0%
1,500,000	3.4%	3.2%	3.2%	-	3.3%	-	-	-	3.2%
2,000,000	3.0%	2.8%	2.8%	-	2.8%	-	-	-	2.8%
5,000,000	1.9%	-	-	-	-	-	-	-	1.8%
8,000,000	-	-	-	-	-	-	-	-	1.4%

Table 10. Standard errors of child estimates

Standard errors									
Size of estimate	NSW (no.)	Vic (no.)	Qld (no.)	SA (no.)	WA (no.)	Tas (no.)	NT (no.)	ACT (no.)	Australia (no.)
1,000	1,700	1,400	1,700	1,500	1,700	1,600	800	1,100	1,600
2,000	2,400	2,000	2,500	2,100	2,400	2,200	1,200	1,600	2,300
5,000	3,800	3,200	3,900	3,400	3,700	3,500	1,900	2,500	3,600
10,000	5,400	4,500	5,500	4,800	5,300	5,000	2,600	3,500	5,100
20,000	7,700	6,400	7,800	6,700	7,400	7,000	3,700	4,900	7,300
50,000	12,200	10,200	12,300	10,700	11,800	11,100	-	7,800	11,500
100,000	17,200	14,400	17,400	15,100	16,600	-	-	-	16,200
200,000	24,300	20,300	24,600	21,300	23,500	-	-	-	22,900
500,000	38,500	32,200	39,000	-	37,200	-	-	-	36,300
800,000	48,700	40,700	49,300	-	-	-	-	-	45,900
1,000,000	54,400	45,500	55,100	-	-	-	-	-	51,300
1,500,000	-	-	-	-	-	-	-	-	62,800
2,000,000	-	-	-	-	-	-	-	-	72,500

Table 11. Relative standard error of child estimates

Relative standard errors									
Size of estimate	NSW (%)	Vic (%)	Qld (%)	SA (%)	WA (%)	Tas (%)	NT (%)	ACT (%)	Australia (%)
1,000	170.0%	140.0%	170.0%	150.0%	170.0%	160.0%	80.0%	110.0%	160.0%
2,000	120.0%	100.0%	125.0%	105.0%	120.0%	110.0%	60.0%	80.0%	115.0%
5,000	76.0%	64.0%	78.0%	68.0%	74.0%	70.0%	38.0%	50.0%	72.0%
10,000	54.0%	45.0%	55.0%	48.0%	53.0%	50.0%	26.0%	35.0%	51.0%
20,000	38.5%	32.0%	39.0%	33.5%	37.0%	35.0%	18.5%	24.5%	36.5%
50,000	24.4%	20.4%	24.6%	21.4%	23.6%	22.2%	-	15.6%	23.0%
100,000	17.2%	14.4%	17.4%	15.1%	16.6%	-	-	-	16.2%
200,000	12.2%	10.2%	12.3%	10.7%	11.8%	-	-	-	11.5%
500,000	7.7%	6.4%	7.8%	-	7.4%	-	-	-	7.3%
800,000	6.1%	5.1%	6.2%	-	-	-	-	-	5.7%
1,000,000	5.4%	4.6%	5.5%	-	-	-	-	-	5.1%
1,500,000	-	-	-	-	-	-	-	-	4.2%
2,000,000	-	-	-	-	-	-	-	-	3.6%

