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Management of persistent pain in older adults: the MOBILIZE Boston Study

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Abstract

Objectives—To describe the prevalence of pharmacological (PS) and nonpharmacological (NPS) pain management approaches used by older adults with persistent pain, and identify characteristics associated with use of these approaches.

Design—Population-based cohort

Setting—Urban and suburban communities in the Boston, Massachusetts area.

Participants—765 adults aged ≥64 years underwent a home interview and clinic exam. Those reporting any persistent pain were included in this analysis (N=599).

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Conflict of Interest

The authors confirm no conflict of interest.

Authors Contributions

Conception & design: Stewart, Leveille

Provided study materials (MBS Cohort): Leveille, Shmerling, Samelson, Bean

Statistical analysis: Stewart, Leveille, Samelson

Interpretation of data: All authors

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Critical intellectual revisions: All authors

Final approval: All authors

Measurements—All prescription and non-prescription medications were recorded during the home interview. NPS for pain management were assessed using a modification of the Pain Management Inventory. The baseline assessment included extensive measures of pain, health and functioning.

Results—More than one third (37.5%) of participants reported using both PS and NPS modalities. Thirty-one percent reported use of NPS alone and 11.5% used PS alone. NPS were reported more frequently than PS (68.4% vs. 49%). Women (odds ratio (OR)=2.2, 95% confidence interval (CI)=1.26-3.82), those with knee OA (OR=3.07, 95% CI 1.6,- 5.9) and with moderate to severe pain (OR=5.02, CI-2.23,11.28) were more likely to report combined use of both PS and NPS. Characteristics associated with individual NPS modalities varied greatly.

Conclusion—Only one-third of older adults with persistent pain reported pain management strategies consistent with current guidelines. Further research is required to understand reasons behind choices, barriers to adherence and the benefits of multiple modalities used by older adults who have persistent pain.

Keywords

Persistent pain; chronic pain; pain; pain management; elderly; aged; complementary therapies; analgesics

INTRODUCTION

Pain affects about half of community-dwelling older adults ¹ and leads to disability ², social isolation ³, depression ¹⁻² and falls ⁴. Nonetheless, several studies have found that pain management in older adults is often limited and inadequate ⁵⁻⁶. Few population studies have examined the use of the many available pain management strategies by older adults. Therefore, an understanding of current pain management practices and factors related to choice of pain management strategies is needed to inform clinical care.

Current geriatric recommendations are that pain treatment plans include both pharmacologic (PS) and nonpharmacologic strategies (NPS) ⁷. Analgesics prescribed and over the counter (OTC), are commonly used by older adults as a first line management strategy ⁸. Cautious prescribing practices, resulting from increased risks of side effects and adverse drug reactions, coupled with competing treatment priorities for co-morbidities, means pharmacologic management of pain in older adults is often insufficient ⁷. Additionally, many older adults have concerns about using analgesics ⁹, resulting in under-use of potentially helpful treatments ⁶. NPS, such as physical therapy, chiropractic care, and many other therapies offer an alternative, or complementary, approach to pharmacologic pain management ¹⁰. However, limited evidence of efficacy has been found to hinder the availability of NPS ¹¹. Most concerning is that some older adults who have pain use no pain therapies, particularly those who have cognitive impairments and the oldest old ¹².

To better understand the use of pain management strategies by community-dwelling older adults, we conducted a cross-sectional study using data from the baseline visit of the MOBILIZE Boston Study (MBS), a population-based study of persons aged 70 and older living in the Boston area. This study will describe the use of both PS and NPS and the characteristics of older adults who use these pain management strategies.

METHODS

Participants

Participants of MBS, a cohort study of fall risk factors, were recruited from 2005 to 2008 using a random sample from town lists covering urban and suburban communities bounded by a five-mile radius from the Hebrew SeniorLife in Boston. The recruitment methods have been described previously¹³. Briefly, following door-to-door recruitment, 1616 potential participants were screened for participation; with a 53% response rate among eligible adults, 765 people enrolled in the study. Principally, participants were eligible if aged 70 years or older, however spouses or co-habiting companions aged 64 years or older were also eligible to participate (N=16, aged 64 to 69 years). Reasons for ineligibility included non-English speaking, unable to walk 20 feet unaided, terminal illness, severe vision or hearing deficiencies or Mini-Mental State Exam (MMSE) score of less than 18¹⁴. The baseline assessment included a 3-hour home interview and subsequent 3-hour clinic exam conducted by research nurses¹⁵. MBS was approved by the Institutional Review Boards of Hebrew SeniorLife and collaborating institutions.

