LONERGAN.

Creative Australia

Methodology Report and Data

Prepared for: Creative Australia

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BESTPRACTICE CERTIFICATION AMSRO ISO20252 MARKET, OPINION & SOCIAL RESEARCH

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Contents

1 Statistical Analysis

1.1 Overview

Following completion of the NAPS survey, Lonergan undertook a series of statistical procedures to develop a suite of **statistical tools** that could be used by Council to better understand engagement with the arts across its national sample. Each tool was created from combining the data from a number of questions / variables.

The tools created were:

1. **A Consumer Segmentation** reflecting how Australians cluster together on a range of attitudinal and behavioural measures (initially created in 2019 and replicated for 2022).
2. **Consumer Personas**, developed to create more 'personality' within the population segments. Each segment was refined to personas based on age, gender, life stage, education and cultural background and looking at ways in which their engagement profiles were similar. (Created in 2022).
3. **Tableau dashboards**, an interactive tool for the arts sector to engage with the results of the NAPS survey. Provides new insights and opportunities to understand Australians' engagement with and attitudes towards the arts (initially created in 2019 and further enhanced in 2022).
4. **A Behavioural Index** an engagement index based on frequency of attendance, reading, listening to, experiencing and creation across art forms (initially created in 2019 and replicated for 2022).
5. **An Attitudinal Index** reflecting a range of attitudes and beliefs about the value of the arts (initially created in 2019 and replicated for 2022).

The creation of these tools was relatively complex. The methodology used has been outlined in this document to ensure the process is captured accurately and that the tools can be replicated over time and for subsequent NAPS data sets.

1.2 Consumer Segmentation

Segmentation is a classification method which uses a cluster analysis to arrange sets of individuals into groups. The aim is to establish a set of segments such that individuals within a given group are more similar to each other than they are to individuals in other groups (or to maximise homogeneity within a group). The degree of association is strong between members of the same group and weak between members of different groups. A multivariate consumer segmentation was used to allow for a range of different types of variables to be used and fed into the segmentation model.

In 2022, the objective of the consumer segmentation was to replicate the same segments used in 2019 so they can be tracked longitudinally. Therefore, the process involved creating a statistical model that predicted segments based on the 2019 segmentation. Below outlines the steps for 2022 segmentation.

Step 1: Build a predictive model (multinomial logit) by selecting 2019 segment as the outcome variable.

Step 2: Enter all the relevant predictor variables used to build the 2019 segmentation (6 attitudinal components, 3 components of the behavioural index and the 3 questions around willingness to attend (Q20), motivations (Q21) and barriers (Q22).

Step 3: Check the prediction accuracy. This step is an internal quality checking step to ensure that the model is accurately predicting segment for the known segment values (2019 data).

Step 4: The resulting model will predict the segment groups for 2022 data.

Please see the 2019 statistical tools report or the appendix below for further details on how the 2019 consumer segmentation was constructed.

Segment	2019	2022
Seg 1 – Little interest	20%	20%
Seg 2 – Have fun & content	16%	10%
Seg 3 – Have fun & want to attend more	12%	14%
Seg 4 – Love the arts & want to attend more	28%	36%
Seg 5 – Arts advocates, happy & content	25%	19%

1.3 Consumer Personas

Developed to create more 'personality' within the population segments. Each segment was refined to personas based on age, gender, life stage, education and cultural background and looking at ways in which their engagement profiles were similar. The consumer personas were developed using the same segmentation methodology as the initial segments.

While the consumer segmentation is longitudinally tracked based on the initial 2019 segmentation,

Step 1: Select Variables

Variables to include in the model were selected as a combination of relevant demographic, behavioural and attitudinal variables that would correlate with consumer segment.

Consumer segment
ARIA
D2. Age
D3. Gender
Q1. Attendance
Q20. Satisfaction with current attendance
Q21. Motivations
Q22. Barriers
Q25. Music
Q28. Reading
Q35. Creation
Q43. Community involvement
Q47. Digital engagement
Q48. Digital creation
Q52. Contribution to the arts

Q53. Attitudes to the arts
Z1. Work status
Z2. Household income
Z3. Education
Z4a. Household composition
Z4b. Parents
Z5. Disability
Z6. Aboriginal or Torres Strait Islander
Z7. Culturally or linguistically diverse

Step 2: Apply segment filter and weight

If not already done, create filters for each of the five consumer segments. Create five copies of the segmentation setup from step 1, each filtered on one of the consumer segments. This is to ensure that the personas created are contained within a segment with a 1 to 1 relationship. Also ensure that the weight is selected to be applied for the segmentation.

Step 3: Combine the variables into one consumer personas variable

Save the resulting persona variables and combine them into one categorical variable with all the final personas.

Consumer Persona	Proportion	Count
Persona 1	9%	760
Persona 2	11%	989
Persona 3	6%	544
Persona 4	4%	444
Persona 5	8%	658
Persona 6	7%	675
Persona 7	6%	568
Persona 8	13%	1,294
Persona 9	18%	1,634
Persona 10	9%	835
Persona 11	11%	995

1.4 Tableau Dashboards

An interactive tool was developed for the arts sector to engage with the results of the NAPS survey. It provides new insights and opportunities to understand Australians' engagement with and attitudes towards the arts.

Data source

The relevant survey questions and variables were selected in Q and exported into Excel. All the single response, demographic and customised variables were grouped into one sheet, while each multiple response question is grouped into its own sheet.

Data cleaning and preparation

All single response questions were exported from Q as their categorical variable name (e.g. Yes, No, etc.), while multiple response questions were exported from Q as their value (0 or 1).

While Q automatically detects and reads multiple response questions so that it is ready for analysis immediately, Tableau is not designed to read multiple response survey questions so easily. Therefore, additional data preparation is required to ensure the data format is correct. Each multiple response tab is unpivoted in Excel (other software such as Tableau Prep can be used). This is so that the data is stacked vertically rather than wide (separate column for each response). Note, the response ID must be included in each multiple response tab so that they can be cross tabulated with other variables.

Data > From Table/Range > Transform > *Select columns to pivot* > Unpivot Columns > Unpivot only selected columns > Home > Close & load

Once the Excel dataset is loaded into Tableau, each multiple response sheet should be joined to the main dataset (containing demographic and other single response variables) using the Response ID as the connecting variable.

Weighting data

Tableau does not currently allow weighting to be applied across an entire data source. Code needs to be amended for each numerical aggregate variable. The following code can be used to apply the weighting variable to common charts used in survey research.

