



# Characterizing primary care patient referrals and attendance patterns for virtual lifestyle medicine shared medical appointments

Dominique L. Popescu<sup>a,b,\*</sup>, Ryan A. Mace<sup>a,b</sup>, Anna Baggett<sup>c</sup>, Jacob B. Mirsky<sup>b,c</sup>

<sup>a</sup> Center for Health Outcomes and Interdisciplinary Research, Department of Psychiatry, Massachusetts General Hospital, Boston, MA, USA

<sup>b</sup> Harvard Medical School, Boston, MA, USA

<sup>c</sup> Division of General Internal Medicine, Massachusetts General Hospital, Boston, MA, USA

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## ABSTRACT

**Objective:** To better understand patient engagement in a Lifestyle Medicine Shared Medical Appointment (LMSMA) program with Health and Wellness Coaching (HWC).

**Methods:** From July 2022 to June 2023, adult patients were referred to the Massachusetts General Hospital Healthy Lifestyle Program by primary care providers or self-referred in LMSMAs and HWC, both virtual programs supporting lifestyle behavior change. Demographic and clinical data extracted from electronic medical records were analyzed to assess associations with engagement using independent samples *t*-test, Chi-squared, Fisher exact-test, and odds ratios.

**Results:** In total, 1315 patients enrolled in LMSMAs and 947 (72.0 %) attended at least one session. Also, 151 patients (15.9 %) attended at least one HWC session. For LMSMAs, age was associated with higher enrollment (OR = 1.02, CI = 1.01–1.03) and attendance (OR = 1.02, CI = 1.01–1.02), male sex was associated with lower enrollment (OR = 0.64, CI = 0.48–0.87) but higher attendance (OR = 1.46, CI = 1.04–2.06). Lower education was associated with lower attendance (OR = 0.42, CI = 0.21–0.83). For HWC enrollment, male sex was associated with higher enrollment (OR = 1.96, CI = 1.19–3.41). Black race (OR = 2.90, CI = 1.36–7.60), Hispanic ethnicity (OR = 2.05, CI = 1.07–4.44), and lower education (OR = 1.71, CI = 1.20–2.46) were associated with higher HWC enrollment.

**Conclusions:** Primary care provider- and self-referred patients both attend LMSMAs and HWC. Both LMSMAs and HWC may reach a racially and educationally diverse subset of patients. Research is needed to better understand the role that age, sex, race, and ethnicity play in LMSMA and HWC participation.

## 1. Introduction

Lifestyle Medicine is an evidence-based approach to preventing and treating chronic disease by modifying behaviors to optimize health (Kushner and Sorensen, 2013; About Us, 2025). Exercise and nutrition counseling are part of Lifestyle Medicine approaches recommended for all patients in the United States to prevent and manage many chronic diseases, including Type 2 Diabetes Mellitus, hypertension, and dementia (Whelton et al., 2018; Jackson et al., 2021). However, several key social barriers to chronic disease management exist. For example, limited health literacy contributes to many patients being unaware of the empirical support for Lifestyle Medicine approaches (Schwarz et al., 2022). Further, limited support networks can reduce access to information about healthcare options through a lack of emotional or

logistical assistance for attending appointments, forcing family caregivers to prioritize caregiving responsibilities over their own healthcare needs (Hall et al., 2022). Moreover, providers have limited time to deliver general education and individualized behavior-related recommendations (Bouma et al., 2022; Kolasa and Rickett, 2010; Pearl, 2023). Consequently, many patients do not benefit from Lifestyle Medicine as part of routine clinical care (Jackson et al., 2021; Mirsky and Horn, 2020). The lack of access to and availability of Lifestyle Medicine programs are likely contributing factors to the low national levels of chronic disease control, such as for hypertension and obesity (Kushner and Sorensen, 2013; Pearl, 2023).

Lifestyle Medicine Shared Medical Appointments (LMSMAs) are an efficient delivery model for addressing gaps in chronic disease care (Mirsky and Horn, 2020; Mirsky and Thorndike, 2021). Clinicians (e.g.,

\* Corresponding author at: Center for Health Outcomes and Interdisciplinary Research, 1 Bowdoin St, Boston, MA 02114, USA.

E-mail address: [dpopescu@mgh.harvard.edu](mailto:dpopescu@mgh.harvard.edu) (D.L. Popescu).

