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Population Reach and Recruitment Bias in a Maintenance RCT in Physically Active Older Adults

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Abstract

Objective—To assess the representativeness of older adults recruited to a physical activity maintenance RCT by conducting sequential comparisons to characterize study sample composition changes occurring between sampling frame construction and study enrollment.

Method—Study subjects (N=1,049) were 50–70 year old men and women who had increased physical activity within the past year recruited from a Midwestern managed care organization.

Results—Those responding to an initial mailed screener differed on demographic, behavioral, and SES characteristics from those not responding. Compared to ineligibles, eligible individuals were significantly younger, more highly educated, and more likely to report improved health in the prior year. Compared to eligible individuals who did not enroll, enrollees had generally higher education and income.

Conclusions—Physical activity promotion programs in older adults may have limited reach and substantial volunteer bias. Additional strategies to increase the reach of physical activity interventions into the target population are needed.

Keywords

(MESH headings): research subject recruitment; selection bias; motor activity; intervention studies; health maintenance organizations; randomized controlled trial

Introduction

Randomized controlled trials (RCT) are widely considered the gold standard scientific method for comparing intervention efficacy in both biological and behavioral research. While well-conducted RCTs effectively address threats to internal validity, there is often concern about threats to the generalizability of RCT findings due to selection effects related to study subject recruitment.[1] Recruitment of subjects into randomized trials is often conducted in a way (media-based advertising, referral of patients by providers, referral of acquaintances) that precludes precise definition of sample frame denominators. Thus it is usually difficult or impossible to assess the "reach" of recruitment into the population of interest, or to document study sample composition differences across the stages of recruitment into trials – from sample frame, to those screened, to those found eligible, to those who enroll.[2–5]

Human Participation Protection: This study was reviewed and approved by Regions Hospital Institutional Review Board

The assessment of selection bias related to recruitment of volunteer study subjects and samples has long been a concern of researchers in diverse fields of research.[6–10] Perhaps not surprisingly, research into the existence of volunteer bias has often found that those who volunteer for specific research studies differ from the general populations from which they are recruited, often in ways that are directly related to the outcomes of interest. One recent, striking example of this is a study recreating the recruitment conditions of the widely cited 1973 Stanford Prison Experiment (SPE); a study that has been interpreted as evidence that any member of the general population might be induced to abusive behavior simply by being situated in an environment that is socially structured to be abusive.[9] The new study compared differences in samples recruited with two newspaper advertisements that were nearly identical to the original ad used to recruit for the SPE, except that one ad omitted the topical identifier "prison life." Compared to those recruited with the more generic ad, volunteers recruited to the "prison life study" scored significantly higher on a number of psychological scales such as aggression, authoritarianism, Machiavellianism and social dominance, and lower on measures of empathy and altruism. Such biases have also been documented in studies of alcohol abuse,[11] research on human sexuality,[8,12–14] psychiatric research,[15,16] and in a handful of physical activity and health promotion intervention studies targeted towards older adults.[9,17–24] Although a large number of health promotion initiatives have focused on promoting physical activity (PA) among older populations, with multiple reviews of this literature having been published,[25–29] relatively few studies of PA in older adults have investigated volunteer bias, and none have examined the issue in the context of an intervention trial focused on PA maintenance.

By design, the Keep Active Minnesota study recruited participants from the membership of one large Midwestern managed-care organization. Knowing the denominator of the sample-frame provided a unique opportunity to examine these issues of differential selection into the study. Data available for the entire sampling frame, for all screened individuals and for study eligible members were used to conduct three stage-wise comparisons to characterize study sample composition changes occurring between the construction of the sampling frame and enrollment of the final study sample. The first comparison was conducted between a randomly selected sampling frame of age, health history and membership eligible health plan members who did and did not volunteer for potential study participation by responding to a brief mailed physical activity survey. The second comparison was conducted between members who met the PA eligibility criteria and those who did not to identify characteristics other than PA that differentiated eligible and ineligible members. The final comparison assessed potential enrollment bias by comparing eligible members who chose to enroll in the study to those who opted not to enroll. The rationale for conducting such assessment is simply that if enrollees differ systematically from others, and the intervention is differentially effective among the enrollees, it is possible to over- or mis-estimate the efficacy of the intervention on all eligible individuals.

