Response Bias in Onboard Questionnaire Surveys

By Neil Douglas

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Abstract

Self completion questionnaires distributed onboard trains or buses offer transport operators and planners a cost-effective way to know their market. However, getting an unbiased sample can be troublesome if passengers with certain characteristics are more difficult to intercept or less willing to complete a questionnaire than others.

This paper first looks at response rate issues and makes referenced to a review by the Transit Research Board (2005) of onboard surveys. The bulk of the paper then uses a 2004 survey of Wellington rail passengers that monitored questionnaire refusal and interception rates to show that systematic biases can exist. A factoring approach is then presented that reduced the bias in the sample.

1. Introduction

Self completion questionnaires distributed onboard trains or buses offer transport operators and planners a cost-effective way to know their market. However, getting an unbiased sample can be troublesome if passengers with certain characteristics are more difficult to intercept or less willing to complete a questionnaire than others. This becomes more burdensome if one of the survey aims is to 'profile' the market by age, gender, ticket type etc.

Management can rely on the survey profiles to target marketing efforts, base fares, guide timetable development and assess passenger growth by market segment. If the profile is biased, management may make inappropriate decisions or present misleading information.

This paper first looks at response rate issues. Reference is made to a review by the Transit Research Board (2005) of onboard surveys undertaken by US Transit agencies. The bulk of the paper then uses a 2004 survey of Wellington rail passengers that monitored questionnaire refusal and interception rates to show that systematic biases can exist. A factoring approach is then presented that reduced the bias in the sample obtained.

2. Onboard Surveys

A review by the U.S. Transportation Research Board, TRB (2005) of 39 transit agencies found nearly all of them (96%) had conducted an on-board survey during 2002-2004. The review concluded that on-board and intercept surveys were the "mainstay" of transit agency market research.

Onboard surveys are popular because they directly access public transport users. Consequently, they are more cost-effective and less time consuming than household interviews or internet surveys since public transport usage rates can be low. It is worth noting however that on-board surveys cannot survey non-users. There will therefore always be a place for household, telephone and internet surveys. However these surveys too face difficulties in obtaining an unbiased sample. Indeed, constructing a sample frame and monitoring response is usually more difficult than onboard surveys. Ampt and Richardson (1994) and Brog and Meyburg (1980 and 1981) have discussed the issues involved.

Probably in response to the relative difficulties and level of bias, most of the research into establishing and correcting for non-response bias has been in the area of household surveys; telephone surveys, e.g. Hassounah (1993) and mail back surveys e.g. Richardson and Ampt (1994).

In principle, onboard surveys can cover the public transport market comprehensively enabling transport planners and operators to develop a detailed picture of their market to tailor timetable and fares. In practice however, survey error and survey bias can lead to inaccurate profiles of the travelling population.

The main problem is that the sample may differ from the population in terms of its profile characteristics if response rates vary and no corrective action is taken. There are two issues: (i) the smaller the sample the greater the sampling error and (ii) the lower the response rate, the greater the chance the sampled passengers may differ from the travelling public in their characteristics and attitudes. The tendency is to just report the sample size and give a measure of the sampling error; *"the accuracy of the survey is ± 5%"*. It is rare for response and refusal rates to be reported and the variation in these rates by demographic group. In summary, samples are a reality but car needs to be taken in gathering them. It may be more efficient to spend more effort monitoring the response rate and less effort maximizing the sample size.

3. Measuring Response Rate

Definitional issues complicate the measurement of survey response. The simplest measure is the number of completed questionnaires expressed as a percentage of passengers on the train. Thus if 20 questionnaires were completed and there were 100 passengers on the train, the sampling fraction would be 20%. However this measure may not measure the number of passengers who were actually approached with a questionnaire to complete.

In fact, several measures of questionnaire response are possible. Table 1 presents some alternative numerators and denominators. Two numerators are possible: either the number of questionnaires distributed or the number of completed questionnaires returned. Of the two measures, the number of completed questionnaires returned will give a lower response rate but is a more revealing measure.