For this study, we included all MBS participants who reported any pain on the Brief Pain Inventory (BPI) Severity Subscale (score>0, N=599, 78.3% of participants). The BPI Severity Subscale measures pain lasting longer than just a couple of weeks and has been validated for assessment of non-malignant pain in older adults^{16–17}. Average pain severity scores were calculated from the four numeric rating scale statements assessing pain in the last week (0= no pain, 10= most severe) when pain was at its worst, least, on average and at present. BPI severity scores were grouped approximately into tertiles: very mild (BPI<2), mild (BPI 2–3.99) and moderate to severe (≥4). The 7-item BPI pain interference subscale¹⁶ measures the degree to which pain interferes with daily activities (general activity, working inside and out of home, mood, walking, social relations, sleep and enjoyment of life). Average scores were derived from the 7 numeric rating scales (0=no interference, 10= complete interference) and coded as none (0), low (1), medium (3) or high (>3) interference.

Demographics and health

Demographic characteristics included age, gender, race and education (<12 years, 12–15, >15 years), recorded in the home interview. Self-rated health was identified as excellent, very good, good, fair or poor. Disability was assessed using the Activities of Daily Living (ADL)¹⁸ and Instrumental Activities of Daily Living (IADL) questionnaires¹⁹. Mobility difficulty was assessed by self-report of any difficulty walking a quarter mile or climbing 10 stairs unaided²⁰. Knee osteoarthritis (OA) was assessed using American College of Rheumatology criteria²¹. Anxiety was measured using the anxiety subscale of the Hospital Anxiety and Depression Scale (HADS)²². Rheumatoid arthritis and cancer were assessed by self-report of physician-diagnosed disease. Heart disease was classified through self report of any of the following: heart disease, heart attack, congestive heart failure, angina, a pacemaker, or cardiac arrhythmia. Diabetes was assessed using an algorithm based on self-reported diabetes, current use of insulin or oral hypoglycaemic agents, and laboratory measures (random blood glucose and haemoglobin A1c).

Self-efficacy

Self-efficacy for pain management was scored using the 5-item Chronic Pain Self-Efficacy (CPSE) questionnaire, which uses a 1–10 numeric rating scale (1= not certain at all, 10= very certain) to rate self-confidence in ability to undertake activities associated with pain management²³. Ratings were averaged and low self-efficacy was defined as the lowest 25% on the CPSE (scores <5.4).

Pain management strategies

PS were assessed using the 'medication inventory' method during the home interview²⁴. Referring to the medication bottles, interviewers recorded the names of all medications participants reported taking in the previous 2 weeks. Original names of medications were transformed into their respective individual active ingredients and coded as per the Iowa Drug Information Service²⁵. PS included all medications classified as non-opioid analgesics and opioid analgesics. Daily analgesic users were those who reported use of one or more analgesics taken at least on a daily basis. Low dose aspirin was not included as an analgesic in our study. To assess NPS, we used a modification of the list used in the Pain Management Inventory²⁶. Participants were asked if they were currently using any of 17 approaches for pain relief on a regular basis.

Statistical analysis

Descriptive statistics were employed to describe demographic and health characteristics and prevalence of each pain management strategy grouped as follows: no pain management, NPS, PS, or both NPS and PS. Associations between characteristics and pain management strategies were tested using chi-square statistics. We used forward stepwise multinomial logistic regression modelling (p-value for inclusion, 0.05) to determine independent associations between characteristics and pain management groups. Similarly, we used forward stepwise multivariable logistic regression modelling to determine independent associations between characteristics and individual NPS. Supplements, herbal remedies and vitamins (SHV), and meditation, relaxation and massage (MRM) were grouped to allow sufficient numbers for the multivariable modelling. There was very little missing information in the baseline interviews and examinations. However, CPSE Scores were missing for 67 participants (11%). Using forward stepwise selection, this variable was only included in the MRM model exploring demographic and health characteristics associated with use of MRM as a NPS. No adjustments to the models were made for missing data. Data were analysed using PASW 18 statistical software²⁷.