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physicians, nurse practitioners, or physician assistants) deliver LMSMAs to groups of patients with similar disease management needs (e.g., hypertension). Through the group setting, LMSMAs address barriers to healthcare access in several ways. Seeing multiple patients simultaneously reduces wait times for appointments. Meeting as a group fosters a sense of community, encouraging patients to engage in care and adhere to treatment plans through peer support (Graham et al., 2021). Further, group settings facilitate shared learning, where patients benefit not only from the provider's guidance but also from peer insights and experiences, enhancing patient education and individualized care (Graham et al., 2021). Additionally, for stigmatized conditions, LMSMAs provide a supportive environment. A uniquely valuable feature of LMSMAs is that each patient visit is billed to insurance, leading to a financially sustainable and more affordable care delivery model for patients, clinicians, and health systems. Importantly, LMSMAs can be designed for specific populations by incorporating cultural and linguistic relevance to better address the unique needs of underserved groups and promote equitable access to quality care.

Initial research on LMSMA pilot programs or disease-specific clinical programs has shown improvements in chronic disease self-management (Mirsky, 2022; Loney-Hutchinson et al., 2009; Naik et al., 2010; Kirk et al., 2017). For example, in a pilot study of primary care patients with hypertension ( $n = 23$ , median age = 65), attendance to LMSMAs was associated with improved blood pressure and decreased antihypertensive medication dosages (Mirsky, 2022). These findings are consistent with other studies conducted in patients with hypertension (Loney-Hutchinson et al., 2009; Naik et al., 2010; Kirk et al., 2017). Importantly, patients report high levels of satisfaction with their care, and rate their care as more accessible and sensitive to their needs after participating in LMSMAs (Heyworth et al., 2014; Wadsworth et al., 2019). Furthermore, LMSMAs can connect patients with additional team members and services, such as Health and Wellness Coaching (HWC) (Compendium of Health and Wellness Coaching, 2019). HWC paired with or following LMSMA participation allows for dedicated attention to individualized facilitators and barriers to successful behavior changes. Therefore, incorporating HWC into LMSMAs programs increases access to and the availability of individualized support in setting and achieving patients' lifestyle goals to improve chronic disease management.

Despite these strengths, LMSMAs remain underutilized in most healthcare systems (Pearl, 2023). This could be in part due to the lack of research on larger LMSMA programs that reach broad populations. To our knowledge, no studies have examined the patient populations referred to, enrolled in, and attending large-scale LMSMA programming. This has likely limited the development of LMSMAs programs that can withstand operational challenges related to recruitment and retention. Therefore, engagement "best practices" for LMSMAs programs remain unclear.

Characterizing the patient population referred to and attending LMSMAs is a crucial first step in improving access and engagement in Lifestyle Medicine for improved chronic disease care. Tailored interventions and strategic improvements to Lifestyle Medicine programming will be informed by clarifying who does and does not attend LMSMA and HWC. By analyzing who is being referred, disparities in access to LMSMAs can also be identified. Further, examining attendance patterns may highlight barriers to care, such as scheduling conflicts for working patients, and inform strategies to improve participation. Additionally, investigating racial, educational, and gender-based disparities among referred and attending patients can help ensure LMSMAs are reaching historically marginalized populations.

We aimed to characterize primary care patient referrals to and attendance patterns in an LMSMA program. The Massachusetts General Hospital (MGH) Healthy Lifestyle Program is the largest LMSMA program in the United States and offers a unique opportunity to address current knowledge gaps. The MGH Healthy Lifestyle Program includes a large and established LMSMAs program, integrated HWC, and serves a diverse patient population across the Greater Boston area. We report

patient demographic characteristics and their associations with Healthy Lifestyle Program LMSMA 1) referrals, 2) enrollment, 3) attendance; as well as 4) enrollment in additional HWC services.

## 2. Methods

### 2.1. Sample

We used data captured by Electronic Medical Records during routine clinical care to understand patient referral, enrollment, and attendance patterns to the MGH Healthy Lifestyle Program. The referral period spanned July 1, 2022, to June 30, 2023. LMSMAs enrollment was assessed from July 1, 2022, to December 31, 2023, allowing at least six months for patient engagement. The MGH Internal Review Board deemed the study Not Human Subjects Research.

### 2.2. Study procedures

Some patients were referred by primary care team members while others self-referred through fliers and online platforms. Primary care providers (PCPs) were informed about the Healthy Lifestyle Program and its referral system through emails and virtual meetings. Upon PCP referral, patients received a secure message or a phone call with LMSMAs details, PCP recommendations, and enrollment instructions. Patients could enroll in additional sessions, however, disease specific LMSMAs were only available to those with the relevant condition. LMSMAs were offered as either a four-part series or single session (Supplemental Table 1). A PCP and a Health and Wellness Coach attended all 60-minute sessions, which included 30 minutes of didactic content and 30 minutes for individual check-ins with each patient. HWC uses a patient-centered approach with goal setting, self-monitoring, and motivational strategies. Interested patients received 10 free one-on-one virtual HWC sessions (i.e., one one-hour initial session and nine 30-minute follow-up sessions over six months), led by board certified coaches. Session referral, enrollment, and attendance were documented in the Electronic Medical Record.