Possible denominators are the number of single trips, the number of return trips or the number of passengers approached. Using the number of single trips will give a different response rate to using the number of passengers approached. Differences will emerge due to the treatment of outbound and return trips i.e. whether the survey is conducted in only one direction with questions asked about the reverse trip. Moreover, if passengers make transfer trips and travel on more than one service, the number of passengers approached can exceed the number of trips.

Table 1: Response Rate Definitions

Numerators	Description	Issues
Returned Questionnaires	Number of returned questionnaires that are non-blank	Some questionnaires may have little or no useable information
Completed Questionnaires	Number of questionnaires that have useable information	Response rate may differ by question
Denominators	**Description**	**Issues**
Questionnaires Distributed	Number of questionnaires handed out	Keeping track of the number of questionnaires distributed may be difficult if questionnaires are left on seats and can be reused
Passengers Approached	Number of passengers approached or handed a	Need to take account of refusals
Base Passengers	Based on ticket sales or boardings exlcuding transfers and adjusted for passengers making multiple trips	There may be difficulties ion reconciling the period of survey with trip statistics (e.g. inclusion of weekends). Transfer trips may be difficult to take into account. Inclusion of school children and transport staff.
Number of Trips	Based on onboard counts or ticket sales or barrier counts	May or may not directly relate to the time of survey

Almost certainly, response rates defined in terms of the number of trips will tend to be lower than when defined in terms of the number of passengers approached if surveys are taken throughout the day. This is simply because people are more likely to refuse to complete a questionnaire at night if they have previously done one in the morning.

Three of the 29 agencies approached by the TRB defined their onboard survey response rate in terms of the number of questionnaires returned as a ratio of the number of passengers approached, Table 2. At 33%, the response rate was the lowest of the reported rates.

It is less common to define response rate in terms of the number of ‘unique’ passengers. This measure would require information on the number of boardings, trips per person per day and the number of trips involving a transfer.

For mail-back questionnaires, the denominator is usually defined in terms of the number of questionnaires distributed. Most on-board questionnaires are completed on board the vehicle with forms collected by fieldworkers. As a result, reported response rates can be high. The TRB review shows that 11 of the 29 agencies (38%) measured response rate as the number of completed questionnaires divided by the number of questionnaires distributed. The average response rate was 70% which was the highest of the response rates reported.

A more informative measure is to monitor the number of passengers approached. Response rate is then calculated as the number of questionnaires returned divided by the number of passengers approached. This measure is appealing since the 'mirror image' is the refusal rate. In the TRB survey, 15 out of 26 agencies (52%) reported a response rate that took into account refusals and for these agencies the average response rate was 39% which is markedly lower than when refusals were not monitored.

Table 2: Reported Response Rate

TRB Survey of 29 Agency Public Transport Surveys undertaken in the USA in 2002-2004

Response Rate Measure	Response Rate (Percent)			
	Average	Min	Max	Surveys
Completed Questionnaires / Number Distributed - Refusals not taken into account	70	41	90	11
Completed Questionnaires / Number of Passengers Approached - Refusals taken into account	39	13	80	15
Completed Questionnaires / Ridership	33	14	45	3
ALL	50	13	90	29

Based on data reported by TRB 2005

It is always possible to report more than one measure however. The recommendation is for (i) completed questionnaires as a percentage of passengers approached to be reported thereby indicating the refusal rate and (ii) completed questionnaires as a percentage of the number of trips to be reported to measure the sampling fraction. It is also worthwhile to report (iii) the expansion factor which gives the number that the sample needs to be multiplied by to get the travelling population. The expansion factor is the inverse of the sampling fraction.

4. Wellington Rail Survey

Tranz Metro engaged Douglas Economics in 2004 to undertake a passenger survey of the Wellington rail market, Douglas Economics (2005). There were two components to the survey: a self-completion questionnaire and an onboard count. All weekday and weekend timetabled services were counted and questionnaires were distributed on most services.

The aim of the survey was to provide Tranz Metro with information to plan services, assess fare levels, target marketing, determine station access requirement and prioritise maintenance across stations according to usage.

The 2004 survey was also compared with a previous survey undertaken in 1998 by Douglas Economics. Changes in usage and user profile were able to be identified by rail line, station and travel zone. The two surveys therefore provided a way to assess passenger growth by market sector.

