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Neighborhood Walking Tours for Physicians-in-Training

A Thesis Submitted to the
Yale University School of Medicine
In Partial Fulfillment of the Requirements for the
Degree of Doctor of Medicine

by
Jeremiah Cross

Yale University School of Medicine

2019

NEIGHBORHOOD WALKING TOURS FOR PHYSICIANS-IN-TRAINING

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Social and economic factors have a profound impact on the health of patients served by physician residents. However, education about these factors has not been consistently incorporated into residency training. Experiential education, such as neighborhood walking tours, may help physician residents learn about the social determinants of health and community resources available to patients.

Using a community-based participatory research (CBPR) approach, we implemented a neighborhood walking tour curriculum for physician residents and faculty in the Pediatrics, OB/Gyn, Emergency Medicine, Primary Care and Traditional Medicine programs. In 2017, 86 individuals participated in the tours, 81 physician residents and 5 faculty. Both pre- and post-tour, we asked participants to rank the importance of various individual- and neighborhood-level factors affecting their patients' health, and to describe strategies they use to improve health behaviors, their knowledge of community resources available to patients living in these neighborhoods, and how the experience might change their patient care.

Among 81 physician-residents who participated in tours in 2017, 75 completed the pre-tour survey (93% response rate) and 43 completed the post-tour survey (53%). In pre-tour surveys, respondents ranked "access to primary care" most frequently (67% of respondents) as a major factor affecting patient health. In describing ways to improve diet and exercise, 67% of respondents discussed strategies focused on the individual, compared to 16% who focused on neighborhood-level strategies. In post-tour surveys, respondents ranked "income" and "transportation" most frequently as major factors affecting patient health (44% each); in describing ways to improve diet and exercise, 39% of respondents discussed strategies focused on the individual, compared to 37% who focused on neighborhood-level. The percentage of respondents aware of community resources grew from 5% to 72% after tours.

The neighborhood walking tour experience helped physician residents recognize the importance of social determinants of health and the value of community resources. The experience also broadened their frameworks for how they might counsel patients on healthy lifestyles.

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INTRODUCTION

The Social Determinants of Health

Social and economic factors, collectively known as the social determinants of health (SDOH), have a profound impact on the health of patients. SDOH include income distribution, education, unemployment, social support, food insecurity, housing, and a number of other factors, each of which when taken individually or in a broader context may influence individual and group differences in health (1,2). Numerous important relationships between these factors and health outcomes are well described in the literature. The relationship of housing and food insecurity with health outcomes and healthcare access has been studied extensively. Charkhchi et al. demonstrated effects of poor housing conditions and food insecurity, independently, on likelihood of healthcare access hardship and poor health status (3). Other studies have associated food and housing insecurity with increased stress, obesity, delayed doctor's visits, and poorer health (4-6).

Individuals, as well as groups, who reside in societies in which there is greater access to economic and social resources generally experience better health and longer lives. This can be illustrated by the difference in expected lifespans between individuals living in countries with varying amounts of resources (1,7). For instance, individuals in Japan or Sweden, both economically well-off countries, can expect to live at least 80 years, whereas those living in the poorest African countries, historically pillaged of resources, can expect to live only 50 years (2). On a local level, the same can be appreciated even between different communities within the same city. In New Orleans

for instance, research from the Robert Wood Johnson Foundation has indicated that individuals living in the Naverre neighborhood, which is home to mostly white middle class families, may expect to live to 80 years. On the other hand, persons living in Iberville, merely 3.5 miles away and home to mostly low-income African Americans, have a life expectancy of only 55 years, approximately 23 years shorter than average life expectancy in the United States (8,9). These differences in lifespan reflect the impact of income distribution. That such a wide difference exists suggests that the conditions into which people are born, grow, work, and live contribute significantly to their health status. In fact, it is estimated that up to 40 percent of deaths are attributable to social circumstances and environmental exposure, while just 10 to 15 percent are due to suboptimal access or quality of medical care (10).

The unequal distribution of power, income, and goods within society lead to a disparate impact of SDOH and subsequent inequality in access to health care and education. SDOH are therefore inseparable from health disparities/inequalities and health inequities, separate but related concepts. The terms are often used interchangeably, but have implications that are independent of one another. A health disparity or health inequality is a difference in health that is tied to economic, social, or environmental disadvantage, and adversely affects those who have systematically experienced greater barriers to good health due to one of many possible identity markers, which can include race, religion, socioeconomic status, disability, sexual orientation, geographic location, and more (11,12). Health inequities are health differences that are avoidable, unfair and unjust. Pursuing health equity means pursuing

the elimination of health disparities/inequalities (13,14). Health equity is also described as equal access to and utilization of care for equal need, and equal quality of care for all patients (14).

In the United States these issues disproportionately impact racial and ethnic minorities. Racism in the United States dates back centuries, and its history includes not only overt discriminatory practices and attitudes, but also societal institutions that systematically limit the access of some groups of people to various resources and opportunities on the basis of race. One well-described example of this systemic injustice is racial residential segregation, which has been in practice since minorities have been allowed to own property in the United States, at times with the support of the housing policies of the federal government (15-17). The practice of “redlining”, in which certain services such as banking and insurance methodically and discriminatorily disinvest from particular communities, has for decades withheld financial and other resources from minority families. It has prevented them from owning property in better-resourced neighborhoods, and also prevented a large-scale accumulation of wealth within minority households (18). As a result, these groups are more likely to live in neighborhoods that have lower-quality and fewer public schools and healthcare facilities, leading to lower educational attainment and health literacy, as well as more health problems across the lifespan (15). Although the mechanistic pathways between social “causes” and health-related “effects” are numerous and complex, a significant body of research supports a profound impact of institutional racial segregation on individual and group well-being (15,17).

SDOH can be described as “upstream” and “downstream” determinants.

Downstream determinants often have more immediate and obvious effects on the lives of patients, and are therefore easier to address and counteract through policies and medical treatment. Upstream effects often are more difficult to detect, despite being considered more fundamental causes of health effects. An example distinguishing the two types of determinants involves a member of a socially disadvantaged group who works a low-income position in an old factory built with asbestos. He becomes ill and, due to poor health insurance, is unable to afford proper treatment for his illness. The downstream effects here include his low-paying job and inability to afford good health coverage. Upstream determinants in this worker’s circumstances include low educational attainment limiting his opportunities for good jobs, as well as the conditions to which workers in his factory are subjected. More affluent or educated individuals are better situated to counteract downstream effects, by, for instance, exercising more control over their working conditions or affording proper medical treatments. Upstream determinants are more difficult to change. This leaves the poor who are unable to exert such control over their circumstances dealing with the consequences (15). These effects appear to follow a graded pattern, such that while individuals who are the most disadvantaged have the worst health outcomes, even individuals with intermediate incomes and education are less healthy than the most affluent and educated (15,19).