#### 2.2.1. Four-part LMSMA series

These series aimed to educate patients on the health benefits of lifestyle changes. Three types were offered: 1) Brain Care— Patients learned about brain disease (i.e., dementia, stroke, and depression) and its links to lifestyle factors (e.g., exercise, nutrition, and stress reduction). Patients received a Brain Care Score™, assessing modifiable risk factors and guiding treatment goals (Singh et al., 2022). 2) Hypertension— Focused on lifestyle changes to lower blood pressure. Patients received a free blood pressure cuff, and the clinical team provided monitoring, self-management guidance, and medication management. 3) Prediabetes & Diabetes— Addressed lifestyle changes for lowering blood sugar levels.

#### 2.2.2. Single LMSMA sessions

Patients could enroll in single LMSMAs instead of or in addition to the four-part series. Topics included: 1) Stress Reduction & Mindfulness— Recognizing stress and using mindfulness-based strategies. 2) Nutrition for Health— Understanding food's impact on health and applying evidence-based nutrition tips. 3) Sleeping Well— Implementing evidence-based strategies to improve sleep. 4) Culinary Medicine— Exploring nutrition and learning to prepare healthy meals.

### 2.3. Measures

#### 2.3.1. Dependent variable

For this study, "referral" is defined as 1) PCP-referred as captured by Electronic Health Records or 2) self-referred by contacting the Healthy Lifestyle Program clinical team for enrollment instructions. "Enrollment" in a session is defined as scheduling a session through the online

platform and "attendance" as completing the scheduled session.

### 2.3.2. Independent variable

Patient demographics including age, sex assigned at birth, race and ethnicity, educational attainment, and preferred language were collected from the Electronic Medical Record.

### 2.4. Statistical analysis

To understand Healthy Lifestyle Program engagement, we examined demographic characteristics of PCP-referred, self-referred, and all enrolled patients. Then, we compared the demographics of the PCP-referred patients who enrolled and those who did not enroll. Next, we examined the characteristics of all enrolled patients and compared the demographics of those who attended at least one session and those who enrolled but did not attend. We also compared the demographics of LMSMA attendees who enrolled in HWC and those who did not, and we examined the characteristics of those who attended their first session. Of the 151 HWC enrollees, 146 attended their first session, so no further comparisons were pursued. Finally, we investigated the strength of the associations between patient demographic characteristics, enrollment, and attendance in LMSMAs and HWC using unadjusted odds ratios to better characterize the study sample. Demographics of the entire MGH primary care system were not available for comparison.

We aggregated the four-part and single session LMSMAs to maximize sample sizes for analyses. Statistical analyses included independent samples *t*-test, Chi-squared, and Fisher exact test, as appropriate. Odds ratios (OR) quantified associations between patient demographics and referrals, enrollment, attendance, and HWC utilization. All data analyses were completed using R software in RStudio.

## 3. Results

### 3.1. Study enrollment and attendance

From July 1, 2022, to June 30, 2023, 1431 PCP referrals were made (Fig. 1). Between July 1, 2022, and December 31, 2023, 1315 patients enrolled, including 454 PCP-referred (31.7 % of PCP referrals, 34.5 % of total enrollees) and 861 self-referred (65.5 %).

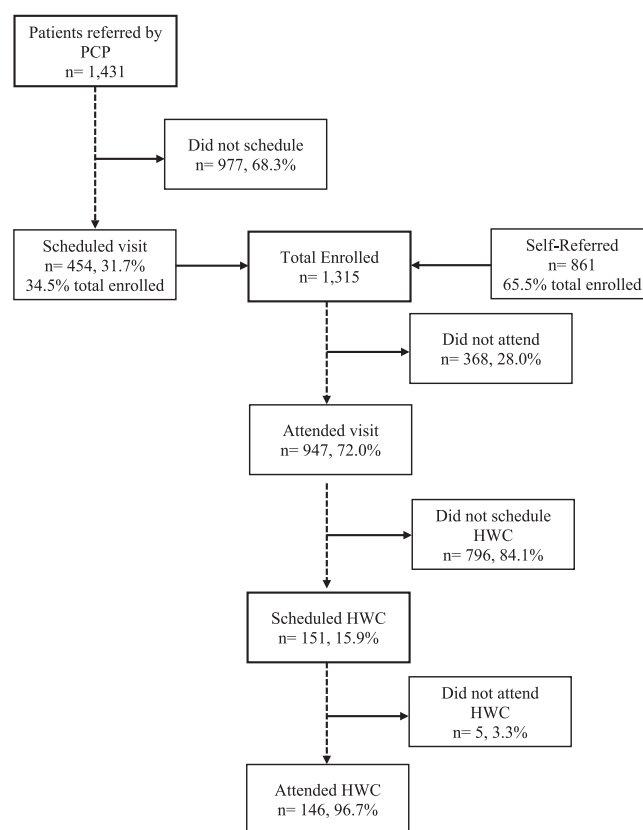
Of the 1315 enrollees, 947 (72.0 %) attended at least one LMSMA session, with an average attendance of 2.7 sessions (SD = 4.5) across all LMSMA formats. Among these patients, 151 (15.9 %) enrolled in HWC, with 146 (96.7 %) attending their first session and an average of 5.1 sessions (SD = 3.5).