The main questionnaire was a one sided A4 page asking socio-demographic, journey purpose, origin–destination and ticket type questions.[1] The questionnaire was distributed and collected onboard trains. Passengers were asked to complete the questionnaire and then hand it back to the surveyor or leave it on their seat for collection. Complimentary pens were handed out and assistance in filling out the questionnaire was given on request. In total, 15,539 completed questionnaires were obtained on 771 services over a 12 week period (May-July 2004).

5. Response Rate

The survey aimed to obtain profile information on inbound and outbound services. This introduced the problem of interviewing passengers twice on inbound and outbound services. On longer distance services, passengers were only interviewed on trains travelling out of Wellington. A modified questionnaire was developed that included questions about their inbound trip. This type of approach was less appropriate on shorter distance services because of the greater choice of inbound services passengers could use.

Questionnaire distribution and refusal was monitored from the second week of the survey. Passengers who refused to complete a questionnaire were asked whether they had completed a questionnaire before. They were then asked what type of ticket they were using. The surveyor noted the gender of the passenger and assessed their most likely age group. Respondents who were willing to complete a questionnaire were asked whether they had completed a questionnaire before.

12,087 passengers were monitored. Table 3 presents the response rate computed as the number of passengers who completed a survey divided by the number of passengers approached (i.e. completers + refusals). Two thirds of passengers who were approached for the first time were willing to complete a questionnaire but only a third of passengers were willing to complete a questionnaire if they had previously undertaken a survey. Thus prior completion of a questionnaire halved the completion rate.

[1] In fact three types of questionnaire were used. Most completed a profile questionnaire which collected information on their trip origin and destination, passenger characteristics, ticket type and fare paid. Around one in ten completed an attitudinal questionnaire which asked rating and improvement questions in addition to basic profile questions.

A complication was that just over 1,000 passengers monitored were not asked whether they had undertaken a survey before. A further 880 questionnaires were completed by passengers travelling on trains that were monitored trains but who were not monitored by the surveyors.

Table 3: Questionnaire Response Rate

	Complete Questionnaire	Refusals	Total	Percent Completed	Percent Refusals
First Approach	4,617	2,556	7,173	64%	36%
Done Before	1,171	2,659	3,830	31%	69%
Approach not recorded	812	272	1,084	75%	25%
Total Monitored	6,600	5,487	12,087	55%	45%
Not Monitored	880	0	880	na	na
Total	7,480	5,487	12,967	na	na

6. Response Rate by Gender & Age

The surveyor noted the gender and likely age group of passengers who refused to do the questionnaire. The data was combined with the questionnaire response to determine completion rates by gender and age. Table 4 and Figure 1 present the results.

Females were more likely to complete a questionnaire than males. Overall, 63% of females completed a questionnaire compared to 58% of males; a difference of 5 percentage points. The difference was significant at the 95% confidence level.

The difference was the same for passengers approached for the first time at 84% for females and 79% for males.

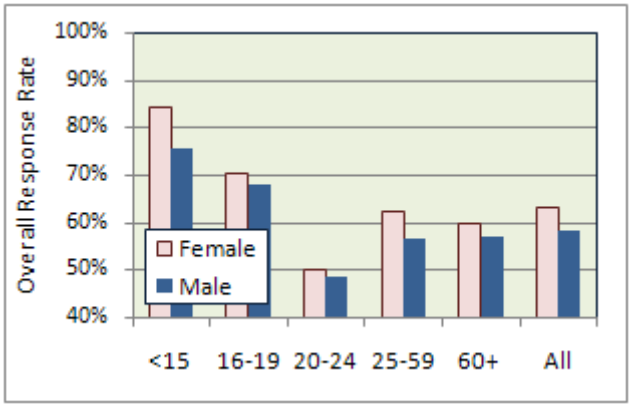
Females had a higher response rate across all five age groups. The difference was widest for young passengers (under 15) with 84% of females completing the questionnaire compared to 76% of males.

