RESULT: Variation in sample means is a little less for "STRATA" than for "SIMPLE".

	Means			Std. Deviations	
Strata	Simple	Abs Diff	%Guys	Strata	Simple	Difference
67.56	66.79	0.35	51%	4.71	5.40	0.69

Following manually copied from above for 20 different trials

	Means	0.21		**Std. Deviations**	0.016
	Strata	**Simple**	Abs Diff	%Guys	Strata	Simple	Difference
1	67.22	67.4	0.15	48%	4.63	5.28	0.65
2	67.31	66.7	0.03	50%	4.68	5.01	0.34
3	66.87	67.0	0.10	50%	5.32	4.61	-0.71
4	67.05	66.9	0.10	54%	5.30	5.02	-0.28
5	66.59	67.4	0.04	54%	4.74	4.97	0.23
6	66.99	67.5	0.50	54%	4.94	4.96	0.01
7	67.14	66.5	0.34	48%	5.08	5.06	-0.02
8	66.83	67.1	0.08	52%	4.87	5.23	0.36
9	67.24	67.3	0.11	47%	4.90	5.03	0.13
10	67.01	67.2	0.20	52%	4.97	4.88	-0.08
11	67.09	67.4	0.26	54%	4.86	4.88	0.02
12	67.36	67.2	0.16	51%	4.98	4.60	-0.38
13	67.18	67.1	0.04	52%	5.05	5.56	0.51
14	67.03	67.4	0.35	55%	5.23	5.03	-0.20
15	67.13	66.7	0.21	50%	5.13	4.76	-0.37
16	66.65	66.6	0.04	50%	4.93	5.22	0.28
17	67.03	67.2	0.13	54%	4.95	4.93	-0.01
18	66.99	66.3	0.70	44%	5.19	5.18	-0.01
19	66.85	67.5	0.39	58%	5.08	4.72	-0.36
20	67.08	66.7	0.21	48%	5.12	5.35	0.23
	Strata	**Simple**	Abs Diff	%Guys	Strata	Simple	Difference
	67.03	67.05	0.208	**Average** 51.0%	4.998	5.014	0.016
	0.20	0.36		**StdDev**			

L5 =+D15 M5 =+H15 P5 =+H13 R5 =+D14
N5 =+ABS(ABS(M5-C9)-ABS(L5-C9)) S5 =+H14 T5 =S5-R5

C9	=SUM(A9:B9)/2	G9	=C10/A10
C10	=SQRT((A10^2+B10^2)/2 + (B9-A9)^2/4)	G10	=(B9-A9)/C10
B14	=STDEV(B17:B116)	H13	=AVERAGE(F17:G116)
B15	=AVERAGE(B17:B116)	H14	=STDEV(H17:I116)
B17	=A$9+NORM.S.INV(RAND())*A$10	H15	=AVERAGE(H17:I116)
C14	=STDEV(C17:C116)		
C15	=AVERAGE(C17:C116)	F17	=RANDBETWEEN(0,1)
C17	=B$9+NORM.S.INV(RAND())*B$10	G17	=RANDBETWEEN(0,1)
D14	=SQRT((C14^2+B14^2)/2 + (C15-B15)^2/4)	D15	=(C15+B15)/2

H17 =IF(F17=1, B9+NORM.S.INV(RAND())*B10, A9+NORM.S.INV(RAND())*A10)
I17 =IF(G17=1, B9+NORM.S.INV(RAND())*B10, A9+NORM.S.INV(RAND())*A10)

GOAL: Show that stratified random sampling can be superior to random sampling. Row

Consider a population of adults: half gals and half guys 2

Gals' height averages 64" normally distributed with a standard deviation of 4". 3

Guys' height averages 70" normally distributed with a standard deviation of 4". 4

Benefit Expect Mean of unstratified to have more deviation than mean of stratified. 5

Benefit Expect StdDev of unstratified to be bigger than stdev of stratified combined. 6

A	B	C	D	E	F	G	H	I	
									7
Gals	Guys	ALL							8
64	70	67.00	Population Mean			**1.25**	Ratio Std Deviations		9
4	4	5.00	Population Std Sev			**1.20**	Difference Means/SDsrs		10
									11

STRATIFIED Random Sample (N = 100 of each)