New Haven, CT, a medium-sized city in the northeast United States, has a number of distinct neighborhoods with clear geographic bounds and demographic differences, making the city ideally suited for the purpose of studying health differences

related to demographics within a city. A 2008 study indicated that, while prices of various food items are similar across neighborhoods in New Haven, access to healthier foods is more limited in low-income neighborhoods (20). Nationally there is evidence that households in low-income neighborhoods, defined as neighborhoods in which the median household income is less than the national median, may pay more for their food. Specifically, households located in low-income neighborhoods in the central city, or in rural areas are less likely than suburban households to have access to large supermarkets. These low-income households are more likely to be located near small food stores, which charge an average of 10% more than supermarkets for particular food items (20,21). Furthermore, supermarkets and small food stores in low-income neighborhoods have been found to have lower-quality produce than those in higher-income neighborhoods, with supermarkets also having better-quality produce than small food stores. The implication is that on top of already limited budgets, lower-income individuals are often forced to decide between a limited selection of pricier, healthier foods and faster, less healthy options, a choice that sets the groundwork for long-term health issues. The Community Alliance for Research and Engagement (CARE), a partnership between residents of New Haven, Southern Connecticut State University, and the Yale School of Public Health, aims to identify and address chronic diseases affecting the communities of New Haven. CARE tracks neighborhood health markers by surveying members of low-income communities in New Haven every three years. In its most recent publication, CARE identified a number of social issues impacting health in New Haven's low-income communities, including food insecurity (35% of residents

report food insecurity vs 10% in higher-income neighborhoods); unemployment (17% vs 5%); low rates of home ownership (12% vs 58% in all of Connecticut); gun violence, and economic inequality. The authors make an explicit link between diabetes and household income: from 2012-2015, diabetes rates for individuals at the highest income level (>\$50000/year) decreased from 15% to 9%, while for individuals making less than \$15000 per year, there was no decrease (22).

When SDOH factors are addressed by investments in social services and in integrated healthcare models, there is potential to improve health and reduce healthcare spending. In a review of literature about the impact of social service interventions on health outcomes and healthcare spending, Taylor, et al. found that interventions in the areas of housing, income support, nutritional support, care coordination, and community outreach can have an overall positive impact on health improvement and healthcare expenditure reductions (23). In the review, 82% of studies reported significant positive impact. Separately, a 2018 study found an inverse relationship between housing stability and virologic suppression in HIV+ patients (24).

Health Disparities and Social Determinants of Health Training During Residency

Given the far-reaching consequences of SDOH, healthcare providers should be well-trained on their existence and impact, yet there is an inadequate number of well-trained physicians to address them (25). Overall physician and resident knowledge regarding topics relevant to underserved populations is low (26). Many residents and

physicians feel inadequately prepared to deal with clinical conditions that are common in medically underserved areas and populations. Medically underserved areas are defined as geographic areas and populations with a lack of access to primary care services, while medically underserved populations are specific groups of people that may face barriers to health care, including economic, linguistic, or cultural barriers (27). For instance, Weissman and colleagues surveyed over 2600 physician residents and found that while the vast majority (>85%) of respondents felt prepared to care for critically or terminally ill patients, only 67% felt prepared to offer counseling to patients who were victims of domestic violence, to care for HIV/AIDS patients, or to care for patients with substance abuse issues—all conditions related to structural factors that affect patients living in underserved areas. However, residents with significant exposure to underserved areas felt significantly more prepared to manage these issues (28). It is likely that health disparities will continue to exist if doctors-in-training are not provided instruction on the factors that shape them.

The incorporation of health disparities education is inconsistent in medical school and residency training (26). The ACGME requires residency training programs to train residents to be sensitive and responsive to the needs of diverse patient populations. As a part of the ACGME's system of accreditation, the Clinical Learning Environment Review program evaluates the ways in which institutions engage residents in the discussion of health disparities (29-31). Despite this educational requirement and its evaluation, deficiencies in teaching health disparities remain: SDOH education has been suboptimally and inconsistently integrated into medical training programs, as

many existing healthcare disparities education programs do not link their training aspects to core competencies described in ACGME guidelines (25). Ensuring that a program's training goals are aligned with specific standards designed to address healthcare disparities should be a priority for institutions educating the next generation of healthcare providers, who will encounter these issues frequently.

Healthcare providers who receive training in health disparities and in underserved settings are more likely to choose primary care specialties and to practice in underserved settings (25,32,33). This information is particularly relevant in light of looming shortages in primary care physicians, as well as the recognition that disparities worsen when there are inadequate numbers of primary care physicians skilled at caring for diverse populations (29,34). Additional research indicates that residents change their attitudes and display improved competence in addressing health disparities when they are exposed to a curriculum that engages these issues (29). Indeed, residents exposed to training on health disparities indicate its substantial impact on their clinical practice, and feel overwhelmed by the extent to which structural factors influence health (35). Even so, they feel more comfortable addressing those factors with patients. Even medical students, when instructed on health disparities, feel more confident in their own abilities to address them (36). Recent years have witnessed the rise of various task forces aimed at addressing topics related to underserved patients, including the Underserved Task Force, a group formed by the American Board of Internal Medicine and the Association of Professors in Medicine (37,38), as well as the Health Equity Commission of the Society for General Internal Medicine (39). The rise of these task

forces indicates a nationwide interest in addressing issues of health disparities, and has bolstered support for more widespread residency training on these issues.

Models of Experiential Education

There are many ways to teach residents about SDOH and underserved populations. Experiential education is an educational model used in a number of contexts that emphasizes direct experience with the information being taught, and is commonly used in teaching other medical school topics, such as simulated patient encounters, medical simulation scenarios, and exposure to anatomy in the cadaver lab (40). Experiential education is a preferred learning modality for young physicians-in-training and may be an effective way to expose residents to cultural diversity and healthcare disparities (41). Educational experiences have the potential to shape resident conceptions of the communities they serve, and the ways in which they manage health issues. For instance, residents who are knowledgeable of exercise resources in a particular community may be more likely to encourage outdoor exercise to a patient to whom they are recommending increased exercise. This type of recommendation could have the dual effects of being patient-centered and identifying a point of commonality between patient and provider. Indeed, in spending time in their patients' communities, physicians have the opportunity to enhance patient lives by providing medical expertise, taking their experiences back with them to their practice and research, and using those experiences to teach other providers (42).

Various experiential education models have been described. Simulation scenarios allow the provider-trainee to practice under simulated circumstances, which can be constructed to be similar to the real world. For instance, a simulation may introduce a patient with a language barrier or unfamiliar dialect, challenging the provider to respond appropriately. Involvement in community organizations, another form of experiential education, offers insight into the engagement of individuals in community resources, which may be of particular importance to patients. House calls expose residents to the precise conditions in which patients live and serve as a way to introduce them into the home environments of patients. Other experiential interventions include neighborhood tours, film viewings, and community research partnerships (40). A combination of different models may serve synergistically to deepen the appreciation of residents for the SDOH impacting their patients.

Multiple models exist in which physician-residents are taught about SDOH and conditions in which their future patients live via experiential education, and several have evaluated the impact of a neighborhood tour on the attitudes and perceptions of new physicians. The Residency Program in Social Medicine at Montefiore began a joint orientation in 1983 for interns from three residency programs, pediatrics, internal medicine, and family medicine, as an introduction to the Bronx, its health centers, and their patients. As one part of the orientation, interns are given an epidemiological overview followed by a bus tour of Bronx neighborhoods, health facilities, and landmarks. Later the same day they eat at a local restaurant, meet with neighborhood organizations, and visit local service agencies. Little quantitative evaluation of this

program has been done, but interns who have completed the orientation have consistently rated it highly, with written reflection highlighting impactful moments, and various scholarly projects have stemmed from the experience (43,44). A study from The George Washington University took new medical interns on a 3-hour, community leader-guided bus tour through Washington, D.C., in which they assessed comfort with understanding and addressing SDOH. This study recruited community leaders from various service organizations to assist in designing the curriculum and leading the tours. After the tour, study authors noted increases in familiarity with local neighborhoods as well as comfort addressing and understanding SDOH (45). More recently, a pediatric residency program, also affiliated with George Washington University, undertook a similar community bus tour in which their interns were exposed to sites around D.C., stopping in front of several locations at which the impact of SDOH was exemplified. Their objective was to illustrate how local factors contributed to health disparities in their patient population. Here, similarly, positive effects were noted: the tour improved interns' factual knowledge of SDOH, and influenced their plans with regard to counseling patients and resource referral (46). The results from this limited number of studies are encouraging with regard to the promise of incorporating experiential learning about SDOH into residency curricula. However, to our knowledge, no study has evaluated the effects of a walking tour on physician-residents' understandings of SDOH, and whether or not it influences how they interact with patients in clinic settings in attempting to improve health.