Methods

Brief description of the intervention trial

Keep Active Minnesota is an RCT testing the efficacy of telephone based cognitive behavioral counseling with additional mail support on PA maintenance. Details regarding the design and implementation of the intervention have been previously published[30] as have 6 month outcomes of the trial itself.[31]

Recruitment Procedures

The goal of recruitment was to obtain baseline data from 1,000 male or female members ages 50–70 who were enrolled in HealthPartners (HP), a large managed care organization, and who

at the time of enrollment were engaged in moderate or vigorous PA a minimum of two days a week for 30 minutes a day and who had increased their PA within the prior year. Among those meeting the above criteria, we excluded those with a modified Charlson comorbidity score > 3 (a standard index of comorbidity calculated using prior year diagnoses of a broad range of serious medical conditions),[32,33] as well as those who had diagnoses of coronary heart disease (CHD), congestive heart failure (CHF), atrial or ventricular arrhythmias, cardiac arrest, or had an implantable defribillator.

A two-phase recruitment process was used. In Phase I, a sampling frame of about 104,000 HP members was identified using administrative data and the eligibility criteria as described above. In mid July 2004, a screening survey was administered by mail to a random sample of 4,000 individuals who met age, health history and enrollment criteria, to provide data to characterize the population from which the intervention sample was being recruited. These individuals received a letter describing the study and a six page survey that included screening questions similar to those typically found in health risk assessment surveys. Participants who completed the survey and met PA eligibility criteria, were called, received information about Keep Active Minnesota and were asked if they were interested in participating.

A second phase represented primary study recruitment. This phase consisted of three recruitment methods – direct mail to members who met age, enrollment and health history criteria; targeted mail to members who met these same eligibility criteria and were either known ethnic minorities or had been involved in activity programs; and self-referrals to the program. Recruitment proceeded both via direct mail recruitment, starting in December 2004, and via self-referral, starting in March 2005. The direct mail recruitment packet included a cover letter similar to that used in Phase I; however, the back of the cover letters contained screening questions to determine eligibility and interest. Recipients were asked to answer these questions and return them. Upon receipt of these screeners, interested PA eligible respondents were contacted by phone. These direct mailings were sent in December, 2004 (n=1995); January, 2005 (n=2296); February, 2005 (n=2098); and April, 2005 (n=2996).

We implemented two direct mail strategies to increase representation of racial/ethnic minorities in the study population. First, direct mail recruitment packets were sent to all age, co-morbidity and enrollment eligible health plan members who were identified as racial/ethnic minorities in the health plan administrative database. Because collection of information on race/ethnicity had only recently begun in the health plan, the number of potentially eligible individuals so identified was only about 2,100 out of the initial sampling frame of 104,000. Second, geographically targeted direct mailings were conducted to more than 2,000 age, co-morbidity and enrollment eligible health plan members residing in census tracts in which minority individuals were over-represented (>= 40% racial/ethnic minorities, based on Census 2000 counts). Targeted mailings based on self-reported race/ethnicity recorded in health plan administrative data were incorporated into the direct mailings sent in December, 2004 (n=499 of 1994); January, 2005 (n=747 of 2993); and February, 2005 (n=900 of 2998). Geographically targeted mailings were sent in March, 2005 (n=2084).

The final two direct mailings were targeted to eligible health plan members who had previously engaged in one of two health plan programs that promote physical activity. In May, 2005, n=3127 mailings were sent to participants in the “Frequent Fitness” program paying a monthly rebate to health plan members who visit participating health clubs a minimum of eight times per month. In July, 2005, n=3963 mailings were sent to health plan members participating in the “10,000 Steps” mail and web based physical activity program that uses a pedometer.

In addition to direct mail recruitment, inexpensive forms of advertising began in March 2005 to generate self-referrals to intervention staff who conducted phone-based, real-time eligibility

screening of interested individuals. Brief descriptions of the study and eligibility criteria were placed in a variety of print, email and web media. Venues included a magazine that is sent to all health plan members; the health plan web site; an electronic newsletter to health plan employees; posters and brochures at all metropolitan YW and YMCA's; a targeted email from a large employer to all age eligible employees with health plan insurance; and two other large employers included the brief descriptions in electronic newsletters to employees.

Table 1 summarizes recruitment efforts by method, timing, target population, number contacted, and number recruited.

Study Measures

In this paper, we report primarily on the following measures which we collected during the screening phases of recruitment.