Single response / bar chart (usually want to determine the percentage of the total)
Unweighted calculation: COUNT([Constructed ID]) / TOTAL(COUNT([Constructed ID]))
Weighted calculation: **SUM([Weight]) / TOTAL(SUM([Weight]))**

Multiple response question / bar chart (usually want to determine the percentage of people that selected an item). The total will almost always add up to more than 100%. Typically items that are checked with a 1 or 0.
Unweighted calculation: SUM([Value]) / COUNT([Constructed ID])
Weighted calculation: **SUM(IF [Value]=1 THEN [Weight] ELSE 0 END) / SUM([Weight])**

Likert scale / stacked bar chart
Unweighted calculation: SUM([Constructed ID]) / TOTAL(COUNT([Constructed ID]))
Weighted calculation: **SUM([Weight]) / TOTAL(SUM([Weight]))**

Dashboard development

The 3 dashboard deliverables are Consumer Segment, Behavioural Index and Attitudinal Index. The dashboards are interactive tools for the arts sector to engage with the results of the NAPS survey. They provide new insights and opportunities to understand Australians' engagement with and attitudes towards the arts. The core sections of the dashboards include:

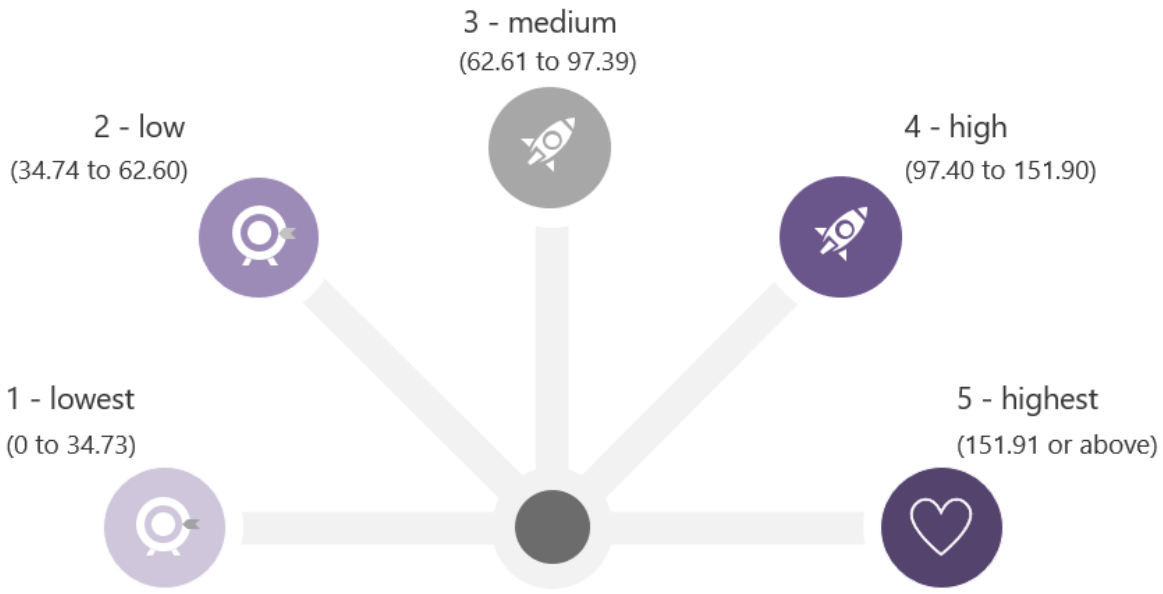
- Types of Engagement
- Motivations and barriers
- Value of the arts
- Attitudes to digital arts
- Digital arts engagement
- Demographics
- COVID arts engagement
- Indexes

Sharing with the Arts Council

The Tableau dashboards are shared to the Arts Council by publishing the dashboards to Tableau Public and sharing the code to embed on the Council website.

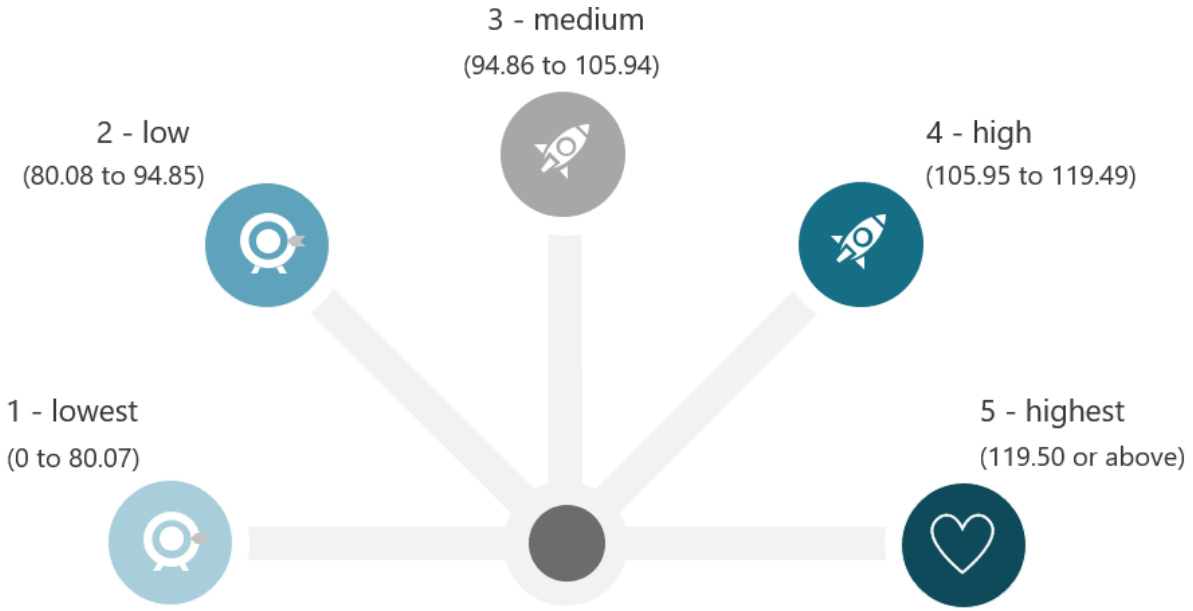
1.5 Behavioural Index

The Behavioural Index was created in 2019 and replicated for 2022. Please see the statistical tools report from 2019 or the Appendix for further details on how the Behavioural Index was constructed.



1.6 Attitudinal Index

The Attitudinal Index was created in 2019 and replicated for 2022. Please see the statistical tools report from 2019 or the Appendix for further details on how the Attitudinal Index was constructed.



1.7 Comparing the two indexes

Although both indexes have a mean score of roughly 100, they will move in quite different ways. The Behavioural Index is highly right skewed, whereas the Attitudinal Index has a normal distribution.