Statement of Purpose

In the present study, we describe the usefulness of a one-time walking tour of New Haven neighborhoods in impacting PGY1 physician-residents' comfort understanding SDOH, and, in contrast to the studies mentioned above, their intentions with respect to ways in which they plan to improve the health of their patients in several specific domains. We hypothesized that after the tours, physician-residents would be more aware of the impact of SDOH on patients and of local community resources, and that they would be more likely to plan on making use of those community resources during their time in clinics with patients.

Using a community-based participatory research (CBPR) framework, the research team developed a curriculum in coordination with community organizations and stakeholders, in a manner similar to that of the George Washington University study cited above, in which physician-residents were introduced to one of several underserved neighborhoods in New Haven during or shortly after their orientation period. In the CBPR model, community stakeholders are considered equal partners in designing and carrying out research. Over the past several decades this model has gained traction, especially in communities that are underserved, and in communities of people who have historically been distrustful of healthcare providers due to historic mistreatment by the healthcare industry (47). These types of partnerships can be beneficial for both providers and communities, and can provide deeper insights into the ways in which local healthcare institutions can effectively care for surrounding communities. Such programs may positively impact the way that physician-residents

view their communities and patients, and are often cherished experiences by participants (48).

METHODS

In 2016, a group of post-doctoral fellows from the Robert Wood Johnson Foundation Clinical Scholars program at Yale University presented the idea of a Fair Haven neighborhood walking tour as a part of orientation for the incoming physician-residents to the program directors for the Internal Medicine and Internal Medicine/Primary Care residency programs at Yale-New Haven Hospital. In 2017, these same post-doctoral fellows expanded the neighborhood walking tour program by adding new residency programs (Emergency Medicine, Pediatrics, Combined Medicine/Pediatrics, and Obstetrics/Gynecology) and new neighborhoods (West River and Newhallville). For each tour, 8 to 10 interns from the same residency program participated. There were 11 total tours in 2017. Each of the 11 walking tour groups was assigned to a tour date during or shortly after their program's orientation, and to one of the three New Haven neighborhoods. Departmental faculty and other members of the respective departments were also invited to attend the tours. The remainder of methods presented here represent only the tours done during 2017.

The walking tours were led by neighborhood leaders of the respective neighborhoods, each of whom has worked with the hospital or medical school in various capacities. The tour leader for the Newhallville tour is a community health worker for

the Transitions Clinic, a healthcare clinic at Yale that works with the formerly incarcerated. The tour leader for West River is the leader of the West River Neighborhood Services Corporation, and has previously partnered with post-doctoral and faculty in community-based participatory research. The tour leader for Fair Haven is a member of the Community Foundation for Greater New Haven. The three tour leaders have worked with the hospital and/or medical school previously in giving tours to medical students via the US Health Justice elective course, as well as to fellows in the Robert Wood Johnson Foundation Clinical Scholars Program and the National Clinician Scholars Program. They also give tours of their respective neighborhoods to unrelated groups of people in separate capacities that are not affiliated with the hospital or medical school.

The walking tour curriculum, devised to be relevant to incoming hospital interns, was developed using a CBPR framework. The curriculum was developed with input from the tour leaders, physician-researchers, an organizational psychologist, medical students, and other residents of the neighborhoods where the tours took place; this team had expertise in CBPR, medical education, physician advocacy, organizational behavior, community organization, and health services research. Together this team devised a tour curriculum with four major components: 1) Information about neighborhood access to food, transportation, and exercise; 2) Community resources and ways that neighborhood leaders had responded to health and social needs of neighborhood residents; 3) Historical landmarks; and 4) Pre-reading articles before the

tours, which documented the work of community organizers in improving neighborhood conditions, or described resources available in the neighborhood (49-56).

Several days before each tour, a member of the research team emailed each participant detailed information about the tour and surveys, corresponding to the respective neighborhood to which they were individually assigned, using Qualtrics, an online survey tool. The research team and program directors created batch email lists corresponding to the tour groups. In order to optimize survey response rates, follow-up reminder emails were sent the day before and day of the tour to participants who had not completed the pre-tour surveys. At the end of each tour approximately one hour after the tour ended, post-tour surveys were distributed via email to all participants who had completed the initial survey. To participants who had not yet completed the post-tour survey, follow-up reminder emails were sent every other day for a total of three reminders.

Tours occurred at 5PM or 5:30PM on Thursday evenings beginning in June and ending in August. These times were chosen to decrease the potential for overlap with other intern orientation activities and clinical responsibilities. On each tour, interns were led on a walk lasting 60-90 minutes, during which they were shown around the neighborhood they were touring, with attention paid to certain important pieces of history in the neighborhood, healthcare institutions, local options for healthcare within the neighborhood, challenges to good health and general well-being in the neighborhood, as well as aspects of the neighborhood that are encouraging good

health. At least one member of the research team, in addition to the tour leader, was present on each tour.

Examples of information presented to participants on the tour included the following: an area in the Newhallville neighborhood which was formerly a large housing project and crime-ridden, which was subsequently demolished and converted into individual housing units as a low-income housing option, increasing perception of safety; an unpaved pathway in the West River neighborhood next to a high-speed roadway which patients without access to transportation need to traverse in order to make their way to the nearby hospital; the federally qualified health center (Fair Haven Community Health Clinic) in the Fair Haven neighborhood which offers primary care services to members of the community for free or discounted prices. At the end of each tour, participants were taken to a local restaurant for dinner where they could interact more closely with tour leaders and, on some occasions, other neighborhood residents, ask questions, and debrief on the information that was presented to them during the tour. Dinners lasted about 60 minutes, were not structured in terms of the information covered during them, and it was clarified to tour participants that they would be allowed to leave at any point during the dinner. Tour leaders were compensated monetarily for their time for each tour that they led, and post-tour dinners were subsidized by the respective departments of the interns participating in the tours.

Survey Creation

Consistent with CBPR, surveys were created with input from all members of the research team. The aim of the surveys was to elicit interns' perceptions about the importance of various social determinants of health and their plans for counseling patients on healthy living. The pre-tour survey consisted of 11 questions, including an online consent. The questions asked for basic demographic information, for participants to rank the top 5 most important factors affecting patient health from a list of 26, as seen in **Figure 1**, 3 ways that they would approach improving patient health via diet, exercise, and medication compliance, and their familiarity with community resources in the neighborhood that they were touring. The post-tour survey consisted of 15 questions, with 10 being identical to questions from the pre-tour survey, and the remaining 4 asking for them to reflect on their experience of the tour, offer ways that the tour may impact their care of patients, and whether they had previous experience learning about or working with the social determinants of health. The last question asked if residents had completed the assigned readings prior to attending the tour.