RESULTS

The average age of participants with persistent pain (N=599) was 77.8 years (SD 5.3) with a range of 64–95 years. Two-thirds of participants were female, 77% were white, non-Hispanic and 17% were black; 17% reported their health as fair or poor. The mean BPI pain severity score was 3.03 (SD 1.96) with a range from 0.25 to 10. Very mild pain was reported by 35% of participants, while 33% and 32% reported mild and moderate to severe pain, respectively. Almost half of participants (49%) reported use of one or more PS to manage pain, with one quarter (27.7%) reporting daily use. Around one in ten (11.5%) reported analgesic use as their only strategy to manage pain. According to pain groups, just over half of older adults who reported moderate to severe pain also reported use of both PS and NPS to manage pain. Regular use of one or more NPS was reported by 410 participants (68.4%). Almost one-third of all participants (N=185, 31%) reported NPS as their only pain management modality. The most common NPS were exercise (N=298, 49.7%), nutritional supplements (N=99, 16.5%), ointments (N=85, 14.2%), heat (N=83, 13.9%) and massage (N=76, 12.7%). Use of Reiki was not reported by any participants and TENS, chiropractics, vitamins, herbal remedies, magnets and acupuncture were each utilised by fewer than 5% of participants. Just over one-third (37.5%) used both PS and NPS.

We observed significant differences in use of pain management strategies according to demographic and health characteristics (table 1). Women were more likely than men to use any pain management strategy. Other factors associated with use of PS either alone or in

combination with NPS included fair or poor health, OA, mobility or ADL difficulty, more severe pain and greater pain interference with daily activities.

Participants using NPS alone, compared to the other groups, were least likely to: report fair or poor health (11.9% versus 22% of those who used both PS and NPS), be obese (Body Mass Index ≥ 30 , 19.3% versus 30% of persons using both or 38% of non-users), have low self-efficacy for pain management (19% versus 34% of persons using PS alone) and report ADL disability (19.5% versus 31.6% of those using both). Compared to persons using any strategy, non-users were more likely to be men, and those without OA, and with better self-rated health, better physical function and less pain (table 1).

In our multivariable adjusted analysis, health factors most strongly associated with combined use of PS and NPS were pain severity, pain interference and OA (table 2). For example, persons who had moderate to severe pain were five times more likely to use multimodal approaches than participants reporting very mild pain (OR=5.02, CI 2.23, 11.28). Alternatively, obese persons were least likely to use NPS alone (OR=0.29, CI 0.15, 0.56). Even after controlling for a number of health factors, women were more likely than men to use both PS and NPS combined (OR 2.2, CI 1.26, 3.82).

Choice of nonpharmacologic strategies

The characteristics of users of each NPS varied widely after multivariable adjustment (table 3). Similar to the above findings, pain severity and pain interference were strongly associated with most individual NPS modalities. Participants with a Body Mass Index ≥ 30 were less likely to report use of exercise as a pain management modality (OR=0.53, CI=0.34, 0.84). OA was associated with use of SHV (OR=2.2, CI=1.44, 3.38) and with exercise for pain management (OR=1.46, 95% CI 1.0, 2.13). Women were nearly twice as likely to report using thermal modalities compared to men (OR=1.84, CI 1.09, 3.11). The use of MRM was associated with higher self-efficacy for pain management (OR=1.19, CI 1.05, 1.36).

DISCUSSION

To the best of our knowledge, this is the first population-based study exploring both PS and NPS used by community-dwelling older adults with pain. Our results are generalizable to the broader population of English-speaking older adults with pain living in urban and suburban communities.