Figure 3. Skewed distribution of Behavioural Index 2022

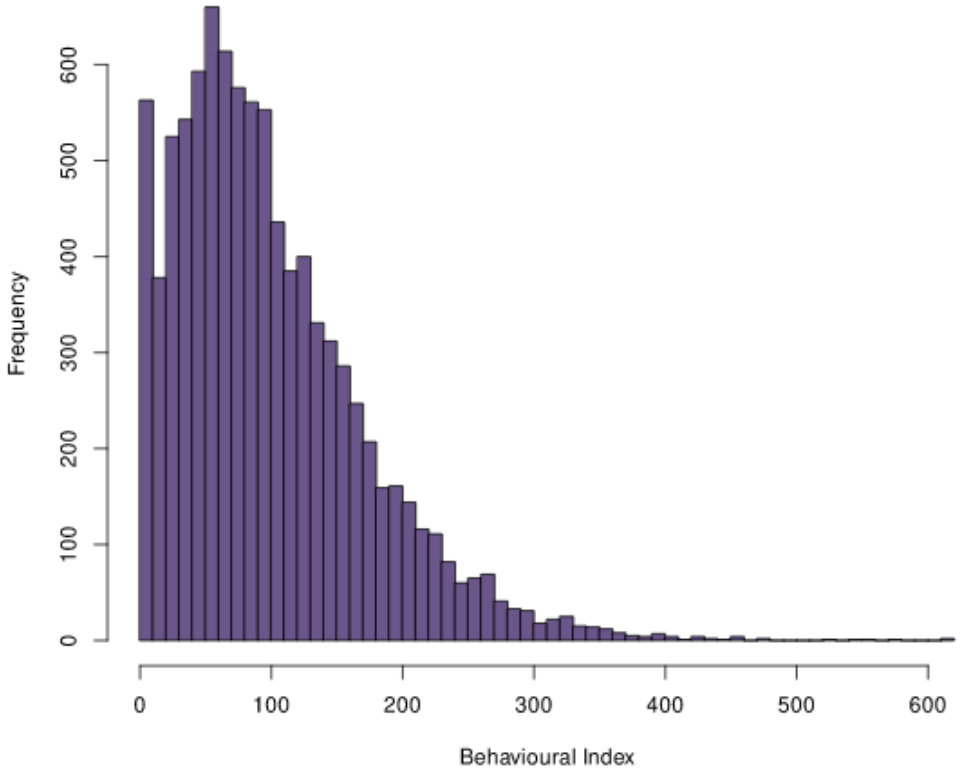
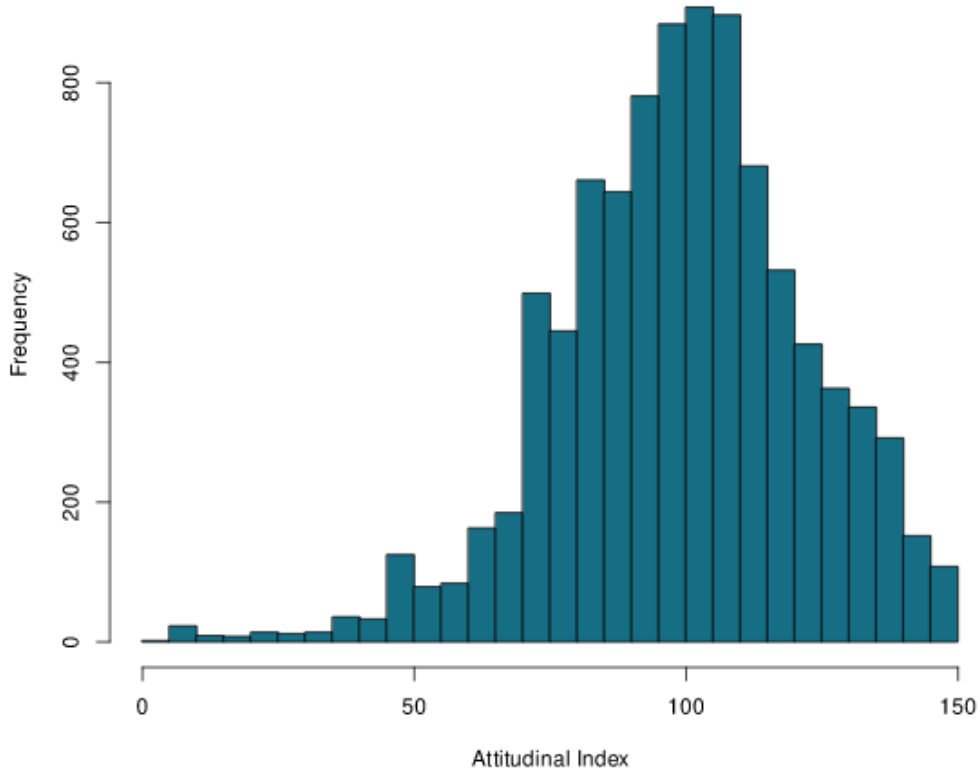


Figure 4. Normal distribution of Attitudinal Index 2022



Furthermore, the spread on the attitudinal index is far greater, implying we will see far more variation in the behavioural than the attitudinal index. In other words, a movement of 5 points in the Behavioural Index is not the same as a movement of 5 points in the attitudinal index.

Table 20. Comparison of the Behavioural Index and the Attitudinal Index

	Behavioural Index	Attitudinal Index
Mean	95.8	98.5
Median	80	100
Standard deviation	72.5	22.8
First quintile	0 – 34.73	0 – 80.07
Second quartile	34.74 – 62.60	80.08 – 94.85
Third quartile	62.61 – 97.39	94.86 – 105.94
Fourth quartile	97.40 – 151.90	105.95 – 119.49
Fifth quintile	≥ 151.91	≥ 119.50

Table 21. Comparison of the Behavioural and Attitudinal Indexes by demographic groups

	Demographic group	Behavioural Index	Attitudinal Index
Average		95.8	98.5
Age	15-17	136.3	99.2
	18-24	134.5	100.8
	25-34	120.6	101.9
	35-54	98.0	99.7
	55-64	74.3	96.9
	65+	58.8	93.5
Gender	Men	94.0	94.4
	Women	97.1	102.4
Parents	Parents of children under 16	111.6	101.3
	Not parents of children under 16	90.8	97.8
Education	Below year 12 / Never been to school	80.0	94.0
	Year 12	95.0	97.0
	TAFE/technical college	86.7	97.4
	University	106.9	101.7
	Post-graduate	115.1	102.2
Location	Major city	98.2	98.8
	Regional	88.4	97.1
	Remote	93.5	107.3
CALD	Yes	127.6	104.2

	No	88.3	97.8
Disability	Yes	103.7	98.8
	No	93.8	98.8
First Nations	Yes	130.1	107.8
	No	94.1	98.7

1.8 Custom Variables

Arts engagement

(OR FUNCTION FOR ALL VARIABLES)

Variable	2022	2019
Total Engagement	Q1 – Attend events in person Q10 – Attend festivals Q12 – First Nations festivals Q17 – Attend own cultural events Q25 – Listen / watch recorded music Q28 – Read books Q31 – First Nations arts events Q35 – Creation Q42 – Own cultural background creation Q43 – Community activities Q44 - CACD Q45 – Used internet to engage (added codes) Q47 – Engage Digital platforms (diff codes) Q48 – Creation on Digital platforms (diff codes)	Q1 – Attend events in person Q9 – Attend festivals Q10 – First Nations festivals Q12 – Attend own cultural events Q18 – Listen / watch recorded music Q20 – Read books Q22 – First Nations arts events Q26 – Creation Q32 – Own cultural background creation Q33 – Community activities Q34 - CACD Q35 – Used internet to engage Q36 – Engage Digital platforms Q37 – Creation on Digital platforms

Variable	2022	2019	2016
Listen to recorded music	Q25	Q18	B2.4X.1
Read books	Q28	Q20	B1.1 B2.5
Involvement with CACD	Q44	Q34	B3.1
Engage with the arts of their cultural background	Q17 Q42	Q12 Q32	B3.2

Online engagement	Q25_3 Q25_4 Q45 Q47 Q48	Q18_3 Q18_4 Q35 Q36	B1 B2.4X.1 F1
Creative Participation	Q35 Q43 Q44	Q26 Q33 Q34	B1 B3.1