Data Analysis

Participant names were hidden from the researchers and each participant was assigned a random number identifier to associate his or her pre- and post-tour survey responses. The collected data consisted of rankings of factors affecting patient health, and free text responses to open-ended reflection questions. We excluded pre-tour survey results from participants who did not also complete the post-tour survey, based

on matching random number identifiers associated with responses. Descriptive summary statistics are used to characterize the sample. Results from pre-tour surveys are compared to the results from post-tour surveys based on random number identifiers.

The authors conducted a chi-squared test comparing the tour populations with the population of survey respondents, based on demographic survey data collected. For question 4 (see **Figure 10**), the authors conducted a paired t-test analyzing whether, among the top 3 most common factors, participants were more likely to choose social determinants of health in post-tour surveys. Possible answers included in the questions were coded as either “S” for social determinant of health or “I” for individual-level factor (**Figure 1**). For question 7 (see **Figure 10**), the authors conducted a paired t-test analyzing whether participants were more likely to be aware of community resources in post-tour surveys.

In analyzing free responses, the primary author read through free responses to develop a list of themes common to each group of responses. He then reapplied this list of themes to the free responses to categorize them into a set of themes for each free response question. Responses were then characterized and grouped by the themes, one or multiple, that each response reflected. Tests of statistical significance were not conducted for this analysis as only one individual was involved in categorizing themes.

Student Involvement

The thesis writer was involved as an equal partner in drafting and revising the surveys distributed to physician-residents; emailing pre- and post-tour surveys to physician-residents, and communicating with them before the tours; attending tours as the research team representative; collecting and analyzing data; literature review; developing the tour curriculum; and presenting the data and suggesting tour revisions to tour leaders.

RESULTS

81 physician-residents participated in walking tours in 2017. 29 physician-residents attended the tour in Newhallville, 21 attended the tour in Fair Haven, and 31 attended the tour in West River. There were 9 from the OB/GYN program, 14 from the Emergency Medicine program, 18 from the Pediatrics program, 24 from the Traditional Medicine program, 12 from the Internal Medicine/Primary Care Program, and 4 from the Internal Medicine/Pediatrics combined program. Among the 81 physician-residents who participated in the walking tours in 2017, 75 completed the pre-tour survey (93% response rate) and 43 completed the post-tour survey (53%). Among those who completed the post-tour survey 13 participated in the Newhallville tour; 11 participated in the Fair Haven tour; 19 participated in the West River tour. There were 6 from the OB/GYN program, 7 from Emergency Medicine, 11 from Pediatrics, 11 from Traditional Medicine, 5 from Internal Medicine/Primary Care, and 1 from Internal Medicine/Pediatrics who completed the post-tour survey. There was no significant

difference between the population of tour participants and survey respondents ($\chi^2 = 0.3838$, $p = 0.984$).

Tour participants were asked to rank the 5 most important factors of a list of 26 impacting patient health (**Figure 1**). The possible responses included individual-level factors and SDOH (**Figure 1**). Analysis of this question examined those factors most commonly ranked in the top 5 by respondents. In pre-tour surveys, depicted in **Figure 2**, “access to primary care” was ranked most frequently in the top 5, with 28/43 (65%) respondents including it in the most important factors affecting patient health. This was followed in by “income” ranked by 21 respondents (49%), “health literacy” by 18 (42%), “insurance status” by 16 (37%), “housing stability” by 14 respondents (33%), and “multiple comorbidities” by 11 respondents (26%). The remaining factors were each ranked by 10 or fewer respondents. Overall, 4 of the top 6 responses in the pre-tour survey were considered social determinants of health (access to primary care, income, insurance status, and housing stability) while 2 were individual-level factors (health literacy, and multiple comorbidities).

In post-tour surveys, depicted in **Figure 3**, “transportation” and “income” were tied with both being ranked most commonly in the top 5 factors, with 19 respondents (44%) choosing each. Among the remainder, 17 respondents (40%) ranked “access to primary care”, 16 (37%) ranked “level of education”, 15 (35%) ranked “health literacy”, 13 (30%) ranked “housing stability”, 12 each (28%) ranked “individual health behaviors” and “access to healthy foods”, and 11 (26%) ranked “experiences with the healthcare system”. The remainder were each ranked by 10 or fewer respondents. Overall, 4 of the

top 6 post-survey responses were social determinants of health (transportation, income, access to primary care, and housing stability), while 2 were individual-level factors (level of education, and health literacy).

Among the 3 most commonly ranked factors in each survey, 67% were SDOH in pre-tour surveys, and 100% were SDOH in post-tour surveys. However, this difference was not found to be significant in a paired t-test, $p=0.42$.

Six of the factors changed, positively or negatively, by greater than 5 responses (12%) in the post-tour survey. “Access to primary care” was ranked by 11 fewer respondents and “insurance status” by 7 fewer respondents. “Transportation” was ranked by 12 additional respondents; “community violence” and “social connectedness” were ranked by 8 additional respondents each; and “level of education” by 7 respondents.

As a follow-up to the question of factors influencing patient health, respondents were asked to comment on other factors that have an impact on patient health, examples shown in **Figure 4**. Answers to this question included many of the factors included in the list provided, and 5 respondents (12%) indicated that the entire list represented issues that impact patient health. Unique responses included the following (answer provided by one respondent unless otherwise indicated): race, domestic violence, adverse childhood events, personal motivation, parent compliance (for pediatric patients), home situation (2 respondents), social stressors (3), apprehension about the medical community (4), unsafe living environment, incarceration, culture, family dynamics, educational and job opportunities, social support (6), other family

responsibilities, luck, understanding of disease, safe spaces in the community, peer influences, personal views on healthcare (2), busy roads dividing the neighborhood, and historical trauma.

Tour participants were asked to list 3 reasons why patients may be late for clinic visits (**Figure 5**). Nine themes were identified, which were issues with transportation, issues with employment, poor organization/patient irresponsibility, unforeseen life events, child care and other home obligations, language and communication barriers, mistrust in the healthcare system, other issues related to socio-economic status, and patient forgetfulness.

In pre-tour surveys, access to transportation (getting to and from appointments) (35 respondents; 100%), child care and other home obligations (22 respondents; 63%), and issues with employment (patients being able to take time off from work in time for their appointment) (19 respondents; 54%) were the most commonly mentioned reasons respondents believed patients might be late for appointments. Poor organization/personal irresponsibility was mentioned by 9 respondents (26%), language/communication barriers by 5 respondents (14%), other socioeconomic issues such as health literacy by 5 respondents (14%), patient forgetfulness by 4 respondents (11%), and 3 (8%) mentioned unforeseen life circumstances. Mistrust was not mentioned as a reason that patients might be late for their appointments in pre-tour surveys.

In post-tour surveys, transportation (35 respondents; 100%), child care and other home obligations (17 respondents; 49%), and employment issues (7 respondents; 20%)

were again the most common reasons mentioned. Other reasons given were as follows: other socioeconomic issues such as poor sidewalk infrastructure (7 respondents; 20%); language/communication barriers (5 respondents; 14%); mistrust of the healthcare system (4 respondents; 11%); poor organization/irresponsibility (3 respondents; 9%); patient forgot (2 respondents; 6%); unforeseen circumstances (1 respondent; 3%).

An example of a change in pre-tour and post-tour response to this question from a participant on the West River tour is as follows: Pre-tour response “access to transportation, childcare issues, addiction issues.” Post-tour response “Poor access to transportation, poor sidewalk infrastructure, major roads deterring foot travel to clinic.”

Tour participants were asked in what ways they would attempt to improve patients’ compliance with medications (**Figure 6**). For this question, eight themes were identified, which were verbal patient education, addressing patient barriers, using teach back, improving access to medication, written instructions, building patient rapport, follow-up, and motivational interviewing.