(i) General demographics—We included in our brief-screener measures of sex, age, educational attainment, employment status, race/ethnicity, marital status, and household income. In order to compare those completing the brief-screener to the entirety of the sampling frame, we supplemented the self-report data using data on sex and age from health plan administrative data for the overall sample frame. Similarly, we use U. S. Census 2000 counts for the Minneapolis/St. Paul MSA as proxy measures to characterize the sample frame in terms of educational attainment, employment status, race/ethnicity, marital status, and household income.

(ii) Meeting ACSM PA guidelines—We assessed participation in moderate and vigorous PA using a modified subset of questions from the RAPA (Rapid Assessment of Physical Activity)[34]. We asked respondents to indicate how physically active they had been over the preceding four weeks, asking about vigorous PA prior to moderate activity. Vigorous activity was assessed by asking, "Vigorous physical activity, like running, cross country skiing, or vigorous bicycling, causes your heart to beat much faster than normal. Over the past 4 weeks, how many days per week did you do **vigorous** physical activities for 20 minutes or more per day?" Moderate PA was assesses by asking, "Moderate physical activity like fast walking, dancing, easy bicycling, or swimming, causes your heart to beat faster than normal. Over the past 4 weeks, how many days per week did you do **moderate** physical activities for 30 minutes or more per day?" In both cases, response options ranged from zero to seven days.

(iv) Self-reported health—The brief-screener included the general health question from the SF-12[35], history of having been told by a health care professional that one has or had a list of chronic conditions (e. g. high cholesterol, hypertension, diabetes, etc.), and whether, over the prior year, one's health had improved or declined, and whether they had experienced a "medical event."

(v) Body mass index—We computed BMI from self-report weight and height (kg/m^2).

Analyses

The goal of these analyses was to quantify sample composition changes in the pool of prospective study participants at each phase of recruitment and enrollment. Starting with the characteristics of the sampling frame, were differences observed between those who were screened for study eligibility, those determined to meet eligibility criteria and those eligible participants who enrolled in the study?

Point estimates (i. e., means, percentages) were calculated for all data elements available from individuals whose study participation continued or stopped at each step of recruitment and

enrollment. At each step, bivariate statistics (i. e., t-test, chi-square) compared the personal characteristics of individuals who continued on to the next step to those whose participation stopped. These analyses were carried out separately on two sampling frames, the phase I sampling frame and the entire study sampling frame (including the phase I sampling frame), due to differences in data that were available in each frame.

Results

The phase I sampling frame consisted of N=3993 members, of whom n=1620 were screened for eligibility (40.5%). For the study as a whole, n=6451 of 24705 members were screened (26.1%). The comparison of those who were screened to those unscreened (see Table 2) revealed that they were more likely to be women and were slightly older than those not screened in both phase I (χ^2=16.92, p<.001; t=5.90, p<.001) and overall study recruitment (χ^2=156.88, p<.001; t=5.71, p<.001). Those who were screened were also more likely to have a 4 year college degree (z=12.51, p<.001), be employed (z=9.51, p<.001), have a spouse (z=5.37, p<.001) and have an annual income of at least $50,000 (z=6.07, p<.001) compared to community-based estimates. They were also less likely to meet the ACSM recommended 30 minutes of moderate activity 5 days per week (z_{phaseI}=5.24, p<.001, z_{study}=7.97, p<.001) but more likely to meet the recommendation for 20 minutes of vigorous activity at least 3 days per week (z_{phaseI}=6.49, p<.001, z_{study}=8.11, p<.001). Based on these data, sampling frame members who agreed to be screened for participation in this physical activity trial were more likely to be women, a year older, and have a higher socioeconomic status as indicated by education, employment and income. They may have also been more physically active than their counterparts in the community.

In the study overall, 32.5% of those screened were determined to be study eligible (n=2098 of 6451) once the physical activity criteria were applied. As expected, this produced a sample of eligible members who were more active according to our study entry criteria and the ACSM recommendations than those who screened ineligible (see Table 3). Many (phase 168.7%; study 74.2%) of the ineligible members engaged in moderate or vigorous physical activity at least two days per week, thus meeting the minimal PA requirement for eligibility. However, because these individuals further reported *stability* in their activity for at least the prior year, they were not study eligible. Of those who screened eligible, most engaged in more physical activity at screening than they had been in the prior year (78.6%), although some had made a full (17.0%) or partial (4.4%) return to a PA regimen after being inactive for at least some portion of the year.