Group	Gals=0	Guys=1	Together
StdDev	3.83	4.13	**4.71**
Mean	65.03	70.08	**67.56**

SIMLPE Random Sample (N=200)

Guys	51%
StdDev	**5.40**
Mean	**66.79**

ID	Gals	Guys	Sex#1	Sex#2	Ht#1	Ht#2	
1	60.44	74.16	0	0	62.79	63.74	17
2	61.74	69.83	0	0	62.72	62.47	18
3	69.92	68.54	0	1	63.57	67.94	19
4	66.99	72.67	0	1	55.72	69.29	20
5	69.61	71.11	0	0	59.35	68.42	21
6	64.95	72.73	1	0	65.71	54.61	22
7	69.18	66.67	0	1	65.98	73.76	23
8	64.14	69.06	1	1	77.17	73.21	24
9	62.17	68.63	0	0	57.01	62.84	25
10	64.35	66.72	0	0	66.13	61.64	26
11	64.75	67.64	1	0	66.32	58.91	27
12	68.93	69.94	1	0	70.41	54.46	28
13	63.09	69.81	0	1	68.25	72.55	29
14	69.30	64.51	1	1	71.76	67.19	30
15	58.11	67.58	1	0	69.82	60.28	31
16	62.90	75.49	1	0	71.35	61.04	32
17	65.19	64.19	1	1	68.84	75.55	33
18	63.69	65.00	0	0	61.60	66.44	34
19	69.31	72.75	1	0	70.96	64.65	35
20	60.07	70.45	1	1	74.90	64.33	36
21	67.15	76.54	0	0	65.24	62.21	37
22	65.35	67.02	0	0	58.06	58.37	38
23	64.31	73.00	0	0	58.76	59.67	39
24	67.09	67.01	1	0	63.37	68.15	40
25	64.59	69.54	1	0	69.48	66.40	41
26	70.45	72.18	0	0	62.80	57.13	42
27	62.11	67.97	1	1	69.99	73.59	43
28	70.27	64.54	0	1	61.74	68.74	44
29	67.67	68.09	1	0	68.02	68.48	45
30	60.77	75.53	0	1	62.10	70.46	46

RESULT: Variation in sample means is much less for "STRATA" than for "SIMPLE".

	Means			Std. Deviations	
Strata	Simple	Abs Diff	%Guys	Strata	Simple	Difference
67.00	66.56	0.44	43%	3.00	2.98	-0.02

Following manually copied from above for 20 different trials

	Means	0.15		**Std. Deviations**		0.003
	Strata	**Simple**	Abs Diff	%Guys	Strata	Simple	Difference
1	67.01	67.1	0.06	51%	3.00	3.02	0.02
2	67.00	66.7	0.33	45%	3.00	2.98	-0.01
3	66.99	67.0	0.03	51%	3.00	3.01	0.01
4	67.01	67.5	0.53	59%	3.00	2.97	-0.02
5	67.01	66.8	0.23	46%	3.00	3.00	-0.01
6	67.00	67.0	0.03	50%	3.00	3.01	0.01
7	67.00	67.1	0.10	52%	3.01	3.01	0.00
8	67.00	67.0	0.00	50%	3.01	3.01	0.00
9	67.01	67.1	0.11	52%	2.99	2.99	0.00
10	67.00	67.2	0.21	54%	3.00	3.01	0.01
11	67.00	66.7	0.27	46%	3.01	2.98	-0.03
12	67.00	67.0	0.02	50%	3.00	3.02	0.01
13	67.00	67.3	0.30	55%	2.99	2.99	0.00
14	67.01	67.1	0.05	51%	3.00	3.01	0.02
15	67.00	67.3	0.28	55%	3.00	3.01	0.01
16	67.01	66.9	0.05	49%	3.00	3.02	0.01
17	67.00	67.0	0.00	50%	3.01	3.01	0.00
18	67.00	67.1	0.08	52%	2.99	3.01	0.02
19	67.00	66.9	0.12	48%	3.00	3.00	0.01
20	67.00	67.2	0.20	54%	3.01	3.01	0.00
	Strata	**Simple**	Abs Diff	%Guys	Strata	Simple	Difference
	67.00	67.05	0.150	**Average** 50.8%	3.000	3.003	0.003
	0.0055	0.205		**StdDev**			