Table 4: Response Rate with Gender and Age

Age Group	Response Rate Overall Female	Overall Male	1st Approach Female	1st Approach Male	Sample Size Female	Sample Size Male
<15	84%	76%	93%	84%	543	413
16-19	70%	68%	85%	83%	1,279	952
20-24	50%	49%	80%	77%	1,230	1,026
25-59	62%	57%	84%	79%	3,322	3,708
60+	60%	57%	76%	76%	286	290
All	63%	58%	84%	79%	6,721	6,449

numbers may not sum due to non response

Figure 1: Response Rate with Gender and Age



20-24 year olds had the lowest response rate of around 50%. There was less difference by gender however with only a one percent higher response rate for females.

The completion rate then increased to 62% for 25-59 year old females compared to 57% for males.

For over 60 year olds, the response rate declined for women to 60% with the male response rate remaining at 57%.

7. Response Rate by Ticket Type, Gender and Age

Passengers were asked the type of ticket they were using (or intended to purchase). Tickets were grouped into single or 'multiple use' tickets such as ten trips, monthlies and school passes.[2]

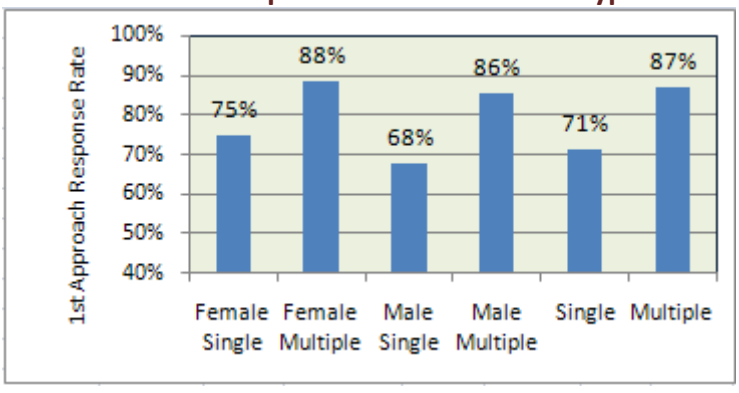
Passengers on a multiple ticket type were more likely to respond than single ticket users; this probably reflects a greater personal investment in rail travel. At 64%, the overall response rate was 10% points higher for multiple ticket users than single tickets (54%). For passengers approached for the first time, the difference was wider at 87% versus 71%.

Table 5: Response Rate and Ticket Type, Gender and Age

	Single Ticket			Multiple Use Ticket		
	Overall	1st Approach	Sample Size	Overall	1st Approach	Sample Size
Female <15	82%	91%	316	86%	95%	195
Female <16-19	68%	80%	758	75%	92%	433
Female <20-24	45%	69%	560	54%	88%	589
Female <25-59	39%	63%	696	47%	81%	1,388
Female 60+	73%	82%	250	95%	97%	828
Female	57%	75%	2,580	66%	88%	3,433
Male <15	75%	80%	209	74%	86%	170
Male <16-19	63%	76%	572	76%	91%	314
Male <20-24	44%	67%	557	53%	86%	409
Male <25-59	33%	56%	918	44%	79%	1,577
Male 60+	76%	84%	248	93%	97%	794
Male	50%	68%	2,504	62%	86%	3,264
ALL	54%	71%	5,084	64%	87%	6,697

The gender difference also declined for multiple ticket users to 2% points for passengers approached for the first time; 88% for females and 86% for males, Figure 2. Thus the greatest difference in gender response rate was for passengers travelling on single tickets with a 7% point higher rate for females.

Figure 2: First Time Response Rate with Ticket Type & Gender



[2] Return tickets are not offered on Tranz Metro services

The higher response rate for passengers using multiple tickets was consistent over the age groups excepting males aged less than 15. Appendix 1 provides information on the statistical significance of the response rates for passengers approached for the first time.