The application of the PA criteria also resulted in a sample of eligible screened members who were more likely than their ineligible counterparts to be younger (t_{phaseI}=5.66, p<.001; t_{study}=6.71, p<.001), and to be female (χ^2_{study}=85.50, p<.001). It should be noted that the significant change in age results in an eligible group who is similar in age to the original sample frame. In phase I it appeared that those who met the PA eligibility criteria may have had a higher socioeconomic status and been healthier than those who did not as they were more likely to be college educated (χ^2_{phaseI}=12.99, p<.001) and employed (χ^2_{phaseI}=4.13, p<.05), and to say that they were in very good or excellent health (χ^2_{phaseI}=6.74, p<.01) and that their health had improved over the past year (χ^2_{phaseI}=109.19, p<.001).

About half of those who were study eligible chose to enroll in both the initial phase of recruitment (138 of 312 = 44.2%) and overall (1049 of 2098 = 50.0%). As seen in Table 4, there were few differences between enrollees and non-enrollees once eligibility had been established. There was evidence in phase I that the enrollees may be more likely to be college educated (χ^2_{phaseI}=4.89, p<.05). Otherwise, there was no evidence of enrollment bias based in demographic, health or physical activity characteristics.

While the majority of study enrollees were recruited via direct mailings (n=824), roughly one-quarter of enrollees were recruited via a self-referral process (n=225). Participants recruited through direct mail were compared to those who self-referred on a number of characteristics assessed at study baseline, including socio-demographic characteristics, BMI, physical activity and functional health status. Those who self-referred were less likely to be male ($p<.001$) and to report poor functional health status ($p=.03$) than those who were recruited by direct mail. Those who self-referred were also slightly more likely to report being non-Hispanic White, though this difference was only marginally significant ($p<.09$). No other comparisons by recruitment method were statistically significant.

Discussion and Conclusions

By recruiting older adults from within a defined population with a known denominator, and using health plan administrative data and a brief survey in the first phase of recruitment, the Keep Active Minnesota study was able to quantify volunteer and enrollment biases as study recruitment proceeded from sample frame to eligibility, to enrollment. Interestingly, we observed relatively few differences between eligible individuals who did and did not enroll in the study, but more pervasive differences at the point of initial contact with potential subjects. These differences encompassed demographic, socioeconomic, and behavioral characteristics. Overall, we recruited 50% of individuals who were screened as eligible, a figure that compares favorably to recruitment rates in other recent physical activity intervention studies recruiting inactive older adults, which have ranged from 17% to 33%.[21,22,24]

The pattern of our specific findings is also of particular interest for what it may tell us about the likely underlying sources of volunteer bias that have been observed in many previous behavioral intervention studies. The under-representation of men in the study relative to women results largely from the fact that, 1) men were less likely to respond to our screening invitation or to self-refer, and 2) men who *were* screened were less likely to be found eligible to participate than were women. Among those who screened eligible, men and women enrolled in proportions that were not significantly different. While the average age of those who screened ineligible was significantly higher than the average, the average age of eligibles, enrolled or not, was very close to the sample frame average. With respect to education and income, we find that enrollees were more likely to have a college or higher education, and had relatively higher incomes than eligible individuals who did not enroll – though the latter difference was only marginally significant.

Although we do not have a full complement of demographic characteristics for the sample frame itself, qualitative comparisons with Census 2000 counts of similar aged individuals in the Minneapolis/St. Paul metropolitan statistical area suggest that those we screened were of generally higher SES than the metropolitan area as a whole, with more years of education, more likely to be employed, more likely to have high income. Moreover, study subjects were more likely to have a spouse, though they were comparable in terms of race and ethnicity. Comparisons of the health plan membership to the composition of the metropolitan area (data not presented) suggest that health plan demographics mirror those of the metro area, leading us to believe that the majority of the demographic differences we observe here have more to do with bias in terms of who was willing to complete and return our brief screening survey than to systematic differences between health plan members and the general population. While we observed some smaller demographic differentials appearing between those screened, those found eligible and those enrolling, most of these differences were not statistically significant.