Attend live

Variable	2022	2019	2016
ATTEND LIVE	All below Q1 Q10 Q12 Q17 Q31	All below Q1 Q9 Q10 Q12 Q22	All below
Attend Festivals	Q10	Q9	B3
Attend Music	Q1_5 Q10_1 Q17_5 Q31_5	Q1_5 Q9_1 Q12_5 Q22_5	B1 B3_1 B4.2_5
Attend Literary events	Q1_4 Q17_4 Q31_2	Q1_4 Q12_4 Q22_2	B1 B2.5X B4.2_2
Attend Dance	Q1_3 Q10_4* Q17_3 Q31_3	Q1_3 Q9_4* Q12_3 Q22_3	
Attend Theatre	Q1_2 Q10_4* Q17_2 Q31_4	Q1_2 Q9_4* Q12_2 Q22_4	
Attend Visual arts and crafts	Q1_1	Q1_1	B1

	Q10_2 Q17_1 Q31_1	Q9_2 Q12_1 Q22_1	B3_2 B4.2_1
Attend First Nations arts	Q12 Q31	Q10 Q22	B3_5 B4.2

*We will split out Theatre and Dance, Q10_4 will need to be counted in both categories

Creation

Variable	2022	2019
Create Music	Q35_5 Q42_5	Q26_5 Q32_5
Create Writing	Q35_4 Q42_4	Q26_4 Q32_4
Create Dance	Q35_3 Q42_3	Q26_3 Q32_3
Create Theatre	Q35_2 Q42_2	Q26_2 Q32_2
Create Visual arts and crafts	Q35_1 Q42_1	Q26_1 Q32_1

1.9 Motivations & Barriers

In the 2022 NAPS wave, the motivations and barriers questions were asked to all respondents. However, in the 2019 NAPS wave, motivations and barriers questions were asked to a subset of respondents based on their answers to "Q20. Regardless of whether you have or haven't attended these kinds of creative, cultural, and artistic events in the past 12 months, which of these statements best applies to you?"

In 2019, motivations were asked of those respondents who were happy with how often they attend arts events or would like to attend more arts events. Barriers were asked of those respondents who are not interested in attending arts events or would like to attend more arts events.

	2019		2022	
	Motivations	Barriers	Motivations	Barriers
I am happy with how often I attend arts events	✓		✓	x
I would like to attend more arts events	✓	x	✓	x
I am not interested in attending arts events		x	✓	x

The base sample is different across 2019 and 2022 for motivations and barriers, and therefore direct comparison requires an additional filter. As a result, there are two sets of figures to be aware of for both motivations and barriers, one of which was used in the main report and another with a filter used for direct comparison.

	Main Report		Used for Direct Comparison	
	2022 Total population vs 2019 Rebased		2019 vs 2022 - Only those 'Happy' or 'Want More'	
Motivations	**2022**	**2019**	**2022**	**2019**
To understand other perspectives and cultures	36%	33%	42%	40%
To socialise and connect with others	46%	41%	53%	50%
To improve my wellbeing	32%	25%	38%	30%
To express myself	14%	15%	17%	18%
To develop skills for education, training or work	12%	13%	14%	15%
To have fun/to be entertained	69%	63%	78%	76%
None of these	13%	2%	2%	3%
I am not interested in attending		17%		
NET	100%	83%	100%	100%

	Main Report		Used for Direct Comparison	
	2022 Total population vs 2019 Rebased		2019 vs 2022 - Only those 'Want more' or 'Not interested'	
Barriers	**2022**	**2019**	**2022**	**2019**
Cost of tickets/entry	55%	34%	57%	57%
Hard to find the time	26%	16%	26%	27%
Lack of personal interest	31%	16%	31%	27%
Friends/family not interested	25%	14%	25%	24%
Health (physical or mental)	16%	9%	17%	15%
Difficulty getting there (e.g. poor public transpo	28%	19%	29%	32%
Lack of awareness/information (e.g. when/whe	27%	17%	28%	29%
Too far away/not near where I live	40%	25%	40%	43%
Safety concerns	20%	6%	20%	9%
Event information isn't provided in my languag	4%	1%	3%	2%
None of these .	7%	3%	7%	5%
I am happy with how often I attend		41%		
NET	100%	59%	100%	100%

Appendices

Appendix 1 - Consumer Segmentation (2019)

Step 1: Select variables

The segmentation analysis aimed to segment the NAPS 2019 data set of Australians, based on the following questions and custom variables:

1. Gender (D3)
2. Age (D2)
3. Education background (Z3)
4. Culturally and linguistically diverse background / First Nations heritage (Z6 & Z7)
5. Willingness to attend more arts events/activities (Q20)
6. Motivations / reason to attend arts events (Q21)
7. Reasons to not attend arts (Q22)

Custom variables:

8. Behavioural Index (how often people engage with the arts) or Active engagement, Passive engagement, and Creative engagement
9. Attitudinal Index

Attitudinal Index (strength of values/support of the arts) or 6 attitude components

10. PCA Motivations 2 components (replace Q21)
11. PCA Barriers 4 components (replace Q22)

Step 2: Trial model examples

All the variables were used in the various iterations and segmentation models that were created. However, some variables proved to be unproductive (worked against the model) and were removed from the final modelling to make the optimal solution. A two – step cluster analysis was applied.

Ten models were trailed, and the most favourable and explainable model selected to be used (see below).

Step 3: Cull / reduce variables

Regardless of modelling, it was difficult find solutions that differentiated the demographic variables, and these variables emerged as of very low importance in the final modelling. As a result, the following were dropped from the final model:

Removed:

- Gender (D3)
- Age (D2)
- Education background (Z3)
- Culturally and linguistically diverse background / First Nations heritage (Z6 & Z7)

Age did have some relevance – however it was not a discrete enough measure to be useful (e.g. age range used might need to be grouped into younger 15-44 and older 45+).

Step 4: Maximise model score and relevance of segmentation

This segmentation analysis is an iterative process which altogether resulted to having 10 variations to find the best model to use as the 2019 segments.

Model selected:
The final model selected used the 6 attitudinal components, willingness to attend more activities (Q20), motivations (Q21), barriers (Q22), as well as the 3 components of the Behavioural Index (i.e. active, passive, and creative engagement).

This model gave a similar output to Model 3 and 5, but model 7 is driven more by attitude components. 5 segments were found using this model with a decent range from 12.7% (n=1130) of the population to 28.1% (n=2508).

This was the optimal solution to use as NAPS segments. The reason for this is not only because the sample sizes are good allocated to each segment, but also the model was driven by attitudinal statements and not demographics. The basis of these segments was to find any attitudinal or behavioural components driving the clusters. It also indicated more details of attitude and behaviours than other models. Also, the other models depended a lot on the demographics, and not necessarily on the important variables.