In pre-tour surveys, respondents most commonly endorsed using verbal explanations and education in the office to teach patients about why it was important to stay compliant with medications (21 respondents; 68%). An example response was: “Explain the need for medication compliance, or the consequences of not using medication as prescribed.” Another common pre-tour response included addressing patient barriers to compliance (13 responses; 42%), by, for instance, helping the patient obtain access to medications or offering assistance via a pill box or visiting nurse. Using the “teach back” method in communicating medication compliance with patients in

order to ensure understanding was mentioned by 12 respondents (39%). Other strategies included offering cheap medications (the “\$4 list”) (8 respondents; 26%), written instructions (7 respondents; 23%), building patient rapport (making the plan with the patient’s input, using language familiar to them) (7 respondents; 23%), following up with patients (7 respondents; 23%), and motivational interviewing (2 respondents; 6%).

In post-tour surveys, verbal explanations/education was again the most commonly endorsed method to improve compliance (18 respondents; 58%), and addressing patient barriers the second most common method (16 respondents; 52%). Respondents were equally likely to offer cheap medications (8 respondents; 26%). Respondents were less likely to endorse teach back (5 respondents; 16%), as well as written instruction (4 respondents; 13%), following up (3 respondents; 10%), and motivational interviewing (1 respondent; 3%). Respondents were more likely to say that they would use rapport building (8 respondents; 26%).

In addition, in post-tour surveys, respondents were more likely to consider structural issues in addressing medication compliance. One respondent changed their pre-tour response of using the teach back method and frequent follow up to “encouraging mail delivery options to negate the need for transportation”. Similarly, other post-tour responses included “recruit additional supports to help patient”, “have a community liaison call patients”, and “make sure to use the right interpreter”.

Tour participants were asked in what ways they would attempt to improve patient exercise. Free responses aligned with one of seven themes: educating patients

and explaining the importance of exercise; goal-setting, planning and motivation; community-oriented suggestions and connection to resources; encouraging patients to exercise with their family or a group; building rapport with patients; referral to PT or to social work for assistance; and improving patient access to exercise.

In pre-tour surveys, respondents most commonly indicated that they would educate and explain the importance of exercise (21 respondents; 72%). The next two most common responses were improving patient rapport (13 respondents; 45%) and goal-setting and motivational conversations (12 respondents; 41%). Less commonly mentioned strategies included community-oriented suggestions (“encourage communities to walk together”) (6 respondents; 21%), encouraging family exercise (5 respondents; 17%), improve patient access to exercise (“share resources for free exercise in area”) (2 respondents; 7%), and referral to PT (1 respondent; 3%).

In post-tour surveys, respondents were most likely to endorse community-oriented suggestions and connection to resources in order to engage patients in exercise (15 respondents; 52%). They also endorsed education and explaining the importance of exercise 48% (14 respondents) and also endorsed family-oriented exercise (38%, 11 respondents). In addition, 34% (10 respondents) said they would work to solidify rapport with patients. Goal setting between provider and patients was discussed by 28% (8 respondents), improving access to exercise by 6% (2 respondents), and referral to PT by 3% (1 respondent).

In addition to the above, responses in the post-tour survey were more thoughtful about conditions occurring in patient neighborhoods. For instance, one

respondent said they would “ask [patients] when it is safe to walk outside and suggest that they occasionally walk.” Another said they would discuss neighborhood walking trails and engaging in community exercise events, and yet another mentioned that they would list places that the patient could walk within the neighborhoods, now that they were familiar with the area.

Tour participants were asked in what ways they would improve patient diet. Free responses aligned with one of five themes: tailoring diet to patient preferences; finding affordable healthy food options for patients; education and discussing the importance of a healthy diet; connecting patients with community resources and farmers markets; and referring patients for dietitian/nutrition consult.

In pre-tour surveys, respondents most commonly endorsed education about the importance of healthy diet (17 respondents; 63%). An example of comments included “discuss the health benefits of eating healthy.” Tailoring the discussion around patients’ preferences was the second most common response with 41% of respondents (11), followed by referral to dietitian counseling by 26% of respondents (7). A smaller number, 22% (6 respondents), indicated that they would connect patients with community resources such as farmers markets. The least common response was addressing the affordability of food options in order to increase patient access to healthful foods, endorsed by 19% (5).

In post-tour surveys, respondents were most likely to refer patients to community resources such as farmers markets or community diet support organizations (19 respondents; 70%). Educating patients on the importance of healthy diet was

present in 59% of responses (16). Increasing the affordability and accessibility of healthy foods appeared in 26% of responses (7). Tailoring conversations to patients' preferences appeared in 22% of responses (6). The least common response was referring patients to diet counseling in 15% (4).

Tour participants were asked whether they were familiar with resources available to patients in the neighborhoods they toured (**Figure 7**). In pre-tour surveys, 5% of respondents (2) indicated that they were aware of community resources. In post-tour surveys, the number of interns familiar with neighborhood resources increased to 72% (31). In a paired t-test, this difference was found to be significant, $p < 0.001$. Respondents in the post-tour surveys indicated that they were aware of the following types of resources to which they could refer their patients: community leaders, neighborhood events, parks and outdoor spaces, community clinics, farmers markets, walking routes, neighborhood gardens, community governance associations, and religious venues.

Participants were asked in what ways they believed attending this tour would change the way that they cared for patients (**Figure 8**). The most common response was that the tour had given participants insight into the lives of patients, challenges patients faced in their daily lives, and barriers to accessing healthcare (33%; 11 respondents). For instance, one respondent said "It'll help me better understand the other aspects of their lives besides the obvious medical issues, things that altogether contribute to the overall health and well-being of the patients." A slightly smaller number of respondents indicated that they would now be better able to connect patients with resources in their

neighborhoods (30%, 10 respondents). One response said “I can give them a route to walk when suggesting exercise.” Several respondents believed the tour would instill greater levels of empathy within them as provider, and allow them to better relate to patients (21%; 7 respondents). One, for instance, noted “It brought me closer to [patients].” Similarly, 11 respondents (33%) appreciated that they now had a better understanding of the neighborhood and community, including groups working to improve the community, as well as challenges within the community, with comments like “The walking tour allowed me to understand the community much better and will help me approach my visits with my patients with increased understanding, better knowledge of their community, their lifestyle, their resources in their immediate living situation.” A new understanding of the history of the neighborhood and its relationship with the hospital was gained by 3 respondents (9%), while 2 respondents (6%) believed that patients would trust them more after the tour.

Tour respondents noted that certain aspects of the tours surprised them. In Newhallville, respondents were surprised that the housing they saw and the community in general was “nicer than expected,” and at the degree to which there are community gatherings, such as family reunions, in the neighborhood. Several respondents were also surprised by the history of and amount of gun violence in New Haven as a whole. Respondents also commented on the degree to which gentrification is affecting the community.

Several Fair Haven tour participants were pleasantly surprised by how driven the community was to effect positive change, and that such change could “be brought on by

a small group of people.” Other tour participants commented on the degree of gentrification occurring in the neighborhood, and the segregation between high- and low-income parts of the community. On the other hand, some respondents commented on the diversity present within the neighborhood, “both ethnic and economic.”