We found that about one-third of older adults employ strategies that are consistent with AGS (2009)⁷ recommendations to use both PS and NPS modalities to manage pain. Use of NPS was far greater than PS. Though almost half of participants reported using PS, only around a quarter reported regular use. One concerning finding was that 9% of persons reporting moderate to severe pain reported no pain management. Women, those with OA, and those with moderate to severe pain are more likely to report a combination of PS and NPS. However, associations between participant characteristics and individual NPS varied greatly. The AGS (2009)⁷ recommends analgesics be used regularly to maximize pain relief. The relatively low proportion of daily analgesic users among our participants likely reflects sub-optimal use of analgesics. A previous population study of older disabled women concluded that the majority of participants under-used analgesics⁶. This may be explained by concerns of both physicians and older adults about side effects or adverse reactions⁷. Also, it is possible that costs of analgesics, which are often over-the-counter and not covered by prescription drug insurance plans, may have been a deterrent for persons with limited incomes. Our findings that women and those with low self-efficacy for pain management

were more likely to use analgesics were reported previously⁸, though not in representative samples of older adults with pain.

Older people tend to be less frequent users of complementary and alternative medicine (CAM) compared with other age groups²⁸. This said, one population-based survey²⁹ reported 62% of the general community of older adults, regardless of pain, reporting use of at least one CAM approach in the previous year. Our findings suggest that older adults are willing, and use, a variety of NPS to manage pain. Research exploring the reasons behind older adults' use of NPS identified that pain management, dissatisfaction with conventional medicine and concerns about medication side effects were frequently reported³⁰. This may explain why we found older adults to use significantly more NPS modalities than analgesics. Our study was cross-sectional and we cannot assume the direction of any associations (i.e. does greater pain severity lead to increased use of a modality, or does use of a modality lead to reports of reduced pain severity). The standard pain management inventory method may not capture the full breadth of pain management strategies used by this population. Also, our exploration of PS was limited to oral analgesics because they are the most common medications used in the treatment of pain. Other medications to treat persistent pain include antidepressants and muscle relaxants, but we did not have information about indication for use of these medications and thus could not confirm their use as a treatment for pain. Participants reported using unspecified ointments for pain relief that may have included topical analgesics. Other non-oral PS, such as intra-articular or fluoroscopic guided injections, were not included. Although the study sample was largely representative of English-speaking older adults living in the Boston area, participants had somewhat higher levels of education than Boston elders in general. Also, the results cannot be generalized to older adults who have moderate to severe cognitive impairments since they were ineligible to participate in the study. Finally, this study did not include individuals with pain whose symptoms were eliminated by pain treatments; therefore, their choice of treatment(s) could not be assessed.

CONCLUSION

This study has found that a relatively small proportion of older adults (about one-third) who report persistent pain are using pain management strategies consistent with current geriatric guidelines. Use of NPS by older adults with pain is very common and may reflect the general avoidance of recommendations or prescriptions for PS by health care providers caring for older adults. Substantial differences exist in the characteristics of those who utilise individual strategies, and our findings may inform future research in this area. Future studies should build upon existing knowledge of older people's preferences for pain management strategies to facilitate improved adherence and targeting of pain management interventions for older adults living in the community. Clinicians should consider the potential influences of older adults' preferences and experiences with pain management when recommending pain management strategies.

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Demographic and Health Characteristics According to Pain Management Strategy Among Older Adults with Persistent Pain (N=599), The MOBILIZE Boston Study.