The summary of the model is present below:

Table 38. Model summary

	Seg 1 (20%, n=1765)	Seg 2 (16%, n=1396)	Seg 3 (12%, n=1130)	Seg 4 (28%, n=2508)	Seg 5 (25%, n=2129)
Behavioural Component 1 – Active engagement index	2.84	12.40	8.36	16.59	33.16
Attitude Component 5 - Value to society and funding	6.29	9.09	9.50	12.23	11.91
Attitude Component 6 - Diversity and Meaning	5.40	9.93	10.59	14.34	13.85
Q20	I am not interested in attending these kind of events / festivals (88%)	I am happy with how often I attend these kind of events / festivals (99%)	Ideally, I would like to attend more of these kind of events / festivals	Ideally, I would like to attend more of these kind of events / festivals	am happy with how often I attend these kind of events / festivals (97%)
No motivation to engage	Yes	No	No	No	No
Motivation Component 1 – higher needs / for achieve life goals	No	No	No (99%)	Yes	Yes
Motivation Component 2 – for fun and socialise	No	Yes	Yes	Yes (85%)	Yes (76%)
No barriers to engage	No (79%)	Yes	No	No	Yes
Barrier Component 1 – not easy to access / budget limit	No (52%)	No	Yes (83%)	Yes (85%)	No
Barrier Component 2 – Lack of time / awareness	No (77%)	No	No (51%)	Yes (60%)	No
Barrier Component 4 - No interest	Yes (58%)	No	No (69%)	No (63%)	No
Attitude Component 3 - Creative thinking and expression	9.89	12.10	12.92	14.72	13.94

Attitude Component 2 - Wellbeing	5.15	6.22	6.49	7.50	7.20
Attitude Component 4 - Education and skills	6.60	8.27	8.81	10.40	9.95
Behavioural Component 2 – Passive engagement index	33.84	51.34	52.16	63.99	72.19
Behavioural Component 3 – Creative engagement index	8.04	16.37	17.55	33.77	46.79
Attitude component 1 - Arts are for me	-0.81	1.40	1.23	2.56	2.13
Barrier Component 3 - Lack of ability	No (80%)	No	No (83%)	No (73%)	No

Please note: the last two factors – attitude component 1 and barrier component 3 contribute little to the model.

Appendix 2 - Behavioural Index (2019)

Step 1. Question selection

To establish the Behavioural Index, a set of questions was selected for inclusion. The index was intended to be a measure of active, passive, and creative engagement activities (e.g. attending different types of events, listening to music, reading and creating art across a range for forms). The selected questions were Q1, Q2, Q26, Q29, Q35 and Q45 (code 01 only). Whilst other questions also recorded engagement, these questions were not mutually exclusive to those selected and were therefore excluded from the index.

There are three components which formed the Behavioural Index

Component 1 - Active engagement: This includes engagement when people actively take the initiative to pursue art events that require attendance at a place away from home. The active behaviour component includes the scores of each sub-question of Q2.

Component 2 - Passive engagement: This includes people engaging with the arts in their own home (or similar), such as reading a book or listening to music. This component includes each sub-question of Q26 and Q29.

Component 3 - Creative engagement. This type of engagement involves the participant actively creating art. This component includes each sub-question of Q35, and Q45_1.

Table 1. Questions usage for each component

Behavioural Components	Weighting	Questions
Component 1- Active engagement (attendance)	33.33%	Q1 - none of these (coded into Q2 as Never) Q2 - frequency of attendance ➢ Once a week or more often ➢ Every 2-3 weeks ➢ Once a month ➢ Every couple of months ➢ Three or four times a year ➢ Once or twice in the last year ➢ Never
Component 2 - Passive engagement (listening to music, reading)	33.33%	Q26 (frequency of music) Q29 (frequency of reading) ➢ Daily ➢ Every 2 - 3 days ➢ Once a week or more often ➢ Every 2-3 weeks ➢ Once a month ➢ Every couple of months ➢ Three or four times a year ➢ Once or twice in the last year ➢ Never
Component 3 - Creative engagement (creating)	33.33%	Q35 Creation across key art forms ➢ Checked Q45 Digital (Code 1) ➢ Checked

The decision to give each component equal weight was made after consultation but is arbitrary.

Step 2. Allocate a value to each code for each question

1) Allocate a score for each sub-question.

Each question within a component was given the same maximum score, as shown below. The total Behavioural Index score is 100, with a range from 0 to 100.

Table 2. Allocate a score for each sub-question

Question	Number of sub-questions / options	Score	Total Score
Q2	5	6.68	33.3
Q26	4	4.76	19.0
Q29	3	4.76	14.3
Q35	5	5.55	27.75
Q45_1	1	5.55	5.55
Total			100

2). Convert frequencies to times per year

On the basis of the respondent's answer / frequency, we have a calculation for average times per year for each category.

Table 3. Average times per year in Q2

Q2 Frequency	Avg. times per year
Never	0
Once or twice in the last year	1.5
Three or four times a year	3.5
Every couple of months	5.5
Once a month	12
Every 2-3 weeks	21.74
Once a week or more often	78.27

Table 4. Average times per year in Q19 & Q21

Q26 & Q29 Frequency	Avg. times per year
Never	0
Once or twice in the last year	1.5
Three or four times a year	3.5
Every couple of months	5.5
Once a month	12
Every 2-3 weeks	21.74
Once a week or more often	78.27
Every 2 - 3 days	152.19
Daily	365.25

3). Use a square root transformation on frequency counts

Due to the large numeric discrepancy between the lowest score and highest score, a square-root transformation was applied to reduce the mathematical impact of conducting one activity at a high frequency (e.g. selecting reading E-book 'daily', but no other activity would result in a higher passive component score than someone who participated in five different passive activities once a week). The impact of this is that the index favours **diversity** over **frequency of a single activity.** The modified scores by square root are presented below.

Table 5. Square root score of frequency Q2

Q2 Frequency	Avg. times per year – Score
Never	0.00
Once or twice in the last year	1.22
Three or four times a year	1.87
Every couple of months	2.35
Once a month	3.46
Every 2-3 weeks	4.66
Once a week or more often	8.85

Table 6. Square root of frequency for Q19 & Q21

Q26 & Q29 Frequency	Avg. times per year - Score
Never	0.00
Once or twice in the last year	1.22
Three or four times a year	1.87
Every couple of months	2.35
Once a month	3.46
Every 2-3 weeks	4.66
Once a week or more often	8.85
Every 2 - 3 days	12.34
Daily	19.11

4). *Calibrate and rebase score*
The scale then needed to be rebased and the scores made consistent with our allocation strategy at the beginning of Step 2 (table 2).

Table 7. Calculation of the score to the allocated weight in Q2

Q2 Frequency	Avg. times per year – Score
Never	0.00
Once or twice in the last year	0.92
Three or four times a year	1.41
Every couple of months	1.77
Once a month	2.62
Every 2-3 weeks	3.52
Once a week or more often	6.68

Table 8. Calculation of the score to the allocated weight in Q19 & Q21

Q26 & Q29 Frequency	Avg. times per year - Score
Never	0.00
Once or twice in the last year	0.30
Three or four times a year	0.47
Every couple of months	0.58
Once a month	0.86
Every 2-3 weeks	1.16
Once a week or more often	2.20
Every 2 - 3 days	3.07
Daily	4.76

Step 3. At a respondent level, sum the scores to create a raw component score

1. **Behavioural Component 1 - Active Engagement** = sum of the scores from Q2_1, Q2_2, Q2_3, Q2_4, and Q2_5. The Active Engagement Index ranges from 0 to 33.33.
2. **Behavioural Component 2 - Passive Engagement** = sum of the scores from Q26_1, Q26_2, Q26_3, Q26_4, Q29_1, Q29_2, and Q29_3. The Passive Engagement Index ranges from 0 to 33.33.

3. **Behavioural Component 3 - Creative engagement** = sum of the scores from Q35_1, Q35_2, Q35_3, Q35_4, Q35_5, and Q45_1. The Creative Engagement Index range is from 0 – 33.33
4. **Total Arts Behavioural Index** = sum of Active Engagement, Passive Engagement, and Creative Engagement. The total Arts Behavioural Index ranges from 0 – 100.