Several participants from the West River neighborhood tour commented that they were surprised by the attitudes of community members towards Yale, as well as the overall relationship of the community with Yale and its various schools. For instance, the school of architecture collaborates with the city to design housing in the West River neighborhood, and one respondent commented that they were surprised that “the architecture school's housing annual projects [in] the neighborhood are not seen as good housing by local residents.” The same respondent mentioned that they were surprised at the small number of local area residents accepted by the school of Forestry at Yale for admission. Other respondents mentioned they were surprised by several neighborhood challenges including “the poor state of the sidewalks in the area,” “how many homicides occurred,” and “the lack of quality food options” in the neighborhood. Still others commented that they were surprised at how safe they felt while walking around the neighborhood, or at the degree of religious diversity in the neighborhood.

In post-tour surveys, participants were asked how they would improve the tours. “Altering the structure of the tour” was present in 26% of responses (7) by, for instance, incorporating “a bit more of an agenda and specific learning points.” An identical number of respondents also mentioned that they would have liked to hear about more issues specific to medicine or to their specialty. A resident in Obstetrics and Gynecology

said that they would have liked to hear about “more specific issues women deal with in the community.” “No change to the tour” was indicated by 22% of respondents (6). Seeing more of the neighborhood during the tour was a priority for 11% (3 respondents), while 7% (2) mentioned shortening or changing the scheduling of the tour to not interfere with other responsibilities or orientation activities.

Tour participants were asked in post-tour surveys whether they had ever received training on SDOH prior to joining one of the tours, and if so, where they had received this training (**Figure 9**). 63% of respondents (27) indicated that they had received training on SDOH prior to the tour. Of these, 70% (19) learned during medical school, 11% (3) in graduate school, 11% (3) in college, 7% (2) in community activities, and 4% (1) during residency.

Readings specific to each neighborhood were assigned for recommended reading before each tour. Assigned readings were completed by 26% of respondents (11) prior to the tour.

Participants of the tour were asked to provide several sentences reflecting on their experiences on the tour. As with the other open-ended questions, there was a wide variety of responses. The most common response was that participants gained some new insight on the tour, including learning more about the lives of patients or feeling more connected to the communities they were about to serve (22 respondents; 51%). An example comment is provided from one respondent: “[It] was great to recognize the area our patients come from. The challenges that face them extend far beyond the treatment options we are theorizing in the hospital”. The second most

common response was that respondents enjoyed and appreciated the tour (18 respondents; 42%), with one respondent saying “I enjoyed exploring New Haven and learning a bit about the history and resident experience in this city”. 21% (9) expressed appreciation for the guides leading the tours, saying that they did a good job of expressing their passion for the communities in which they lived or that they did a great job of conveying information about their communities. 16% (7) appreciated learning about the history of the neighborhoods.

Several tour participants offered some complaints about the tours. Many of these complaints were logistical, including 19% (8) of respondents who indicated they felt the tours could have been better organized or better scheduled, and 12% (5) of respondents who indicated they did not think the tour was relevant to themselves as medical professionals, and would have liked more medical information presented during the tour.

DISCUSSION

In this medical education study, we evaluated an experiential method of training new physician-residents in the social determinants of health (SDOH) through tours of New Haven neighborhoods. After tours, physician-residents were more likely to be considerate of and knowledgeable about community-level factors affecting patient health and were also more likely to take them into account when considering how to improve patient health. Physician-residents were also less likely after the tours to blame suboptimal health on individual-level factors. Despite the fact that the findings in which

physician-residents ranked factors affecting patient health were not significant, these findings suggest that exposure to the neighborhoods and conditions in which their patients live, in which strengths, challenges, and resources in these communities are emphasized via a community walking tour can influence their understandings of their patients and patients' communities, and can impact the way that they approach improving patient health. Specifically, these walks caused physician-residents to be more inclined to incorporate health-improvement measures that take into account community resources, patient preferences, and advocacy.

Our findings are consistent with other studies that have evaluated experiential education in training physician-residents on SDOH. Previous studies, which have evaluated bus tours, have demonstrated improvements in physician-resident knowledge of communities, their inclination to practice in underserved areas, and their reliance on community knowledge to improve patient health after going on bus tours of the neighborhoods of their patients (45,46). Our study adds an evaluation of walking tours as opposed to bus tours, and similarly demonstrates an increase in physician-resident knowledge of community resources, and also changes in perceptions of factors impacting patient health, and changes in strategies used to improve patient health.

Combining the results of our study with that of other publications evaluating experiential education in teaching physician-residents about SDOH, the implication is that there is a growing body of literature establishing the utility of these types of interventions in graduate medical education. The type of experiential learning that such exercises provide exposes physician-residents to patients and communities and shapes

clinical judgment in ways perhaps otherwise unseen during residency, in that they are endowed with hands-on experience traveling within their patients' neighborhoods and seeing, and maybe even touching, environments that touch their patients on a daily basis. Our 21st century society requires physicians who can navigate health-impacting social challenges, and our research indicates a walking tour of patient neighborhoods can provide an early foundation.

We also found that after the tours, physician-residents were more knowledgeable about the community resources available to their patients in New Haven neighborhoods. One respondent, in recognizing the importance of medication cost in affecting adherence, offered the following solution to improving medication adherence: "Offer them cheaper alternative for medications, connect them to resources to help with the purchase of their meds." The same respondent had advocated for low cost medications in the pre-tour survey, but had not mentioned connection to outside resources. Through this short experiential education experience, physician-residents were exposed to how, in the words of the WHO, the conditions in which patients live and work shape the conditions of their life and impact their health (1), and physician-residents then began to synthesize patient-centered solutions to issues commonly encountered in healthcare.

SDOH may be difficult to appreciate for many US medical residents, many of whom have not had prior training on them (25), despite several years of immersion in training programs. Given the rigor of residency training programs, and the focus on in-hospital learning and the vast amount of material that residents must digest in order to

understand disease processes, it is understandably difficult for many residency training programs to integrate training on SDOH into curricula. However, recent research has demonstrated that attention to the upstream determinants of health is crucial to improving and maintaining the health of individuals and of communities, especially in areas that are historically disadvantaged (34,48).

Our intervention was scheduled to take place during or shortly after intern orientation, ideally at a time when interns were not fully immersed in their new responsibilities as residents. At this point in training, physician-residents are developing a sense of how they intend to practice and may best be able to incorporate what they learned on the tours. We believe that our results indicate the feasibility of incorporating training on SDOH into intern orientation, when new physicians do not have many responsibilities.

Overall, incorporating this type of educational experience into residency training would prove quite difficult due to timing and the great number of responsibilities that new physician-residents have. Further, it cannot, nor should it, represent the extent of training physician-residents receive on SDOH during residency, as a formal curriculum on these issues and their relation to medical illness should be taught by qualified professionals. During their normal training curriculum, physician-residents receive informal training in SDOH in having everyday interactions with case workers, social workers, insurance companies, and more. Many programs have some sort of formal classroom or conference learning on the SDOH. However, the issue of social determinants requires more than an academic review, and a cursory experience with

them in brief interactions with coworkers infrequently provides the full story of patient circumstances, and does little to inspire thought about addressing them. Walking tours, as an adjunct training component, may offer trainees in-person interactions with the physical environment and with neighborhood residents, thereby building empathy and trust; may teach trainees about community resources about which they might otherwise be unaware, building capacity for innovative patient care; and may connect trainees with groups with whom they may be interested in working or learning more about, potentially planting the seed for future collaboration (25,28,36,58).