### 3.2. Demographic characteristics

The 1431 PCP-referred patients were an average age of 55 years, 54.3 % female, 69.4 % White, 80.3 % non-Hispanic, 43.5 % completed college, and 93.4 % preferred English (Table 1). The 861 self-referred patients were an average age of 60, 58.0 % female, 74.1 % White, 84.2 % non-Hispanic, 39.6 % completed college, and 95.6 preferred English. The total of 1315 enrolled patients were an average age of 59, 59.5 % female, 72.4 % White, 82.8 % non-Hispanic, 40.7 % completed college, and 94.1 % preferred English. Among PCP-referred enrollees, the average age was 58 years, 63.0 % were female, 69.2 % White, 80.6 % non-Hispanic, 32.8 % completed college, and 94.1 % preferred English. The PCP-referred non-enrollees were an average age of 53, 50.3 % female, 50.3 % White, 80.1 % non-Hispanic, 43.8 % completed college, and 93.0 % preferred English.

### 3.3. Comparisons of primary care provider-referred patients

Among PCP-referred patients, those who enrolled were five years older than patients who did not and more females enrolled than males and those who declined to respond (Table 1). No significant differences



Primary care provider, PCP; Health and Wellness Coaching, HWC.

**Fig. 1.** Healthy Lifestyle Program patient enrollment flowchart at Massachusetts General Hospital from July 2022 to June 2023. Primary care provider, PCP; Health and Wellness Coaching, HWC.

were found across race, ethnicity, education, or preferred language ( $p > .05$ ).

### 3.4. Comparisons of enrolled patients

Of the 1315 patients enrolled in LMSMAs, the 947 attendees were an average age of 60, 58.9 % were female, 73.7 % White, 83.8 % non-Hispanic, 42.4 % completed college, and 96.4 % preferred English (Table 2). The 368 enrollees who did not attend an LMSMA were an average age of 57, 61.4 % female, 69.0 % White, 80.2 % non-Hispanic, 36.1 % completed college, and 91.6 % preferred English.

Attendees were three years older than non-attendees ( $t = 3.60$ ,  $p < .01$ ). In total, 42.4 % of attendees earned a college diploma ( $\chi^2 (5) = 19.8$ ,  $p < .01$ ) compared to 36.1 % among non-attendees. Similarly, 16.9 % of attendees had graduate degrees compared to 12.5 % of non-attendees. Additionally, significant differences in attendee ethnicity ( $p = .01$ ) and language ( $p < .01$ ) were found. Hispanic patients had lower attendance— 9.5 % of attendees were Hispanic while 15.2 % of non-attendees were Hispanic. English speakers were more likely to attend (96.4 % attended vs. 91.6 % did not), while Spanish speakers were less likely (2.9 % attended vs. 6.3 % did not). No significant differences among race or sex were observed in association with attendance ( $p > .05$ ).

### 3.5. Comparison of patients using health and wellness coaching

HWC enrollees were an average age of 60 years, 68.9 % were female, 82.8 % White, 86.8 % Non-Hispanic, 47.0 % completed college, 98.0 % preferred English, and 62.9 % self-referred (Table 3). Additionally, significantly more females enrolled ( $\chi^2 (2) = 7.40$ ,  $p < .05$ ) compared to

**Table 1**

Demographic characteristics of referred and all enrolled patients at Massachusetts General Hospital's Healthy Lifestyle Program from July 1, 2022, to December 31, 2023, and comparison of demographics between patients who enrolled and those who did not.