Increasing the proportion of the total population at recommended levels of physical activity is a critically important public health goal. From this perspective, one strength of our study is that we have focused our attention on a population sub-group that has typically been overlooked

in physical activity promotion programs; physical activity self-starters. Because the little we know about this group suggests that for many, such self-starting efforts decay rapidly,[37,38] helping such individuals to maintain a physically active lifestyle could help increase the overall population level of physical activity. On the other hand, focusing on this group creates a form of "double" volunteer bias – first in "volunteering" to be physically active, and second, by enrolling in the study. Thus, it becomes important to consider the impact of the added eligibility criterion (recently increased PA above a minimum threshold) on the composition of the enrolled sample. Given the paucity of literature regarding those who self-start physical activity,[37,38] we currently know little about how they may or may not differ from the general population. One hypothesis is that this group is more weighted toward those favorably predisposed towards physical activity, or towards health promotion or engagement in preventive activities more generally. Demographically, we might expect this group to look more like that sub-group of slightly less than half the general population (45%) that meets physical activity guidelines. Thus we would expect this group to be younger, more likely to be male, and to be a healthy weight, more highly educated, and less likely to be of minority race/ethnicity.[39]

It is noteworthy that aside from education, few other characteristics differ between eligible individuals who did and did not enroll in the study – suggesting that this decision point didn't appear to introduce much bias into the enrolled sample. By contrast, at the point of initial screening, we find numerous differences between those who were and were not willing to be screened. Specifically, those willing to be screened (via completion of the mailed screener) appear to be of generally higher socioeconomic status, were more likely to be vigorously physically active, slightly older, and more likely to be female. Thus, this initial decision point appears to be a more potent source of bias in the recruitment and enrollment process.

Our findings are generally consistent with those studies, most of which have found that, compared to individuals who choose not to enroll in such studies, those willing to enroll tend to be in better health, more favorably disposed towards health promotion and PA in general, drawn from higher socioeconomic groups, and more likely to be female.[18,21–24] The existing literature is not entirely consistent on this point as at least two studies of community-based health promotion programs for seniors have found that participants were more likely than non-participants to have less favorable profiles in terms of characteristics such as mental health, history of disease and behavioral risk factors for chronic diseases.[17,19] Nonetheless, the overall picture that emerges from this literature is consistent with other recent evidence that "stage of change" is positively associated with socioeconomic status.[36]

These findings raise the question of whether health promotion and physical activity promotion programs are ever likely to reach the population subgroups who might benefit the most from increasing their physical activity, or whether they are destined to reach only a highly selected group of people. Such programs may be beneficial for the subsets of the population that they reach, but clearly, other means and methods are needed if we hope to increase the physical activity of the population as a whole, and particularly if we hope to increase activity among the most recalcitrantly sedentary segments of the population.

It may be worth considering some common constructs underlying both enrollment into an intervention study, and long term maintenance of behavior change, as this may suggest areas for future investigation. Both require individual awareness, interest and motivation – or in other words, a reliance on the vigilance and activation of individuals. While a certain, likely highly selected subset of a population may be spurred to such vigilance and activation through health promotion efforts and programs, it seems equally obvious that there is another, potentially large subset of the population that will likely always remain untouched and unmoved by such efforts. Moreover, even among activated individuals, vigilance and activation can be difficult to sustain

with respect to a given area of behavior, in part because individuals have a limited capacity for self-management, and complex lives that frequently interrupt their efforts in one area with demands for expending self-management resources in other areas of their lives. As David Mechanic has recently argued, “Good health behaviors that flow naturally from everyday patterns of activity and experiences are more readily sustained than are artificial interventions imposed on already complex lives.[40]

In summary, our study design and results suggest that a public health strategy of improving reach into the population by segmenting the population and offering a variety of approaches that appeal to various segments is appropriate and deserves further theoretical development and broader application. Additional work that assesses shifts in patterns of physical activity over time, “harvests” those who become active, and supports their continued activity is promising, but, like other strategies, has uneven appeal across various segments of the target population.

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Table 1

Recruitment methods, targets, timing, and yield.

Method	Date	Target of Mailings					N sent	Yield
		None	Minority		Prior Activity program			
			Admin	Geographic	Frequent Fitness[(a)]	10,000 steps[(b)]		
Pilot-Mail	Jul 2004	3993					3993	138
Direct-Mail	Dec 2004	1495	499				1994	44
	Jan 2005	2246	747				2993	81
	Feb 2005	2098	900				2998	80
	Mar 2005			2084			2084	42
	Apr 2005	2996					2996	118
	May 2005				3127		3127	258
	Jul 2005					3963	3963	63
Self-Refer		557					557	225
TOTAL		13385	2146	2084	3127	3963	24705	1049

[(a)]"Frequent Fitness" is a program paying a monthly rebate to health plan members who visit participating health clubs a minimum of eight times per month.

[(b)]"10,000 Steps" is a mail and web based physical activity program that uses a pedometer.