The surveys revealed a range of how acceptable this type of intervention was to physician-residents. Several survey respondents indicated a desire to experience walking tours in the other neighborhoods that they were unable to experience. One such respondent said: "I appreciated hearing about and seeing a neighborhood in New Haven. I felt like we heard a lot about what is going well in the community and less about what still needs improvement. I would like to participate in tours of other neighborhoods." Several also indicated that this exercise was their most enjoyable part of orientation so far. On the other hand, a smaller number of tour participants also expressed a disinterest in the tour: "I felt that the walking tour was not worth the time. I would have appreciated multiple perspectives... I also would have appreciated talking more about medically related subjects, given that all of us are doctors... I feel like we barely addressed the subjects listed below ... in regard to our patients." While there are individuals for whom this training will be more pertinent and will inform their future career choices (46), we would argue that since all patients will be affected by social

determinants (57), the training represented by our study is relevant to all who plan to practice medicine. With recent guidelines set by the LCME and the ACGME instructing that more attention should be paid to SDOH, this study represents an important step forward in developing curricula to train physician-residents in SDOH (31).

Throughout this intervention, our team also learned about interns' perceptions of the tours and ways they can be improved for future iterations. First, late in the orientation proved to be a difficult time for interns to focus on the intervention because of the proximity in time to when they have their first responsibilities as MDs. In the future, efforts should be made to schedule tours earlier during intern orientation as to minimize interference with clinical responsibilities. This is also a case for better integration of these tours into the overall orientation curriculum, which some interns said was their favorite part of the entire orientation experience. Second, interns were interested in connecting the tour content to the medical aspects their patients' lives, including the social conditions that lead to particular presentations of illness. Our tour guides are not medical specialists, but with more intentional curriculum planning, it is likely that this information can be better integrated into the tours or post-tour meeting led by someone knowledgeable about SDOH and medicine. A third and final lesson is that these experiences are valuable for physician-residents. With the vast majority of respondents mentioning how much they appreciated the tours, it is obvious that in the 21st century, understanding SDOH is both a desired and necessary part of the training of future physicians. Expanding the tours to more residency programs is a top priority so

that a broader group of residents can experience more neighborhoods in New Haven and learn more about the patients that they are serving.

Our study has several limitations. First, we did not include a control survey group in the analysis. Second, we did not administer a long-term follow up survey and so we do not know if the changes identified in this study are sustainable. Additionally, this study noted an intention to increase incorporation of SDOH; we were not able to follow up on adherence to intention. The question remains whether interns are, for example, establishing connections between real patients and resources that exist in the community, rather than merely, and more easily, having educational discussions with them about the importance of adhering to a strict medication regimen and diet. Third, as we did not have 100% participation, the survey results might be biased as the survey participants who responded to both surveys may represent a particularly motivated and self-selecting group. It is possible that participants who were predisposed to be interested in SDOH were more inclined to respond to the survey. Fourth, our tours across the different neighborhoods are not standardized as to the nature of or order of information presented to them. Although the general structure of the tour was preserved across neighborhoods and the tour leaders discussed the content of their tours with each other, ultimately each tour leader had a fair amount of discretion to structure the tour to reflect their presentation styles and live in different neighborhoods. Were tours implemented in residency programs across the country, however, they would reflect the unique nature of neighborhoods and leaders and so evaluating this real-world implementation may be ideal. Fifth, due to scheduling

difficulties, tours occurred at various times at the beginning of the academic year, with some groups being scheduled before and others after they had started their first clinical blocks. In particular later in the tour season, interns had increasing clinical responsibilities. Given the time commitment of clinical rotations, this could have impacted the level of engagement of interns on some of the tours, as well as the response rates on surveys. Without a more intentional inclusion of these tours into intern orientation, this is a difficult issue to resolve.

Future studies should evaluate whether interns' longer-term actions in caring for patients align with the information they learned on the tours as well as their stated intentions with regard to improving patient health. At the beginning of their residency training period, interns have a conception about how they intend to practice and the types of doctors they intend to be. These ideas likely change during the course of their training, in ways dictated by the experiences had while in residency. This study was one early experience out of many that interns would have over the course of the following three years in becoming certified physicians. A longer-term follow-up study would hopefully help to establish the extent to which this or a similar intervention would impact the ways in which interns ultimately practice as physicians, how they incorporate SDOH into their understanding of patient disease, and how they utilize community resources to improve patient health. Future studies should also include a structured debriefing session in which interns are able to digest and discuss the information that they received while on these tours. The tour experience was isolated to 3-6 hours in which they were mostly spoken to by tour guides. While they were given the

opportunity to ask questions, it was not a structured part of the experience. Once interns had time to think about the information to which they were exposed on the tour, and with the benefit of questions posed to interns for the purpose of discussion and to evoke deeper thought about their patients and the impact of SDOH, they may have more insights and may want to learn more about that to which they were exposed.

In conclusion, neighborhood walking tours led to measurable improvements in resident familiarity with the neighborhoods from which their patients come, changes in their perceptions of factors impacting patient health to favor a more holistic view of patient lives, and changes in the ways that residents intend to improve the health of their patients to favor methods that align more with connection to outside resources and to resources that can be found in their communities. Our study indicates positive results in a novel walking tour curriculum program for physician-residents. In the future, we hope to incorporate more neighborhoods and a more longitudinal curriculum into training physician-residents in the social determinants of health.

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FIGURES

Medication compliance - I	Employment - S	Health literacy - I
Access to primary care - S	Individual health behaviors - I	Racism - S
Housing stability - S	Genetics - I	Insurance status - S
Transportation - S	Community violence - S	Access to green spaces - S
Language barriers - S	Income - S	Social connectedness - S
Acute illness - I	Chronic disease - I	Mental illness - I
Illicit drug use - I	Access to healthy foods - S	Level of education - I
Community role models - S	Gender - I	Food insecurity - S
Experiences w/ healthcare - I		Multiple comorbidities - I

Figure 1. Answer choices for survey question 1: Of the following, please rank the 5 most important factors influencing your patients' health. 'S' indicates factor coded as a social determinant of health. 'I' indicates factor coded as an individual-level factor.

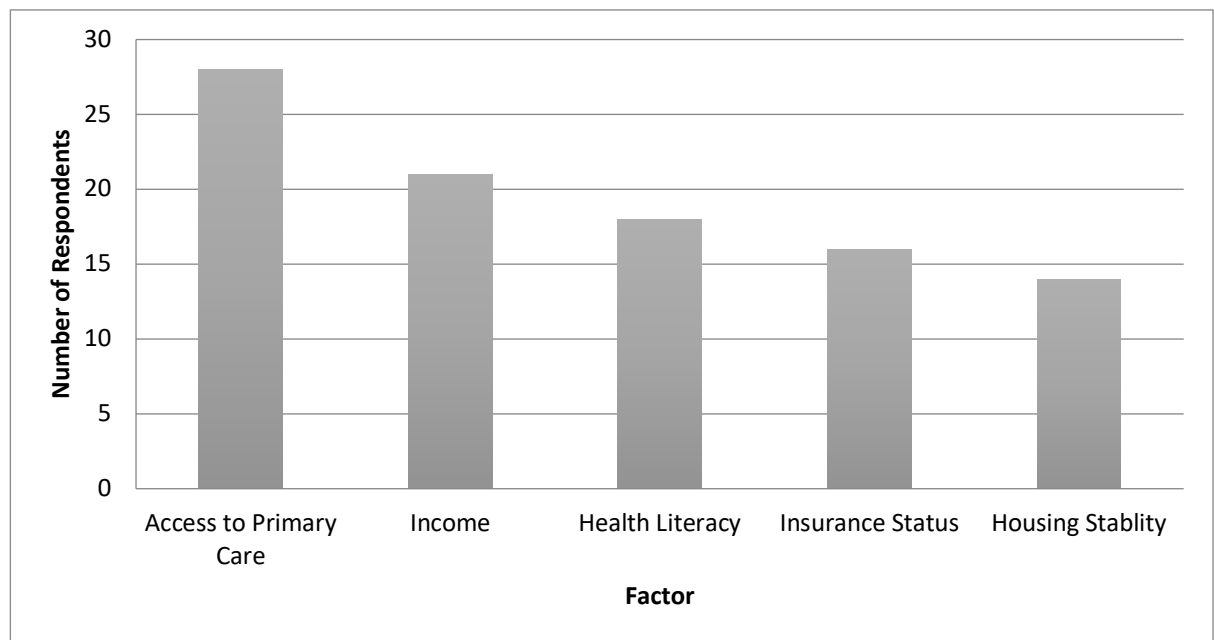


Figure 2. Most commonly ranked factors affecting patient health, pre-tour response