	PCP Referred	Self-Referred	Total Enrolled	PCP-Referred		<i>p</i> -value
				Enrolled	Not Enrolled	
	n (%)	n (%)	n (%)	n (%)	n (%)	
Age, mean, SD	55, 14.9	60, 14.2	59, 14.5	58, 15.0	53, 14.7	<0.01
Sex assigned at birth						<0.01
Female	777, 54.3	499, 58.0	783, 59.5	286, 63.0	491, 50.3	
Male	292, 20.4	173, 20.1	250, 19.0	79, 17.4	213, 21.8	
Declined	362, 25.3	189, 22.0	282, 21.4	89, 19.6	273, 27.9	
Race						0.81
White	993, 69.4	638, 74.1	952, 72.4	314, 69.2	679, 69.5	
Black, African American	147, 10.3	73, 8.5	124, 9.4	51, 11.2	96, 9.8	
Asian	79, 5.5	44, 5.1	65, 4.9	21, 4.6	58, 5.9	
American Indian, Native Alaskan	3, 0.2	1, 0.1	2, 0.2	1, 0.2	2, 0.2	
Native Hawaiian, Pacific Islander	1, 0.1	1, 0.1	2, 0.2	1, 0.2	0, 0	
Multi-racial	17, 1.2	12, 1.4	17, 1.3	5, 1.1	12, 1.2	
Other, Unavailable	171, 11.9	81, 9.4	132, 10.0	54, 11.9	117, 12.0	
Declined	20, 1.4	11, 1.3	17, 1.3	7, 1.5	13, 1.3	
Ethnicity						0.26
Hispanic	179, 12.5	83, 9.6	146, 11.1	62, 13.7	117, 12.0	
Non-Hispanic	1149, 80.3	725, 84.2	1089, 82.8	366, 80.6	783, 80.1	
Declined	103, 7.2	53, 6.2	8, 0.6	26, 5.7	77, 7.9	
Education						0.84
Less than high school	61, 4.3	21, 2.4	37, 2.8	16, 3.5	45, 4.6	
High School/GED	274, 19.1	165, 19.2	250, 19.0	85, 18.7	189, 19.3	
Associates/some college	118, 8.2	63, 7.3	101, 7.7	39, 8.6	79, 8.1	
College	622, 43.5	341, 39.6	535, 40.7	194, 32.8	428, 43.8	
Graduate school	180, 12.6	143, 16.6	250, 19.0	63, 13.9	117, 12.0	
Other, Declined	176, 12.3	128, 14.9	186, 14.1	57, 12.6	119, 12.2	
Preferred Language						0.78
English	1336, 93.4	823, 95.6	1250, 95.1	427, 94.1	909, 93.0	
Spanish	73, 5.1	27, 3.1	50, 3.8	23, 5.1	50, 5.1	
Other	18, 1.3	10, 1.2	14, 1.1	4, 0.9	14, 1.4	
Declined	4, 0.3	1, 0.1	1, 0.1	0, 0	4, 0.4	

Primary Care Provider, PCP; General Education Development, GED, *p*-values for comparisons between PCP-Referred patients who enrolled and those who did not. *p*-value for age comparison from independent *t*-test and for sex comparison from Fisher's Exact-test.

males and those who declined to respond. Further, more patients that completed college enrolled ( $p < .01$ ) compared to those who did not. No significant differences were observed between LMSMA attendees who did and did not enroll in HWC across race, ethnicity, preferred language, or referral source ( $p > .05$ ).

### 3.6. Characterizing LMSMA enrollment and attendance patterns

Older age was associated with higher odds of enrollment in LMSMA (OR = 1.02, CI = 1.01–1.03, Table 4) while male sex was associated with lower odds (OR = 0.64, CI = 0.48–0.87). Race and ethnicity also influenced enrollment odds. Black patients (OR = 2.90, CI = 1.36–7.60) and those identifying as “Other” races (OR = 2.21, CI = 1.22–4.45) had higher enrollment odds, as did Hispanic patients (OR = 2.05, CI = 1.07–4.44). However, Asian race was not associated with higher enrollment (OR = 0.93, CI = 0.47–2.06). Education level was not significantly associated with higher odds of enrollment.

For LMSMA attendance, older age increased attendance odds (OR = 1.02, CI = 1.01–1.02, Table 4) and males had higher attendance odds than females (OR = 1.46, CI = 1.04–2.06). Those identifying as “Other” races (OR = 0.67, CI = 0.48–0.95) had lower attendance odds. Hispanic patients were also less likely to attend (OR = 0.60, CI = 0.42–0.86). Lower education levels were associated with reduced attendance, with those having less than a high school education (OR = 0.42, CI = 0.21–0.83) or a high school diploma (OR = 0.61, CI = 0.46–0.80) showing lower attendance odds.

For enrollment in HWC, while age did not significantly influence odds of enrollment (OR = 1.0, CI = 0.98–1.01, Table 5), males were more likely to enroll (OR = 1.96, CI = 1.19–3.41) as were Black patients (OR = 2.90, CI = 1.36–7.60) and those identifying as “Other” races (OR

= 2.21, CI = 1.22–4.45). Hispanic patients were also more likely to enroll in HWC (OR = 2.05, CI = 1.07–4.44) as were patients who completed high school or less education (OR = 1.71, CI = 1.20–2.46).