8. Factoring Questionnaire Returns

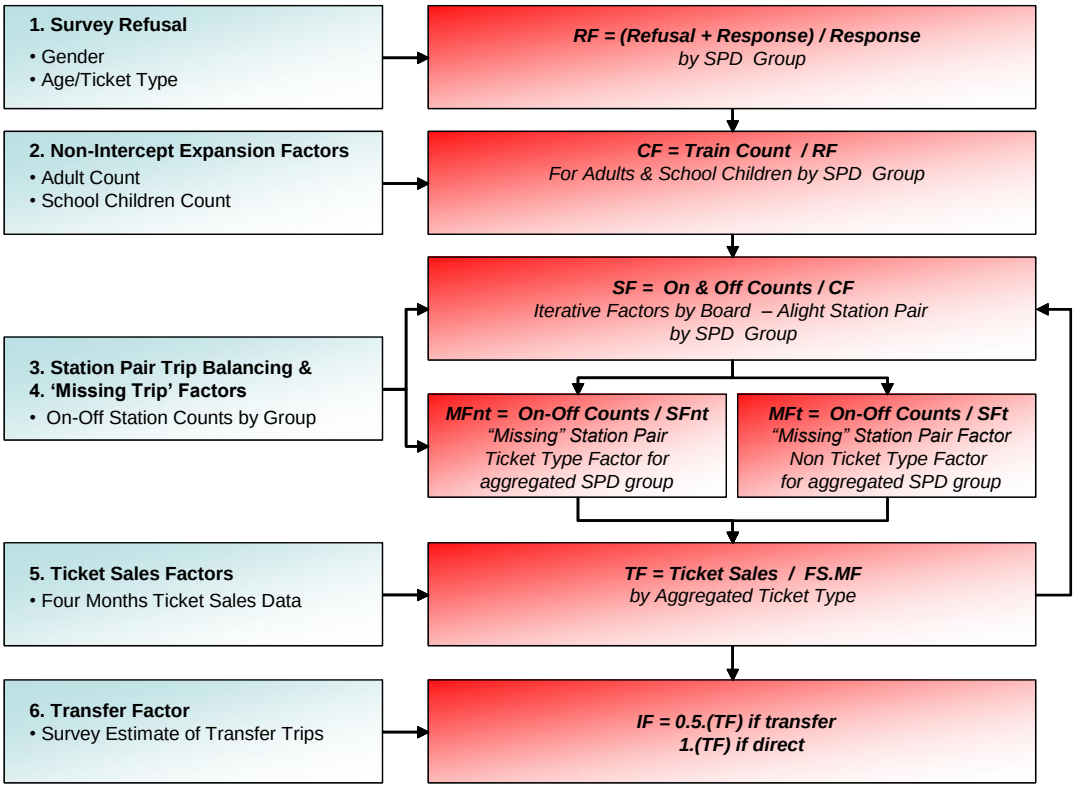
It is rarely possible to approach all passengers with a questionnaire. As a result, factors are usually employed to expand questionnaire returns up to the total travelling population. For example, Stopher and Stecher (1993) outline a method to 'blow up' survey returns to the travelling population.

In the Wellington survey, passenger counts were undertaken at the same time as the questionnaire survey and these counts were used to expand the survey returns.

School children in particular tended to be under-sampled relative to adult passengers. School children travel in bunches and it is difficult to hand out questionnaire to all school children "in a bunch".[3] Separate counts of school children were undertaken which enabled school children questionnaire returns to be expanded separately from adult questionnaires.

Altogether, five factors were introduced to address: non-interception; imbalances in station 'ons and offs'; non-surveyed or 'missing' station pair flows; discrepancies with ticket sales data and double counting of transfer trips. Figure 3 shows the overall factoring approach.

Figure 3: Factoring Approach



[3] Some surveys specifically exclude school children from completing a questionnaire.

The factors were introduced multiplicatively as shown in equation 1.

$F = RF.CF.SF.MF.TF.IF$ .....(1)

where:

$F =$ Overall survey factor
$RF =$ Response Rate factor for gender, age and ticket type
$CF =$ Non-intercept expansion factor
$SF =$ Station on-off balancing factor
$MF =$ 'Missing' station pair factor
$TF =$ Ticket sales factor
$IF =$ Transfer trip factor

The non-interception factor was calculated as the ratio of the count to the number of completed questionnaires (after factoring for questionnaire refusals). Adult and school children were separately calculated for peak and weekday off-peak services. On average, each questionnaire represented 2.96 rail trips. At 3.33, the adult factor was lower than the school children factor at 5.5 implying adults were 1.67 times more likely to be asked to do a survey than school children.