Table 1

	All N=599 (N=, %)	None N=120 (N=, %)	NPS N=185 (N=, %)	PS N=69 (N=, %)	PS & NPS N=225 (N=, %)	p-value*
Age (Mean,±SD)	77.8(5.3)	77.3(5.1)	78.5(5.6)	77.5(4.8)	77.7(5.3)	.06
Gender (Women)	400 (66.8)	84 (56)	115 (62.2)	49 (71)	170(75.6)	0.001
Race (White)	460(76.8)	96(80)	141(76.2)	55(79.7)	168(75)	0.93
Education (16 years)	276(46.1)	60(50)	88(47.6)	21(30.9)	107(47.6)	0.15
Self-reported Health (Fair-Poor)	99(16.5)	15(12.5)	22(11.9)	13(18.8)	49(21.8)	0.02
Body Mass Index (Obese)	169(28.2)	44(37.9)	35 (19.3)	24 (34.8)	66(30.1)	0.02
Chronic Diseases Knee Osteoarthritis	181(30.2)	16(13.3)	55(29.7)	23(33.3)	87(38.8)	<.0001
Rheumatoid Arthritis	36(6)	4(3.3)	12(6.5)	6(8.7)	14 (6.2)	0.48
Cancer	144(24)	26(21.7)	42(22.7)	19(27.5)	57(25.3)	0.79
Diabetes	125(20.9)	24(20)	42(22.7)	17(24.6)	42(18.7)	0.64
Heart Disease	151(25.2)	57(47.5)	75(40.5)	32(46.4)	86(38.2)	0.32
Anxiety(HADS) (Mean,±SD)	3.9(2.97)	3.18(2.74)	4.14(3.02)	4.17(3.39)	4(2.87)	0.006
Low self efficacy (CPSE) [†]	132(22)	21(21.9)	32(19)	21(33.9)	58(28.2)	0.06
Mobility Difficulty	230(38.4)	37(30.8)	57(30.8)	30(43.5)	106(47.1)	0.002
ADL difficulty	151(25.2)	24(20)	36(19.5)	20(29)	71(31.6)	0.02
BPI Pain Severity Scale						
Very Mild	210(35.1)	68(56.7)	78(42.2)	17(24.6)	47(20.9)	
Mild	200(33.4)	35(29.2)	62(33.5)	27(39.1)	76(33.8)	
Moderate- Severe	189(31.6)	17(14.2)	45(24.3)	25(36.2)	102(45.3)	<.0001
BPI Pain Interference Scale						
None	125(20.9)	51(42.5)	42(22.7)	16(23.2)	16(7.1)	
Low	144(24)	35(29.2)	54(29.2)	8(11.6)	47(21)	
Medium	162(27)	19(15.8)	50(27)	18(26.1)	75(33.5)	
High	167(27.9)	15(12.5)	39(21.1)	27(39.1)	86(38.4)	<.0001

None= Participants reporting no pain management strategies, PS= Participants reporting any use of analgesics as only pain management strategy, NPS= Participants reporting use of 1+ non-pharmacologic pain management strategies only, PS & NPS= Participants reporting any use of analgesics and use of 1+ non-pharmacologic pain management strategy, HADS= Hospital Anxiety and Depression Scale

CPSE= Chronic Pain Self Efficacy score, any disability was defined by use of the Activities of Daily Living questionnaires (ADL), BPI= Brief Pain Inventory... Any mobility disability was defined by self-report. Knee OA classified as per ACR criteria, Rheumatoid Arthritis and Cancer were classified as per self-report of physician diagnosis, Diabetes classified as per algorithm bases on self-report, use of insulin or oral hypoglycaemic agents and laboratory measures of blood glucose and haemoglobin A1c, Heart disease classified through self-report of heart disease, heart attack, congestive heart failure, angina, pacemaker or cardiac arrhythmia.

* Pearson chi-square test of between-group differences for categorical variables and pairwise t-test for continuous variables (age and anxiety score). A borderline significant difference was detected using the t-test for mean group ages between none and NPS only [p-value as shown]. The only significant difference detected by the t-test for anxiety was between none and NPS only [p-value as shown]

[†]Chronic Pain Self Efficacy Scores were missing for 67 participants.

Table 2

Predictors of Pain Management Approach Used by Older Adults with Persistent Pain (BPI>0, N=599)*

	NPS	PS	PS & NPS
	(N=180)	(N=69)	(N=213)
	OR (95%CI)	OR(95%CI)	OR(95%CI)
Women (<i>vs. men</i>)	1.23 (0.73, 2.07)	1.66 (0.84, 3.3)	2.2 (1.26, 3.82)
Fair or poor health	0.56 (0.23, 1.36)	0.56 (0.2, 1.59)	0.52 (0.22, 1.21)
BMI 30 (<25= 1.0)	0.29 (0.15, 0.56)	0.67 (0.29, 1.56)	0.46 (0.23, 0.91)
Knee Osteoarthritis	2.64 (1.37, 5.07)	2.41 (1.11, 5.22)	3.07 (1.6, 5.88)
Anxiety Score (HADS)	1.06 (0.96, 1.16)	1.02 (0.91, 1.14)	0.98 (0.89, 1.08)
BPI Pain Severity (Very Mild=1.0)			
Mild	1.48 (0.82, 2.68)	2.48 (1.12, 5.49)	2.37 (1.27, 4.45)
Moderate-Severe	2.36 (1.05, 5.32)	3.29 (1.21, 8.94)	5.02 (2.23, 11.28)
BPI Pain Interference (None=1.0)			
Low	1.60 (0.86, 3.0)	0.69 (0.26, 1.83)	4.08 (1.91, 8.69)
Moderate	2.19 (1.02, 4.69)	2.37 (0.92, 6.12)	9.68 (4.15, 22.56)
High	1.72 (0.68, 4.35)	3.27 (1.11, 9.6)	8.58 (3.22, 22.85)

BMI 30= Body Mass Index, Obese.