## 4. Discussion

### 4.1. Summary

This is the first report detailing the demographic features of patients referred to, enrolled in, and attending a large-scale LMSMAs program. Of the 1431 patients who were referred to the MGH Healthy Lifestyle Program by their PCP during the study period, 454 (31.7 %) enrolled in an LMSMA. Of all 1315 enrolled patients, 34.5 % were PCP-referred while 65.5 % were self-referred. The majority (72.0 %) of enrolled patients attended at least one LMSMAs, and a subset of those patients (15.9 %) enrolled in HWC.

Although PCP-referred patients represented a diversity of demographic features, the most

common demographic features were non-Hispanic, White, female, earned a college diploma, and English-speaking. The demographic features of all patients receiving primary care at MGH were not available to compare to the study population. While referral patterns vary by healthcare provider awareness and organizational priorities, our findings on referral patterns expand on those reported in the literature. Older adults are commonly reported as the most referred group, followed by women specifically for pre- or postnatal care (Graham et al., 2021; Edelman et al., 2015). Here we show high rates of referrals among women for chronic disease management purposes, suggesting a possible referral bias or reflecting a sex-based disparity in patient needs.

Of all enrolled patients, LMSMA attendance was 2 % more likely

**Table 2**

Demographic characteristics of all enrolled patients at Massachusetts General Hospital's Healthy Lifestyle Program from July 1, 2022, to December 31, 2023, and comparison of characteristics between Lifestyle Medicine Shared Medical Appointment attendees and those who were absent.

	Total Enrolled	Attended	Absent	p-value
	n (%)	n (%)	n (%)	
Age, mean, SD	1315	947 (72.0)	368 (28.0)	
Sex assigned at birth	59, 14.5	60, 13.8	57, 16.0	<0.01
Female	783, 59.5	558, 58.9	225, 61.4	0.95
Male	250, 19.0	196, 20.7	54, 14.7	
Declined	282, 21.4	193, 20.4	89, 24.2	
Race				0.13
White	952, 72.4	698, 73.7	254, 69.0	
Black, African American	124, 9.4	88, 9.3	36, 9.8	
Asian	66, 5.0	49, 5.2	18, 4.9	
American Indian, Native Alaskan	2, 0.2	1, 0.1	1, 0.3	
Native Hawaiian, Pacific Islander	2, 0.2	0, 0	2, 0.5	
Multi-racial	20, 1.5	13, 1.4	7, 1.9	
Other, Unavailable	132, 10.0	86, 9.1	46, 12.5	
Declined	17, 1.3	13, 1.4	4, 1.1	
Ethnicity				0.01
Hispanic	146, 11.1	90, 9.5	56, 15.2	
Non-Hispanic	1089, 82.8	794, 83.8	295, 80.2	
Declined	80, 6.0	63, 6.7	17, 4.6	
Education				<0.01
Less than high school	37, 2.8	21, 2.2	16, 4.3	
High School/GED	250, 19.0	158, 16.7	92, 25.0	
Associates/some college	101, 7.7	72, 7.6	29, 7.9	
College	535, 40.7	402, 42.4	133, 36.1	
Graduate school	206, 15.7	160, 16.9	46, 12.5	
Other, Declined	186, 14.1	134, 14.1	52, 14.1	
Preferred Language				<0.01
English	1250, 95.1	913, 96.4	337, 91.6	
Spanish	50, 3.8	27, 2.9	23, 6.3	
Other	11, 0.8	5, 0.5	6, 1.6	
Declined	4, 0.3	2, 0.2	2, 0.5	
Referral Source				0.48
PCP	454, 34.5	321, 70.7	133, 29.3	
Self	861, 65.5	626, 72.7	235, 27.3	

Primary Care Provider, PCP; General Education Development, GED, p-values for comparisons between attendees and those who were absent. p-value for age comparison from independent t test and for education and preferred language comparisons from Chi-square.



**Table 3**

Comparison of demographics between those enrolled in Health and Wellness Coaching at Massachusetts General Hospital's Healthy Lifestyle Program from July 1, 2022, to December 31, 2023, and those who did not, and attendee characteristics.