Shorter rail trips and trips not involving Wellington (the main terminal station) were found to be under-surveyed when questionnaire response to the board and alight station questions were compared with the count data. The expanded questionnaire response was therefore reconciled with the on and off counts using an iterative row-column matrix balancing approach. The outcome was a factored rail station to station trip matrix for each grouping of train services.

The balanced matrix inputted some trips for some station pairs where there were no questionnaire returns. For these stations, 'dummy' questionnaires were introduced which created a small shortfall in overall factored questionnaire response. For Non Wellington flows, missing trips amounted to 9% of total trips (compared to 1% for Wellington flows). Rather than adopt the same profile for 'missing' station pairs as observed station pairs, a set of 'missing' factors were computed for Wellington and Non-Wellington flows. The factors were calculated as the ratio of the count (including dummy pairs) to the factored questionnaire response.

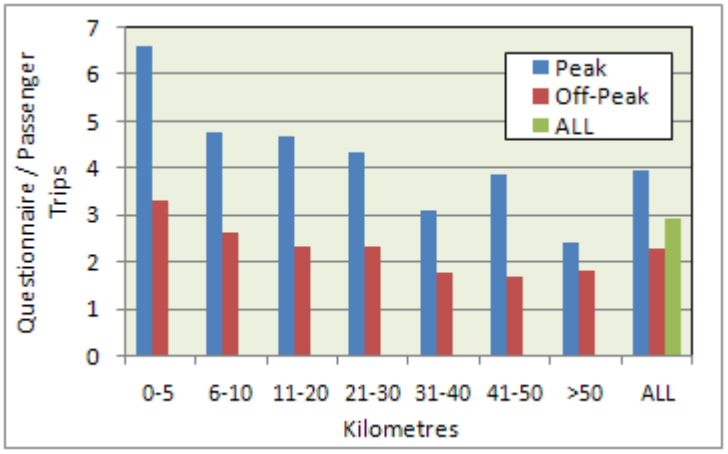
Total ticket sales data (revenue, tickets sold and estimated rail trips) for a four month period was compared with estimated survey revenue for six aggregated ticket types. For the survey, the ticket price per trip (ticket price ÷ trips per ticket) was multiplied by the questionnaire factor and then summed. Balancing ticket sales had the side-effect of unbalancing the station pair totals. The ticket sales and station pair factoring were therefore undertaken sequentially to attempt to balance both sets of factors. Four rounds of factoring produced ticket sales factors close to 1.

There was a reasonable accord between the survey revenue estimates and ticket sales. Adult Monthly tickets needed to be factored down by 8% to agree with sales and single tickets increased by 15%. After balancing, the survey revenue estimate was within 1% of ticket sales.

The final factor took account of transfers. Rail – rail transfers are in fact relatively infrequent on the Wellington rail network with a transfer percentage of just 2%. Nevertheless, passengers making trips involving a transfer had twice the chance of being surveyed as non-transfer passengers. For profiles based on passenger trips, questionnaires involving a transfer were factored by 0.5. In so doing, the number of passenger trips was reduced below the number of rail trips. The effect of taking into account transfers reduced the average expansion from 2.93 to 2.88.

Figure 4 presents the final expansion factors by distance and time period. The average survey expansion factor was just under 3. Expansion factors were higher in the peak than in the off-peak and weekend. The expansion factors also declined with distance reflecting an increased likelihood of being surveyed. For trips of less than five kilometres, the average factor was around 5 compared to around 3 for thirty to forty kilometre trips.

Figure 4: Questionnaire Expansion Factors by Distance & Time Period



9. Concluding Remarks

Onboard self completion questionnaires are a cost-effective approach to gather demand information on public transport services. It is nearly impossible to survey all passengers however and counts or ticketing data are usually required to expand questionnaire returns up to the travelling population. This approach is fine if interception and refusal rates are constant. However, as this paper has shown using a large scale survey of Wellington rail passengers, refusal rates may be systematic and interception rates can favour certain trips.