* Multinomial logistic regression models using forward stepwise selection (p-value<0.05). All OR's in comparison to those reporting no pain management (Reference group= None).

Table 3
Demographic and Health Characteristics' Associated with Use of Nonpharmacologic Pain Management Strategies*

	B	p	OR	(95% C.I.)
Exercise (n= 298)				
BPI Severity:				
Mild	.11	.62	1.12	(0.73, 1.71)
Mod-Sev.	.54	.04	1.71	(1.04,2.81)
BPI Interference:				
Low	.74	.004	2.11	(1.27, 3.49)
Mod.	.74	.005	2.1	(1.25,3.53)
High	.44	.13	1.56	(0.88, 2.76)
BMI:				
25–29 (overweight)	–.20	.34	0.82	(0.54, 1.23)
30 (obese)	–.63	.007	0.53	(0.34, 0.84)
Knee OA	.38	.05	1.46	(1.0, 2.13)
Supplements (dietary), Herbal Remedies and Vitamins (n= 123)				
Gender	.45	.06	1.57	(0.98, 2.49)
(Women)				
Education:	.89	.04	2.42	(1.02, 5.73)
12–15yrs				
16yrs	1.19	.006	3.27	(1.40, 7.65)
Knee OA	.79	<.0001	2.2	(1.44, 3.38)
Thermal (Cold or Heat Modalities) (n= 110)				
Gender	.61	.02	1.84	(1.09, 3.11)
(Women)				
BPI Severity:	–.04	.91	0.96	(0.51,1.82)
Mild				
Mod-Sev.	.69	.04	1.99	(1.03, 3.84)
BPI Interference:				
Low	1.23	.01	3.41	(1.31, 8.85)
Mod.	1.53	.001	4.61	(1.81, 11.72)
High	1.68	.001	5.34	(2.06, 14.03)
Meditation, Relaxation and Massage (n= 119)				
BPI Severity:	.43	.18	1.50	(0.83,2.87)
Mild				
Mod-Sev	1.16	.001	3.19	(1.64,6.17)
BPI Interference:				
Low	.89	.04	2.45	(1.06,5.67)

	B	P	OR	(95% C.I.)
Mod.	1.34	.002	3.83	(1.67, 8.79)
High	1.17	.01	3.20	(1.30, 7.87)
Average CPSE [‡]	.18	.006	1.19	(1.05, 1.36)
Physical Therapy (n= 37)				
Age (yrs)	.07	.04	1.07	(1.0, 1.14)
Education:				
12–15yrs	1.41	.18	4.09	(0.51, 32.6)
16yrs	2.24	.03	9.40	(1.22, 72.1)
BPI Interference:				
Low	.27	.72	1.31	(0.30, 5.65)
Mod.	1.12	.10	3.05	(0.82, 11.32)
High	1.54	.02	4.68	(1.30, 16.84)
Braces and Splints (n= 44)				
BPI Severity:				
Mild	.81	.09	2.25	(0.89, 5.67)
Mod-Sev	1.09	.02	2.96	(1.20, 7.31)
HADS	.09	.06	1.10	(1.0, 1.21)

* Multivariable logistic regression models using forward stepwise selection (p-value<0.05). BMI= Body Mass Index, Knee OA= Knee Osteoarthritis, For age, and BPI Pain severity and interference scales, continuous forms of the variables were used in the models. Education groups were <12, 12–15, 16 years. BMI groups were <25, 25–30 and >30. Reference categories: BPI Severity (Very Mild, BPI <2), BMI (Normal weight, BMI <25), Education (<12 yrs formal education), Gender (men), BPI Interference (None, BPI=0), Average CPSE (0).

[‡] CPSE scores were missing for 67 participants.