	Did not enroll	Enrolled	p-value	Attended
	n (%)	n (%)		n (%)
Age, mean, SD	1164 (88.5)	151 (11.4)		146 (96.7)
Sex assigned at birth	59, 14.6	60, 13.4	0.51	60, 13.4
Female	679, 58.3	104, 68.9	0.03	102, 69.9
Male	232, 19.9	18, 11.9		17, 11.6
Declined	253, 21.7	29, 19.2		27, 18.5
Race			0.10	
White	827, 71.0	125, 82.8		120, 82.2
Black, African American	118, 10.1	6, 4.0		6, 4.1
Asian	57, 4.9	10, 6.6		9, 6.2
American Indian, Native Alaskan	2, 0.2	0, 0		0, 0
Native Hawaiian, Pacific Islander	2, 0.2	0, 0		0, 0
Multi-racial	20, 1.7	0, 0		0, 0
Other, Unavailable	124, 10.7	8, 5.3		8, 5.5
Declined	14, 1.2	3, 2.0		3, 2.1
Ethnicity			0.12	
Hispanic	137, 11.8	9, 6.0		9, 6.2
Non-Hispanic	958, 82.3	131, 86.8		127, 87.0
Declined	69, 5.9	11, 7.3		10, 6.8
Education			<0.01	
Less than high school	37, 3.2	0, 0		0, 0
High School/GED	233, 20.0	17, 11.3		16, 11.0
Associates/some college	91, 7.8	10, 6.6		10, 6.8
College	64, 5.5	71, 47.0		68, 46.6
Graduate school	175, 15.0	31, 20.5		31, 21.2
Other, Declined	164, 14.1	22, 14.6		21, 14.4
Preferred Language			0.75	
English	1102, 94.7	148, 98.0		143, 97.9
Spanish	48, 4.1	2, 1.3		2, 1.4
Other	11, 0.9	1, 0.7		1, 0.7
Declined	3, 0.3	0, 0		0, 0
Referral Source			0.54	
PCP	398, 34.2	56, 37.1		53, 36.3
Self	766, 65.8	95, 62.9		93, 63.7

Primary Care Provider, PCP; General Education Development, GED, p-values for comparisons between enrollees and those who did not enroll. p-value for sex comparison from Fisher's Exact test and for education comparison from Chi-square.

among older patients, 46 % higher among male patients, 40 % less likely among Hispanic patients, and 58 % less like among patients who completed less than a high school education. Of the 15.9 % of LMSMA patients who enrolled in HWC, male patients were 96 % more likely to enroll, Black patients were 190 % more likely, Hispanic patients were 105 % more likely, and patients who completed a high school education or less were 71 % more like to enroll. Our findings expand on the current

**Table 4**

Unadjusted odds ratios for the associations between patient demographic characteristics, enrollment in, and attendance to Lifestyle Medicine Shared Medical Appointments at Massachusetts General Hospital's Healthy Lifestyle Program from July 1, 2022, to December 31, 2023.

Demographics	Enrollment OR (95 % CI)	Attendance OR (95 % CI)
Age	1.02 (1.01–1.03)	1.02 (1.01–1.02)
Sex		
Female	1.00	1.00
Male	0.64 (0.48–0.87)	1.46 (1.04–2.06)
Race		
White	1.00	1.00
Black	2.90 (1.36–7.60)	0.89 (0.59–1.36)
Asian	0.93 (0.47–2.06)	1.02 (0.59–1.86)
Other	2.21 (1.22–4.45)	0.67 (0.48–0.95)
Ethnicity		
Non-Hispanic	1.00	1.00
Hispanic	2.05 (1.07–4.44)	0.60 (0.42–0.86)
Education		
College or higher	1.00	1.00
High School	0.98 (0.75–1.27)	0.61 (0.46–0.80)
Less than High School	0.74 (0.40–1.31)	0.42 (0.21–0.83)

literature on attendance, which reports higher attendance among patients with higher health literacy and lower attendance among minority groups (Ritchie et al., 2023).

Notably, the average patient age at each stage of engagement with the Healthy Lifestyle Program increased: PCP referral (55 years), enrollment (59 years), attendance (60 years), and HWC (60 years). As most LMSMAs and HWC sessions took place during business hours, it is likely that retired or unemployed patients were more likely to engage with the Healthy Lifestyle Program. This finding among older adults is in line with similar findings detailing how older adult patients access health care services through technology and mobile health applications (Vollmerdahlke and Ory, 2016; Sohaib Aslam et al., 2020; Mace et al., 2017). As we saw this age demographic disproportionately affected by current limitations within the healthcare system during COVID-19 (Lebrasseur et al., 2021; Zhong et al., 2022), these findings are particularly relevant in increasing access to healthcare among older adults.

Only 32 % of PCP-referred patients enrolled in an LMSMA session, and the percentage of White participants increased at each stage of program engagement: PCP referral (69.4 %) and self-referral (74.1 %), enrollment (72.4 %), attendance (73.7 %), and HWC (82.8 %). Importantly, once enrolled, patients attended LMSMAs at high rates across race and ethnicity with 73.3 % of White, 71.0 % of Black, 74.2 % of Asian, and 61.6 % of Hispanic patients attending LMSMA sessions. This demonstrates high levels of patient attendance across racial and ethnic identities. We also found non-significant differences in the odds of LMSMA enrollment across racial and ethnic categories which suggest that, when made available, LMSMAs might be utilized similarly among diverse patient populations. Together, our findings emphasize the critical need for improved programmatic reach through 1) implementing

**Table 5**  
Unadjusted odds ratios for associations between patient demographic characteristics and enrollment in Health and Wellness Coaching sessions at Massachusetts General Hospital's Healthy Lifestyle Program from July 1, 2022, to December 31, 2023.