Step 4. Create a multiplier for total Behavioural Index

The average score for total behavioural and each component are presented in the table below:

Table 9. Average Behavioural Index scores

	Total Behavioural Index	Component 1 - Active Engagement Index	Component 2 - Passive Engagement Index	Component 3 - Creative Engagement Index
Average	16.18	2.63	9.16	4.39

The fact that the average is 16.18 is meaningless. To make the index easier to interpret, we altered this to make the mean 100.

Note the passive index average is higher than the other two components as these activities are conducted more often.

Calculate the multiplier by using the formula below:

Behavioural Multiplier = 100 / average Behavioural Index score

Table 10. Multiplier for total Behavioural Index

	Total Behavioural Index
Multiplier	6.18

Step 5. Calibrate to make the average index score to 100

Final behaviour scores for each respondent can be calculated using the formula below:

Final Behavioural Index Score = Raw Behavioural Index Score * Behaviour Multiplier

Although this next step is not mathematically necessary, we calibrated the data to make the 2020 (base year) have a value of 100 (rather than 16.18). We simply multiplied each score by (100/16.18). The range of the Behavioural Index after modification is 0 – 617.98.

Note: In the 2022 wave, the same multiplier was used so that the index score can be longitudinally tracked across multiple waves.

Step 6. Behavioural Index Quintiles

Respondents were divided into five equal groups (quintiles) based on their Behavioural Index score.

Table 11. Behavioural Index Quintiles

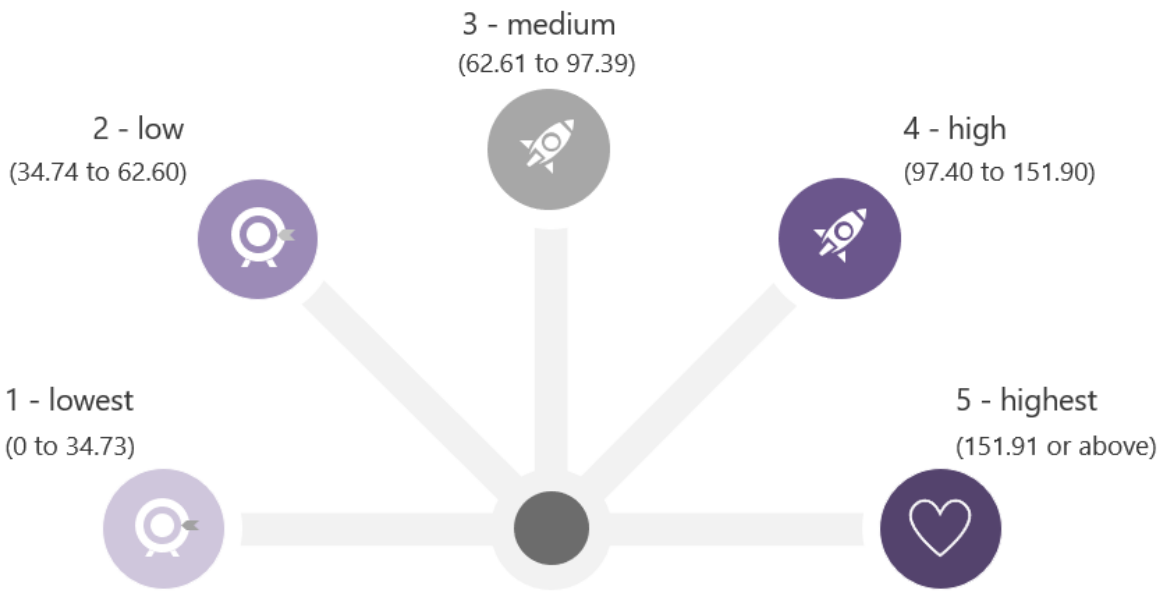
Category	Number of Cases in each Cluster	Score
1st	1803	0 – 34.73
2nd	1771	34.74 – 62.60
3rd	1787	62.61 – 97.39
4th	1781	97.40 – 151.90
5th	1786	>151.91

Note: In the 2022 wave, the same score boundaries are used so that the quintiles can be tracked across multiple waves.

Step 7. Visualise

The quintiles were named, and icons were created

Figure 1. Behavioural Index Quintiles



Appendix 3 - Attitudinal Index (2019)

Step 1. Question selection

Questions which recorded core attitudes to the arts were chosen for inclusion (Q53 and Q54. As Q53 was asked using a split run (using different language for expressing 'the arts', See NAPS 2019 Report), a merged variable was used.

Table 12. Attitudinal questions

Attitude concepts	Weighting	Questions
Attitudes to the Arts (Agree/Disagree)	50%	Q53
Impact statements about the Arts (Impact scale)	50%	Q54

Step 2. Allocate a value to each code for each question

1) Allocate a score for each sub-question

The maximum attitudinal index score is 100, with a range from -50 to 100.

Table 13. Allocate a score for each sub-question

Question	Number of sub-questions / options	Score range	Total Score
Q53	10	-5 to 5	-50 to 50
Q54	10	0 to 5	0 to 50

2). Allocate a score for each code in Q53 and Q54

On the basis of the respondent's answer, we allocated a score for each response code.

Table 14. Allocate a score for each response code in Q53 (except Q53_5)

Q53 (except Q53_5)	Scores
Strongly Agree	5
Agree	2.5
Neither agree nor disagree	0
Disagree	-2.5
Strongly Disagree	-5

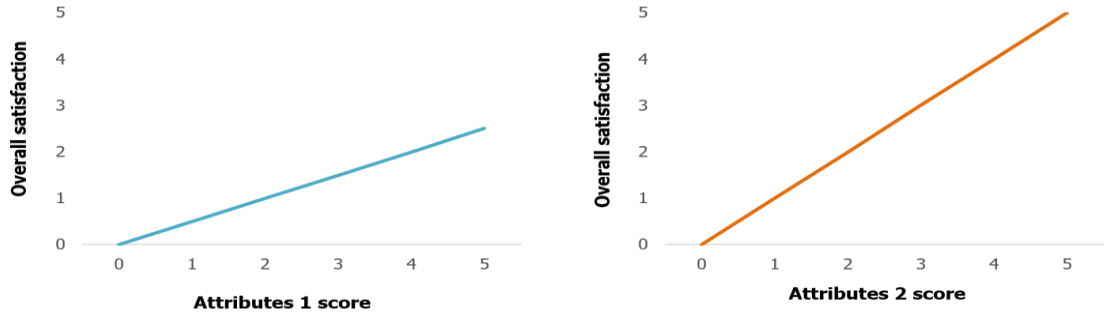
Appendix 4 - Drivers of engagement (2019)

Identifying drivers of overall satisfaction involved two processes:

1. Correlation analysis – measuring the strength of the relationship
   - Correlation is a measure of how changes in one variable (in this case the Behavioural Index) are reflected in a second variable. This is on a scale of -1 (perfect negative) to 1 (perfect positive relationship). It does not measure the size of the relationship nor is correlation a causation.
2. Regression analysis – measuring the size of the relationship
   - Each variable is then regressed individually (linear regression). The net result is a regression coefficient shown by the slope of the line of best fit (i.e. the value of 'm' in the equation 'y=mx+b'). This reflects the size of the relationship between arts behaviour and each independent variable.

In the diagram, both independent variables have a strong correlation with dependent variables, yet independent Variable 2 has twice as much impact on dependent variable as independent Variable 1.