In terms of response rate, females and multiple ticket users were more willing to complete a questionnaire than male and single ticket users. Passengers aged 20-24 year had a particularly low response rate.

In terms of interception rate, longer distance trips; trips to/from Wellington station the major station and adult passengers had a higher chance of being intercepted than short distance trips; trips not involving Wellington station and trips by school children.

By undertaking onboard counts and monitoring response it was possible to undertake remedial factoring to adjust for sampling bias. The resultant profile can be used with greater confidence to inform the future direction of fares, timetables and marketing.

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Appendix 1: Statistical Significance of First Intercept Response Rate Difference by Gender, Age and Ticket Type

Critical 't' values for the difference in response rate (%) between market segments

Sex: Age: Ticket Type	Code	Response Rate	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	Sample Size
Female <15 Single	1	91%	0.0	**2.5**	**4.9**	**5.9**	1.7	-0.9	-0.2	0.7	**2.6**	-1.3	1.8	**3.2**	**5.2**	**7.3**	1.2	1.0	-0.1	1.3	**3.1**	-1.2	**2.9**	316
Female 16-19 Single	2	80%	**-3.1**	0.0	**3.9**	**5.8**	-0.3	**-4.5**	**-4.9**	**-3.7**	-0.3	**-4.4**	0.0	1.3	**4.5**	**8.2**	-1.0	-1.3	**-4.3**	**-2.3**	0.6	**-4.7**	0.0	758
Female 20-24 Single	3	69%	**-7.2**	**-4.7**	0.0	**2.1**	**-3.5**	**-9.1**	**-10.9**	**-9.8**	**-6.0**	**-8.3**	**-2.9**	**-2.9**	0.8	**4.9**	**-4.3**	**-4.5**	**-9.7**	**-7.9**	**-5.0**	**-9.1**	**-6.0**	560
Female 25-59 Single	4	63%	**-10.0**	**-7.9**	**-2.4**	0.0	**-5.6**	**-12.2**	**-15.2**	**-14.3**	**-10.0**	**-10.9**	**-4.8**	**-5.7**	-1.4	**3.1**	**-6.4**	**-6.7**	**-13.5**	**-11.8**	**-8.8**	**-12.1**	**-10.2**	696
Female 60+ Single	5	82%	-1.9	0.3	**2.6**	**3.7**	0.0	**-2.9**	**-2.5**	-1.6	0.2	**-3.1**	0.2	1.1	**3.0**	**5.0**	-0.5	-0.7	**-2.3**	-1.0	0.7	**-3.1**	0.3	250
Female <15 Multiple	6	95%	0.8	**3.5**	**5.8**	**7.0**	**2.4**	0.0	0.9	1.9	**3.8**	-0.5	**2.4**	**4.2**	**6.2**	**8.3**	1.9	1.7	0.9	**2.4**	**4.3**	-0.4	**4.1**	195
Female 16-19 Multiple	7	92%	0.2	**4.2**	**7.8**	**9.8**	**2.3**	-0.9	0.0	1.7	**5.4**	-1.3	**2.3**	**5.1**	**8.3**	**12.3**	1.6	1.3	0.2	**2.6**	**6.4**	-1.3	**6.4**	433
Female 20-24 Multiple	8	88%	-0.8	**3.4**	**7.7**	**10.1**	1.6	**-2.1**	-1.8	0.0	**4.8**	**-2.3**	1.7	**4.5**	**8.2**	**13.3**	0.9	0.6	-1.4	1.3	**6.1**	**-2.4**	**6.2**	589