Table 2

Comparing personal characteristics of phase I and study sampling frame members who were and were not screened for eligibility.

	phase I frame, not screened	screened	study frame, not screened	screened
N	2373	1620	18254	6451
% female	49.2	55.8***	53.3	62.3***
average age	56.6	57.6***	56.8	57.2***
% moderate PA 5+ days/wk	29.7(a)	23.7***	29.7(a)	25.1***
% vigorous PA 3+ days/wk	23.0(a)	29.9***	23.0(a)	27.3***
% active 2+ days/wk		74.8		82.7
% newly active		22.7		33.8
% full PA recovery		7.3		6.7
% partial PA recovery		0.9		1.8
% education ≥ BA	34(b)	48.9***		
% employed	57(c)	68.7***		
% non-Hispanic White	93(d)	93.1		
% with spouse	71.4(e)	77.5***		
% ≥ $50k / year income	61(f)	68.8***		

*** p<.001

(a) based on 2005 BRFSS data for Minnesota – ages 55–64. (Note: The NCHS website gives the 3d/vigorous breakout, and the "3d/vigorous OR 5d/moderate" total as 52.7% for age group 55–64. We derived the 5d/moderate proportion by subtracting the 3d/vig from the total.)

(b) based on Census 2000 counts for Mpls/St. Paul MSA – ages 45–64.

(c) based on Census 2000 counts for Mpls/St. Paul MSA – ages 55–69.

(d) based on Census 2000 counts for Mpls/St. Paul MSA – ages 50–69.

(e) based on Census 2000 counts for Mpls/St. Paul MSA – "married, spouse present" – ages 55–64.

(f) based on Census 2000 counts for Mpls/St. Paul MSA – household income – ages 55–64.

Table 3

Comparing personal characteristics of phase I and study sampling frame members who were screened as study ineligible or eligible.

	phase I screened		study screened	
	not eligible	eligible	not eligible	eligible
N	1308	312	4353	2098
% female	54.9	59.6	58.4	70.3***
average age	58.0	56.2***	57.5	56.6***
% education ≥ BA	46.7	58.2***		
% employed	67.6	73.6*		
% non-Hispanic White	93.2	92.6		
% with spouse	77.4	78.0		
% ≥ $50k / year income	68.7	69.0		
% moderate PA 5+ days/wk	21.9	31.3***	22.9	29.6***
% vigorous PA 3+ days/wk	26.5	44.8***	25.2	31.7***
% active 2+ days/wk	68.7	100***	74.2	100***
% newly active	11.0	68.0***	10.9	78.6***
% full PA recovery	1.6	29.2***	1.4	17.0***
% partial PA recovery	0.4	2.9***	0.4	4.4***
BMI	27.5	27.8		
% excellent, very good health	49.5	57.8**		
% high cholesterol	44.9	44.2		
% hypertension	34.4	30.5		
% diabetes	7.4	8.0		
% lower body arthritis	20.3	21.2		
% health improved prior yr	10.1	33.3***		
% health declined prior yr	12.7	11.2		
% with medical event prior yr	16.1	20.2+		

*** p<.001,

** p<.01,

* p<.05,

+ p<.10

Table 4

Comparing personal characteristics of phase I and study sampling frame members who screened eligible and did or did not enroll.

	phase I		study	
	not enrolled	enrolled	not enrolled	enrolled
N	174	138	1049	1049
% female	58.1	61.6	68.5	72.2+
average age	56.4	55.9	56.5	56.7
% education ≥ BA	52.6	65.2*		66.7
% employed	70.5	77.4		76.8
% non-Hispanic White	90.8	94.9		93.0
% with spouse	77.1	79.3		74.0
% ≥ $50k / year income	64.4	74.2+		79.5
% moderate PA 5+ days/wk	33.7	28.2	31.4	27.7+
% vigorous PA 3+ days/wk	46.3	42.8	31.6	31.8
% active 2+ days/wk	100	100	100	100
% newly active	69.5	65.9	77.5	79.8*
% full PA recovery	27.6	31.2	17.9	16.0
% partial PA recovery	2.9	2.9	4.6	4.2
BMI	27.6	27.9		27.6
% excellent, very good health	55.7	60.5		65.9
% high cholesterol	40.8	48.6		42.6
% hypertension	33.3	26.8		30.8
% diabetes	6.9	9.4		5.8
% lower body arthritis	19.0	23.9		23.6
% health improved prior yr	35.1	31.2		40.9
% health declined prior yr	12.1	10.1		8.0
% medical event prior yr	19.0	21.7		24.3

*p<.05,

+p<.10