L5 =+D15 M5 =+H15 P5 =+H13 R5 =+D14
N5 =+ABS(ABS(M5-C9)-ABS(L5-C9)) S5 =+H14 T5 =S5-R5

C9	=SUM(A9:B9)/2	G9	=C10/A10
C10	=SQRT((A10^2+B10^2)/2 + (B9-A9)^2/4)	G10	=(B9-A9)/C10
B14	=STDEV(B17:B116)	H13	=AVERAGE(F17:G116)
B15	=AVERAGE(B17:B116)	H14	=STDEV(H17:I116)
B17	=A$9+NORM.S.INV(RAND())*A$10	H15	=AVERAGE(H17:I116)
C14	=STDEV(C17:C116)		
C15	=AVERAGE(C17:C116)	F17	=RANDBETWEEN(0,1)
C17	=B$9+NORM.S.INV(RAND())*B$10	G17	=RANDBETWEEN(0,1)
D14	=SQRT((C14^2+B14^2)/2 + (C15-B15)^2/4)	D15	=(C15+B15)/2
H17	=IF(F17=1, B9+NORM.S.INV(RAND())*B10, A9+NORM.S.INV(RAND())*A10)		
I17	=IF(G17=1, B9+NORM.S.INV(RAND())*B10, A9+NORM.S.INV(RAND())*A10)		

GOAL: Show that stratified random sampling can be superior to random sampling. Row

Consider a population of adults: half gals and half guys 2

Gals' height averages 64" normally distributed with a standard deviation of 0.1". 3

Guys' height averages 70" normally distributed with a standard deviation of 0.1". 4

Benefit Expect Mean of unstratified to have more deviation than mean of stratified. 5

Benefit Expect StdDev of unstratified to be bigger than stdev of stratified combined. 6

A	B	C	D	E	F	G	H	I	
									7

Gals	Guys	ALL							
64	70	67.00	Population Mean			**30.02**	Ratio Std Deviations		8 9
0.1	0.1	3.00	Population Std Sev			**2.00**	Difference Means/SDsrs		10

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STRATIFIED Random Sample (N = 100 of each) **SIMLPE Random Sample (N=200)** 12

Group	Gals=0	Guys=1	Together
StdDev	0.11	0.10	**3.00**
Mean	64.01	70.00	**67.00**

Guys	43%
StdDev	**2.98**
Mean	**66.56**

13 14 15

ID	Gals	Guys	Sex#1	Sex#2	Ht#1	Ht#2	
1	64.10	69.96	0	0	64.04	63.88	16 17
2	64.02	70.10	1	0	69.87	64.05	18
3	63.96	69.96	0	0	64.09	63.92	19
4	63.85	69.97	1	1	70.13	69.86	20
5	64.27	69.86	1	1	70.08	69.98	21
6	63.80	70.10	0	0	64.08	64.14	22
7	64.06	70.06	1	0	69.99	63.85	23
8	63.76	70.24	0	0	63.87	63.83	24
9	64.00	70.04	0	1	64.05	69.93	25
10	63.93	69.86	0	0	64.03	63.97	26
11	63.92	69.89	0	1	63.98	69.97	27
12	64.09	70.11	1	1	70.12	69.93	28
13	64.21	70.08	0	0	64.11	63.99	29
14	64.12	70.00	0	1	63.82	69.92	30
15	63.85	69.75	0	0	63.88	63.96	31
16	63.91	69.89	1	0	70.04	63.81	32
17	64.06	70.03	0	0	63.87	63.95	33
18	63.82	70.06	0	0	63.97	63.97	34
19	64.21	69.90	0	1	64.06	69.94	35
20	63.90	70.05	0	0	63.90	63.83	36
21	64.00	69.97	0	0	64.03	63.93	37
22	64.06	69.93	0	1	63.96	69.95	38
23	63.93	69.99	0	1	63.85	69.92	39
24	63.98	70.03	0	0	63.93	64.12	40
25	64.14	70.18	1	0	70.20	64.15	41
26	63.84	70.00	1	1	69.91	70.09	42
27	64.02	70.14	1	0	70.06	63.95	43
28	63.92	69.99	0	0	63.90	64.09	44
29	64.01	70.05	0	0	63.92	64.03	45
30	63.97	69.94	1	0	69.89	64.14	46