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 36,700. This means the 95% confidence interval for the survey result is 200,000 +/- 36,700 = (163,300 – 236,700). 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	2,400	2,500	2,000	2,200	1,800	2,500
2,000	3,700	3,300	3,500	3,100	3,500	2,700	2,900	2,500	3,500
5,000	5,900	5,500	5,500	5,100	5,500	4,300	4,700	4,100	5,500
10,000	8,200	7,600	7,800	7,100	7,800	6,100	6,700	5,700	7,800
20,000	11,600	10,800	11,000	10,000	11,000	8,600	9,600	8,000	11,000
50,000	18,200	17,100	17,400	15,900	17,400	13,500	15,100	12,900	17,400
100,000	25,900	24,100	24,700	22,500	24,700	19,200	21,400	18,200	24,500
200,000	36,700	34,100	34,900	31,900	34,900	27,200	-	25,700	34,700
500,000	57,800	53,900	55,100	50,400	55,300	-	-	-	54,900
800,000	73,100	68,200	69,800	63,900	69,800	-	-	-	69,400
1,000,000	81,700	76,200	78,000	71,300	78,000	-	-	-	77,600
1,500,000	100,200	93,500	95,500	-	95,600	-	-	-	95,100
2,000,000	115,600	108,000	110,300	-	110,300	-	-	-	109,800
5,000,000	182,900	-	-	-	-	-	-	-	173,700
8,000,000	-	-	-	-	-	-	-	-	219,500

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%	240.0%	250.0%	200.0%	220.0%	180.0%	250.0%
2,000	185.0%	165.0%	175.0%	155.0%	175.0%	135.0%	145.0%	125.0%	175.0%
5,000	118.0%	110.0%	110.0%	102.0%	110.0%	86.0%	94.0%	82.0%	110.0%
10,000	82.0%	76.0%	78.0%	71.0%	78.0%	61.0%	67.0%	57.0%	78.0%
20,000	58.0%	54.0%	55.0%	50.0%	55.0%	43.0%	48.0%	40.0%	55.0%
50,000	36.4%	34.2%	34.8%	31.8%	34.8%	27.0%	30.2%	25.8%	34.8%
100,000	25.9%	24.1%	24.7%	22.5%	24.7%	19.2%	21.4%	18.2%	24.5%
200,000	18.4%	17.1%	17.5%	16.0%	17.5%	13.6%	-	12.9%	17.4%
500,000	11.6%	10.8%	11.0%	10.1%	11.1%	-	-	-	11.0%
800,000	9.1%	8.5%	8.7%	8.0%	8.7%	-	-	-	8.7%
1,000,000	8.2%	7.6%	7.8%	7.1%	7.8%	-	-	-	7.8%
1,500,000	6.7%	6.2%	6.4%	-	6.4%	-	-	-	6.3%
2,000,000	5.8%	5.4%	5.5%	-	5.5%	-	-	-	5.5%
5,000,000	3.7%	-	-	-	-	-	-	-	3.5%
8,000,000	-	-	-	-	-	-	-	-	2.7%

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	3,300	2,700	3,300	2,900	3,300	3,100	1,600	2,200	3,100
2,000	4,700	3,900	4,900	4,100	4,700	4,300	2,400	3,100	4,500
5,000	7,400	6,300	7,600	6,700	7,300	6,900	3,700	4,900	7,100
10,000	10,600	8,800	10,800	9,400	10,400	9,800	5,100	6,900	10,000
20,000	15,100	12,500	15,300	13,100	14,500	13,700	7,300	9,600	14,300
50,000	23,900	20,000	24,100	21,000	23,100	21,800	-	15,300	22,500
100,000	33,700	28,200	34,100	29,600	32,500	-	-	-	31,800
200,000	47,600	39,800	48,200	41,700	46,100	-	-	-	44,900
500,000	75,500	63,100	76,400	-	72,900	-	-	-	71,100
800,000	95,500	79,800	96,600	-	-	-	-	-	90,000
1,000,000	106,600	89,200	108,000	-	-	-	-	-	100,500
1,500,000	-	-	-	-	-	-	-	-	123,100
2,000,000	-	-	-	-	-	-	-	-	142,100