Figure 5. Correlation and Regression



We therefore use correlation across all variables, and only where appropriate, supplement this with regression. Note that the regression scores are not always comparable across variables (e.g. Q53 is scored from -5 to 5 i.e. a 10 points range, whereas Q54 is scored from 0 to 5 – a 5 points range, therefore coefficients for Q53 will be twice as big as Q54).

Step 1. Identify variables of interest

Dependent variable: Total Behavioural Index

Independent variables are listed in table below:

Table 21. Independent variables

Attitudes	Demographics	Behaviour	Motivations	Barriers
Q53 Q54 Attitudes to arts	Age(D2) Work status (Z1) Income (Z2) Education (Z3) Parents status (Z4b)	Q52 Funding and giving back to the arts	Q21 Reasons people attend creative, cultural, and artistic events/festivals	Q22 Reasons people may not attend creative, cultural, and artistic events/festivals, or may not go as often as they would like to

Note: all the independent variables are coded to enable the data can be used for correlation and regression analysis.

Step 2. Outcomes – Attitudes

Each sub-question in Q53 is scored from strongly disagree -5 to strongly agree 5, and each sub – question in Q54 is scored from no impact at all 0 to a very big impact 5.

Table 22 presents the outcomes of descending by correlation.

Table 22. The correlation of attitudes with Behaviour Index

Attitude statements	Cor.
Q53_2 The arts allow me to connect with others	0.38
Q54_10 Building creative skills that will be necessary for the future workforce	0.32
Q54_3 Our ability to think creatively and develop new ideas	0.31
Q54_7 Helping us deal with stress, anxiety or depression	0.31
Q54_8 Our sense of wellbeing and happiness	0.31
Q54_2 Bringing customers to local businesses	0.30
Q53_9 The arts help you to understand perspectives different to your own	0.30
Q54_1 Shaping and expressing Australian identity	0.29
Q54_9 Stimulating our minds	0.29
Q53_3 There are plenty of opportunities for me to get involved in the arts	0.29
Q53_4 The arts make for a richer and more meaningful life	0.29
Q54_4 Our ability to express ourselves	0.29
Q54_5 Our understanding of other people and cultures	0.29
Q53_8 Artists make an important contribution to Australian society	0.28
Q53_6 The arts should receive public funding	0.28
Q53_1 The arts should be an important part of education	0.27
Q54_6 Child development	0.27
Q53_10 Artists should have freedom of expression	0.23
Q53_7 The arts in Australia reflect the diversity of cultures present in Australia	0.19
Q53_5 The arts are not really for people like me	0.06

Note: Q53 uses the merged data from both question wordings.

Agreement with the statement the 'arts allow me to connect with others' has the strongest relationship with the Behavioural Index, followed by 'building creative skills that will be necessary for the future workforce' and 'Our ability to think creatively and develop new ideas'. The top 7 attitudes (down to 'the arts help you to understand perspectives different to your own') have a correlation of over 0.3, which indicates a medium level of impact on Behavioural Index. Other attitudes in Q53 and Q54 have a weak relationship with the Behavioural Index, and the attitudes towards 'the arts are not really for people like me' does not have any discernible relationship with the Behaviour Index.

To find more variables with a medium or better relationship with the Behaviour Index, we applied principal component analysis to reduce and group relevant attitudes together. The new groups / components have been tested to explore stronger relationship.

Reduce attitudinal statements – Principal Component Analysis (PCA)

Table 23. PCA analysis of attitudes

Statement	Component 1	Component 2	Component 3
Q54_8. Our sense of wellbeing and happiness	0.78		
Q54_7. Helping us deal with stress, anxiety, or depression	0.78		
Q54_3. Our ability to think creatively and develop new ideas	0.77		
Q54_9. Stimulating our minds	0.76		
Q54_6. Child development	0.75		
Q54_4. Our ability to express ourselves	0.75		
Q54_10. Building creative skills that will be necessary for the future workforce	0.74		
Q54_5. Our understanding of other people and cultures	0.73		
Q54_1. Shaping and expressing Australian identity	0.73		
Q54_2. Bringing customers to local businesses	0.72		
Q53_8. Artists make an important contribution to Australian society		0.74	
Q53_4. The arts make for a richer and more meaningful life		0.73	
Q53_9. The arts help you to understand perspectives that are different to your own		0.73	
Q53_1. The arts should be an important part of education		0.71	
Q53_6. The arts should receive public funding		0.70	
Q53_2. The arts allow me to connect with others		0.66	
Q53_7. The arts in Australia reflect the diversity of cultures present in Australia		0.62	
Q53_10. Artists should have freedom of expression		0.61	
Q53_5. The arts are not really for people like me			0.71
Q53_3. There are plenty of opportunities for me to get involved in the arts			-0.64

PCA analysis indicates there are only 2 components in Q53 and only 1 component in Q54 - the variations are not spread very well. Instead, we generated 6 components in Q53 and Q54 manually, grouped the variables by relevant statements which made logical sense.

Table 24. Attitudes components

New attitudes Components
Component 1 – Arts are for me
Q53_3. There are plenty of opportunities for me to get involved in the arts
Q53_5. The arts are not really for people like me
Component 2 – Wellbeing
Q54_7. Helping us deal with stress, anxiety or depression
Q54_8. Our sense of wellbeing and happiness
Component 3 – Creative thinking and expression
Q54_4. Our ability to express ourselves
Q54_3. Our ability to think creatively and develop new ideas
Q53_10. Artists should have freedom of expression
Q54_9. Stimulating our minds
Component 4 – Education and skills
Q54_6. Child development
Q53_1. The arts should be an important part of education
Q54_10. Building creative skills that will be necessary for the future workforce
Component 5 – Value to society and funding
Q53_8. Artists make an important contribution to Australian society
Q53_6. The arts should receive public funding
Q54_2. Bringing customers to local businesses
Q54_1. Shaping and expressing Australian identity
Component 6 – Diversity and Meaning
Q53_9. The arts help you to understand perspectives that are different to your own
Q53_2. The arts allow me to connect with others
Q54_5. Our understanding of other people and cultures
Q53_4. The arts make for a richer and more meaningful life
Q53_7. The arts in Australia reflect the diversity of cultures present in Australia

Five of the six new components with Behavioural Index had a correlation above 0.3, as shown in the table below:

Table 25. Correlation of attitude components with Behaviour Index

Attitude components	Cor.
New_attitude_component_1. Arts are for me	0.37
New_attitude_component_2. Wellbeing	0.35
New_attitude_component_3. Creative thinking and expression	0.34
New_attitude_component_4. Education and skills	0.34
New_attitude_component_5. Value to society and funding	0.33
New_attitude_component_6. Diversity and Meaning	0.23

The last component - Diversity and meaning also had some impact on Behavioural Index, but the impact is relative lower than the previous five components. Attitudinal components correlations are better than single attitudinal factors.

Step 3. Outcomes – Demographics

Except for age, demographics do not correlate strongly with the Behavioural Index score. The correlation with age reflects an inverse medium level relationship. Therefore, as age increases the score on the Behavioural Index decreases.