Demographics	OR (95 % CI)
Age	1.00 (0.98–1.01)
Sex	
Female	1.00
Male	1.96 (1.19–3.41)
Race	
White	1.00
Black	2.90 (1.36–7.60)
Asian	0.93 (0.47–2.06)
Other	2.21 (1.22–4.45)
Ethnicity	
Non-Hispanic	1.00
Hispanic	2.05 (1.07–4.44)
Education	
College or higher	1.00
High School or less	1.71 (1.20–2.46)

systematic protocols to identify patients who could benefit from referral to the Healthy Lifestyle Program (Balasubramanian et al., 2015), 2) assessing barriers and facilitators to engagement (Toal-Sullivan et al., 2024), 3) tailoring educational curricula (Owens et al., 2019), and 4) developing strategies for effective program delivery (Etz et al., 2008) to increase access to health care providers and services among underserved communities.

Surprisingly, we found that patients of Black race, Hispanic ethnicity, male sex, and lower education levels were more likely to enroll in HWC. These early findings suggest such programming may be a promising method of addressing unequal access to health care services. However, the total number of Black, Hispanic, male, and patients with lower education enrolled in HWC represented a small subset of the overall patient population. More research is needed to determine optimal methods to increase access to resources like HWC among underserved patient populations. Ultimately, these efforts may contribute to reducing the unequal access to health care services and in disparate chronic disease outcomes among minority patient populations.

4.2. Limitations

The most significant limitation of this research study is our inability to compare our study population to the overall MGH primary care population. This constraint prevents us from assessing the reach and generalizability of the LSMSA program within the broader patient network. While we found differences among patients' sex assigned at birth, these results are to be interpreted with caution given the rates of patients who declined to provide their demographic characteristics. Furthermore, patient racial categories in this study, as in most medical science research (Yates et al., 2020), represent an incomplete categorization of diverse cultural backgrounds. Lastly, we are limited in our investigation to characteristics commonly collected during routine care. While this approach has the benefit of being accessible to primary care teams offering LMSMAs to their patients, further investigation into other contextual factors that may influence enrollment and attendance are required.

5. Conclusions

This study suggests that LMSMAs could be a promising method for bridging gaps in access to primary care services for the prevention and management of chronic diseases. A critical next step in assessing the engagement of primary care patients in programs like the Healthy Lifestyle Program will be an evaluation of those participating compared

to a primary care population as a whole. Our findings demonstrate patient interest in and motivation to seek LMSMAs. These findings also indicate that PCPs and patients may benefit from follow-up support to encourage enrollment. Furthermore, PCPs may benefit from additional resources to aid in identifying and referring a diverse population of patients, such as undergoing board certification from the American Board of Lifestyle Medicine.

A future examination into barriers and facilitators to LMSMAs and HWC enrollment and attendance may highlight avenues to increasing patient engagement. Patients attending other SMAs have cited managing other health conditions as a barrier to engagement (Ganetsky et al., 2022). They also want more active learning opportunities and time to share personal experiences (Ganetsky et al., 2022). Additionally, little is known about whether LMSMAs are equitably accessible to all demographic groups, long-term trends in referral and attendance, and barriers to access beyond attendance (e.g., social, cultural, or systemic factors). Understanding the reach of LMSMAs is critical for expanding equitable access, therefore, addressing gaps in provider education, referral process, and patient barriers will help maximize the potential of LMSMAs to improve healthcare access for diverse populations.

LMSMAs hold the potential for increasing access to medical providers and services, particularly among underserved groups. Older patients have demonstrated interest in and motivation to engage with the healthcare system through technology and virtual LMSMAs can meet the needs

of this age demographic. Additionally, LMSMAs may serve to improve social support through meeting peers with shared lived experiences (Kirsh et al., 2017; Tsiamparlis-Wildeboer et al., 2020), an important health-promoting factor.

Credit authorship contribution statement

**Dominique L. Popescu:** Writing – original draft, Data curation. **Ryan A. Mace:** Writing – original draft. **Anna Baggett:** Writing – review & editing, Data curation. **Jacob B. Mirsky:** Writing – review & editing, Data curation, Conceptualization.

Declaration of competing interest

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Jacob Mirsky is the owner of Lifestyle Medicine Consulting LLC.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.pmedr.2025.103059>.

Data availability

The data that has been used is confidential.

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