Female 25-59 Multiple	9	81%	**-3.3**	0.3	**5.4**	**8.1**	-0.2	**-4.9**	**-6.6**	**-5.4**	0.0	**-4.6**	0.1	1.9	**6.1**	**11.8**	-0.9	-1.2	**-5.2**	**-3.0**	1.5	**-5.1**	0.6	1,388
Female 60+ Multiple	10	97%	1.2	**3.3**	**5.1**	**5.9**	**2.5**	0.5	1.2	**2.0**	**3.4**	0.0	**2.5**	**3.8**	**5.3**	**6.9**	**2.1**	1.8	1.2	**2.4**	**3.8**	0.2	**3.6**	828
Male <15 Single	11	80%	**-2.0**	0.0	**2.2**	**3.2**	-0.2	**-2.9**	**-2.5**	-1.8	-0.1	**-3.2**	0.0	0.8	**2.6**	**4.3**	-0.7	-0.9	**-2.4**	-1.2	0.3	**-3.2**	0.0	209
Male 16-19 Single	12	76%	**-4.2**	-1.4	**2.5**	**4.4**	-1.3	**-5.7**	**-6.3**	**-5.1**	-1.9	**-5.4**	-0.9	0.0	**3.2**	**6.6**	-1.9	**-2.2**	**-5.6**	**-3.7**	-1.0	**-5.8**	-1.7	572
Male 20-24 Single	13	67%	**-8.1**	**-5.6**	-0.8	1.3	**-4.2**	**-10.0**	**-11.9**	**-10.9**	**-7.0**	**-9.1**	**-3.6**	**-3.8**	0.0	**4.1**	**-5.0**	**-5.2**	**-10.7**	**-8.9**	**-6.0**	**-10.0**	**-7.1**	557
Male 25-59 Single	14	56%	**-14.7**	**-13.3**	**-6.6**	**-3.7**	**-9.1**	**-17.5**	**-22.5**	**-22.0**	**-16.8**	**-15.3**	**-7.9**	**-10.4**	**-5.3**	0.0	**-10.0**	**-10.3**	**-20.0**	**-18.5**	**-15.4**	**-17.1**	**-17.5**	918
Male 60+ Single	15	84%	-1.3	0.9	**3.1**	**4.1**	0.5	**-2.2**	-1.7	-0.9	0.8	**-2.5**	0.7	1.6	**3.4**	**5.3**	0.0	-0.2	-1.6	-0.3	1.2	**-2.5**	1.0	248
Male <15 Multiple	16	86%	-1.0	1.1	**3.2**	**4.1**	0.7	-1.9	-1.4	-0.6	1.0	**-2.2**	0.8	1.8	**3.5**	**5.3**	0.2	0.0	-1.2	0.0	1.5	**-2.1**	1.2	170
Male 16-19 Multiple	17	91%	0.1	**3.6**	**6.8**	**8.5**	**2.1**	-1.0	-0.2	1.3	**4.3**	-1.4	**2.1**	**4.5**	**7.3**	**10.5**	1.5	1.2	0.0	**2.1**	**5.0**	-1.3	**4.8**	314
Male 20-24 Multiple	18	86%	-1.5	**2.2**	**6.3**	**8.4**	1.0	**-2.9**	**-2.9**	-1.3	**2.7**	**-2.9**	1.2	**3.4**	**6.8**	**11.1**	0.3	0.0	**-2.3**	0.0	**3.7**	**-3.1**	**3.4**	409
Male 25-59 Multiple	19	79%	**-4.0**	-0.7	**4.6**	**7.4**	-0.8	**-5.8**	**-8.0**	**-7.1**	-1.6	**-5.3**	-0.4	1.1	**5.4**	**11.2**	-1.5	-1.8	**-6.4**	**-4.3**	0.0	**-5.9**	-1.4	1,577
Male 60+ Multiple	20	97%	1.1	**3.6**	**5.7**	**6.7**	**2.6**	0.3	1.2	**2.1**	**3.9**	-0.2	**2.6**	**4.2**	**6.0**	**7.9**	**2.1**	1.9	1.2	**2.6**	**4.3**	0.0	**4.1**	794
ALL	21	80%	**-3.6**	0.0	**5.7**	**8.9**	-0.4	**-5.4**	**-8.1**	**-7.5**	-0.7	**-4.9**	-0.1	1.8	**6.5**	**13.3**	-1.1	-1.4	**-6.1**	**-4.0**	1.4	**-5.5**	0.0	11,781

Pr(Rj)>Pr(Ri) significant at the 95% level (|t| > 1.96); Pr(Rj>(Ri) significant at the 99% level (|t| > 3)