Table 26. Code of age

Age	
Code 1	15 - 34 years old
Code 2	35 - 54 years old
Code 3	55 years old or above

Table 27. Code of education

Education	
Code 1	Lower education - below university
Code 2	Higher education - university and above

Table 28. Code of work status

Work status	
Code 1	Not working
Code 2	Workers

Table 29. Code of parent status

Parent with kids / under 16	
Code 1	No
Code 2	Yes

Table 30. Correlation of demographics with Behavioural Index

Demographics	Cor.
D2. Age	-0.33
Z3. Education background	0.18
Z1. Work status	0.17
Z4b. Parent with kids / under 16	0.16
Z2. Income	0.16

Q21 & Q22	
Code 1	Unchecked
Code 2	Checked

Step 4. Outcomes – Motivations & Barriers

Table 31. Code of motivations & barriers

Two motivations to attend arts events have medium level of impact on the Behavioural Index. These are – 'to develop skills for education, training or work' and 'to express myself'. When these are scored more highly, the Behavioural Index goes up. Two motivations – 'improve my wellbeing' and 'to understand other perspectives and cultures' indicate low level impact on Behavioural Index. In terms of barriers, there were no strong correlations found.

Table 32. Correlation and regression of motivations with Behavioural Index

Motivations to attend	Reg.	Cor.
Q21_5. To develop skills for education, training or work	12.35	0.33
Q21_4. To express myself	11.92	0.33
Q21_3. improve my wellbeing	6.65	0.23
Q21_1. To understand other perspectives and cultures	5.40	0.20
Q21_2. To socialise and connect with others	4.44	0.16
Q21_6. To have fun/to be entertained	-0.14	-0.04

Table 33. Correlation of barriers with Behaviour Index

Barriers	Cor.
Q22_3. Lack of personal interest	-0.14
Q22_5. Health (physical or mental)	0.05
Q22_4. Friends/family not interested	0.08
Q22_9. Safety concerns	0.08
Q22_2. Cost of tickets/entry	0.09
Q22_8. Too far away/not near where I live	0.10
Q22_6. Difficulty getting there (e.g. poor public transport)	0.11
Q22_10. Event information isn't provided in my language	0.15
Q22_1. Hard to find the time	0.18
Q22_7. Lack of awareness/information	0.20
Q22_3. Lack of personal interest	-0.14

Reduce motivations and barriers – Principal Component Analysis (PCA)

To seek stronger relationship between motivation/barriers and Behavioural Index, PCA analysis was applied to group relevant factors. Two motivational components and four barrier components were

generated by PCA, and the outcomes were very similar with single motivation and barrier factors. Only one of the motivation components finds a medium level relationship with Behavioural Index, and none of the barrier components had a medium or strong relationship with the Behavioural Index.

Table 34. PCA outcomes of motivation

Statement	Component 1	Component 2
Q21_5. To develop skills for education, training or work	0.66	
Q21_4. To express myself	0.65	
Q21_3. To improve my wellbeing	0.59	
Q21_1. To understand other perspectives and cultures	0.48	
Q21_6. To have fun/to be entertained		0.77
Q21_2. To socialise and connect with others		0.47

Table 35. Correlation and regression of motivation components with Behavioural Index

Motivation Components	Reg.	Cor.
Motivation Component 1 – Higher needs / achieve life goals	10.44	0.39
Motivation Component 2 – For fun and to socialise	6.79	0.23

Table 36. PCA outcomes of barriers

Statement	Component 1	Component 2	Component 3	Component 4
Q22_8. Too far away/not near where I live	0.69			
Q22_6. Difficulty getting there	0.68			
Q22_2. Cost of tickets/entry	0.63			
Q22_1. Hard to find the time		0.72		
Q22_7. Lack of awareness/information (e.g. when/where)		0.55		
Q22_5. Health (physical or mental)			0.62	
Q22_10. Event information isn't provided in my language			0.62	
Q22_9. Safety concerns			0.59	
Q22_3. Lack of personal interest				0.80
Q22_4. Friends/family not interested				0.45

Table 37. Correlation of barriers components with Behavioural Index

Barrier Components	Cor.
Barriers Component 2 – Lack of time / awareness	0.02
Barriers Component 3 – Lack of ability	0.00
Barriers Component 1 – Not easy to access / budget limit	-0.08
Barriers Component 4 – No interest	-0.13

Table 15. Allocate a score for each response code in Q53_5

Q53_5	Scores
Strongly Agree	-5

Agree	-2.5
Neither agree nor disagree	0
Disagree	2.5
Strongly Disagree	5

Please note Q53_5 was a negative statement.

Table 16. Allocate a score for each response code in Q54

Q54	Scores
A very big impact	5
A big impact	3.75
Some impact	2.5
Not much impact	1.25
No impact at all	0

Step 3. Generate an Attitudinal Index score for each respondent

At a respondent level, the Attitudinal Index = sum of the scores (Q53 and Q54). The index ranges from -50 to 100.

Please note: The attitudinal index scoring system gives a 10 units range (-5 to +5) for Q53 and a 5 units range for Q54 (0 to 5). Statistically, this gives double the weight to each statement in Q53 relative to Q54. This is known and deliberate, as we believe each element in Q53 is roughly twice as important as in Q54.

At a logical level, there is a lot more diversity in what is measured in Q53 and Q54. Q54 is strictly limited to the **impact** of the arts (across 10 areas), whereas Q53 has no such constraints. This is supported by our earlier PCA analysis outcomes – Q53 finds 2 components and Q54 only has one. Both the two components in Q53 contribute to the final attitudinal index, which implies it is appropriate to have double the weight for Q53. We examined the correlation between variables within each question set. Within Q53, we found an average absolute correlation of 0.43, compared with 0.63 for Q54. This implies there is a greater diversity of components in Q53 than Q54, hence it is appropriate to give Q53 a higher weight in the index.

Note that $0.62^2 \div 0.43^2 = 2.09$ therefore Q53 having twice the weight on the index than Q54 is appropriate.

In addition, Lonergan also made another attitudinal index, which has 10 units range (-5 to 5) in Q53 and 10 units range (0 - 10) in Q54. The result presents the two indexes are highly correlated, with the correlation coefficient being 0.992, which also indicates the high accuracy of the attitudinal index.

Step 4. Create a multiplier for total attitudinal index

The average score for total attitudinal index is presented in the table below:

Table 17. Average Attitudinal Index

	Total Attitudinal Index
Average	51.47

To make a benchmark of average attitudinal index, we shift all the attitudinal index score to 0 or positive numbers by plus 50, then the average attitudinal index is 101.47. A multiplier was calculated by this formula:

Attitudinal Multiplier = 100 / Shift Average Attitudinal Index

Table 18. Multiplier of attitudinal index

	Total Attitudinal Index
Multiplier	0.985

Step 5. Calibrate the average attitudinal index score to 100

The final attitudinal index score for each respondent can be calculated by the formula below:

*Final Attitudinal Index = (Raw Attitudinal Index + 50) * Attitudinal Multiplier*

The range of the attitudinal index after modification is 0 – 147.82.

Step 6. Attitudinal Index Quintiles

Table 19. Attitudinal Index Quintiles

Category	Number of Cases in each Quintile	Score
1st	1792	≤ 80.07
2nd	1815	80.08 – 94.85
3rd	1880	94.86 – 105.94
4th	1667	105.95 – 119.49
5th	1774	≥ 119.50

Step 7. Visualise

The quintiles were named, and icons created

Figure 2. Attitudinal Index Quintiles