Table 15. Relative margins of error for child estimates

Size of estimate	NSW (%)	Vic (%)	Qld (%)	SA (%)	WA (%)	Tas (%)	NT (%)	ACT (%)	Australia (%)
1,000	330.0%	270.0%	330.0%	290.0%	330.0%	310.0%	160.0%	220.0%	310.0%
2,000	235.0%	195.0%	245.0%	205.0%	235.0%	215.0%	120.0%	155.0%	225.0%
5,000	148.0%	126.0%	152.0%	134.0%	146.0%	138.0%	74.0%	98.0%	142.0%
10,000	106.0%	88.0%	108.0%	94.0%	104.0%	98.0%	51.0%	69.0%	100.0%
20,000	75.5%	62.5%	76.5%	65.5%	72.5%	68.5%	36.5%	48.0%	71.5%
50,000	47.8%	40.0%	48.2%	42.0%	46.2%	43.6%	-	30.6%	45.0%
100,000	33.7%	28.2%	34.1%	29.6%	32.5%	-	-	-	31.8%
200,000	23.8%	19.9%	24.1%	20.9%	23.1%	-	-	-	22.5%
500,000	15.1%	12.6%	15.3%	-	14.6%	-	-	-	14.2%
800,000	11.9%	10.0%	12.1%	-	-	-	-	-	11.3%
1,000,000	10.7%	8.9%	10.8%	-	-	-	-	-	10.1%
1,500,000	-	-	-	-	-	-	-	-	8.2%
2,000,000	-	-	-	-	-	-	-	-	7.1%

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

A literal translation of this rule, given the result that 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; and
- 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 24,300 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%)	**Unreliable for general use** (RMOE greater than 100%, RSE greater than 50%)
NSW	Greater than 26,800	Between 6,700 and 26,800	Less than 6,700
Vic	Greater than 23,300	Between 5,800 and 23,300	Less than 5,800
Qld	Greater than 24,300	Between 6,100 and 24,300	Less than 6,100
SA	Greater than 20,400	Between 5,100 and 20,400	Less than 5,100
WA	Greater than 24,400	Between 6,100 and 24,400	Less than 6,100
Tas	Greater than 14,700	Between 3,700 and 14,700	Less than 3,700
NT	Greater than 18,200	Between 4,500 and 18,200	Less than 4,500
ACT	Greater than 13,200	Between 3,300 and 13,200	Less than 3,300
Australia	Greater than 24,100	Between 6,000 and 24,100	Less than 6,000

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 45,500	Between 11,400 and 45,500	Less than 11,400
Vic	Greater than 31,800	Between 7,900 and 31,800	Less than 7,900
Qld	Greater than 46,700	Between 11,700 and 46,700	Less than 11,700
SA	Greater than 35,000	Between 8,700 and 35,000	Less than 8,700
WA	Greater than 42,600	Between 10,600 and 42,600	Less than 10,600
Tas	Greater than 38,100	Between 9,500 and 38,100	Less than 9,500
NT	Greater than 10,700	Between 2,700 and 10,700	Less than 2,700
ACT	Greater than 18,500	Between 4,600 and 18,500	Less than 4,600
Australia	Greater than 40,400	Between 10,100 and 40,400	Less than 10,100

5.3 Margins of error of proportions

The above margin of error tables enable the margins of error to be calculated for estimates of total (eg 200,000 adults play golf). These tables may also be used to calculate the margins of error of estimates of proportions (eg 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 58.0% 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= 0.0337 and 58.0^2 =0.3364) and subtracting the value for the denominator (0.0337) from that of the numerator (0.3364) to get 0.3027 (0.3364-0.0337).

4. Finally the relative margin of error of the proportion is the square root of the final figure obtained (0.3027) which is 0.550 or 55.0%. This figure is the relative margin of error of the estimate of 10%. The margin of error of the estimate of 10% is then 55.0%/10% = 5.5% (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% +/- 5.5% = (4.5% -15.5%).

5.4 The need to update published measures of sample error

The measures of sample error for adult estimates for the period July 1, 2016 to June 30, 2017 are broadly the same as those set out in the previous methodological report for the period, October 15, 2015 to September 30, 2016. This would be expected given the same sample sizes were achieved for the survey strata on those two occasions. Based on this there is no need to update published measures of sample error for adult estimates.

There has been a slight increase in the sample error of child estimates due to a slight decrease in the child sample size and an accompanying increase in the variability of the child weights. Based on this it is recommended that consideration be given to updating the published estimates of sample error for child estimates.