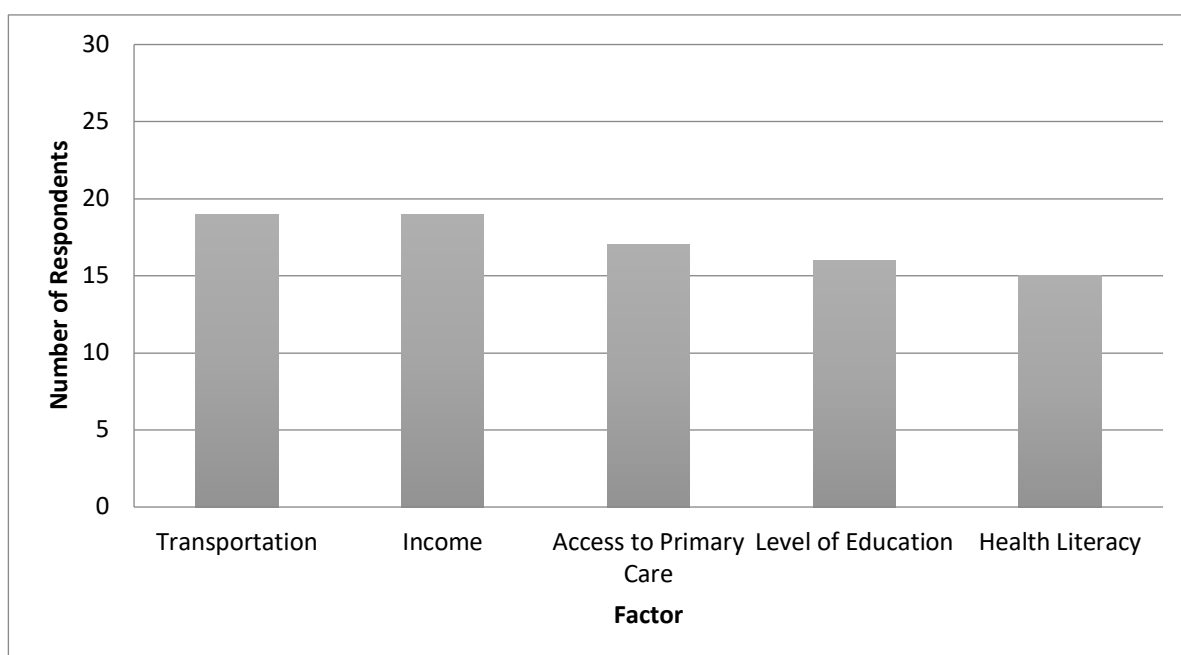


Figure 3. Most commonly ranked factors affecting patient health, post-tour response

Sample Respondent 1: Pre-tour: “Family situation and dynamics.”
Post-tour: “Bus schedule and paths. Distrust of system.”

Sample Respondent 2: Pre-tour: “Environment, surroundings, social support.”
Post-tour: “Health literacy, access to healthy food, access to a medical health professional.”

Sample Respondent 3: Pre-tour: “Motivation, ease of accessing the health system.”
Post-tour: “Food options, stress, home situation.”

Figure 4. Sample responses to “What other factors have an influence on your patients’ health?”

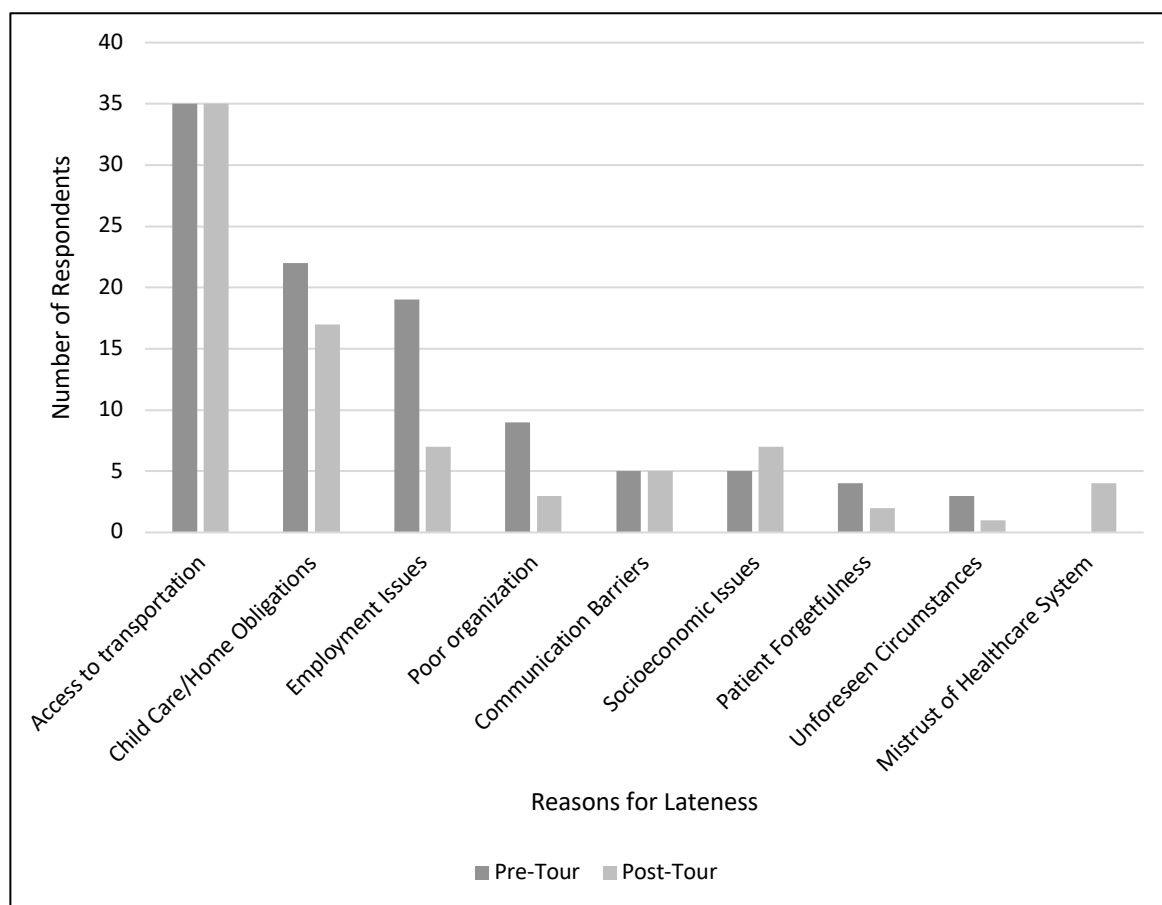


Figure 5. Free responses to survey question: Why are patients late for clinic visits?

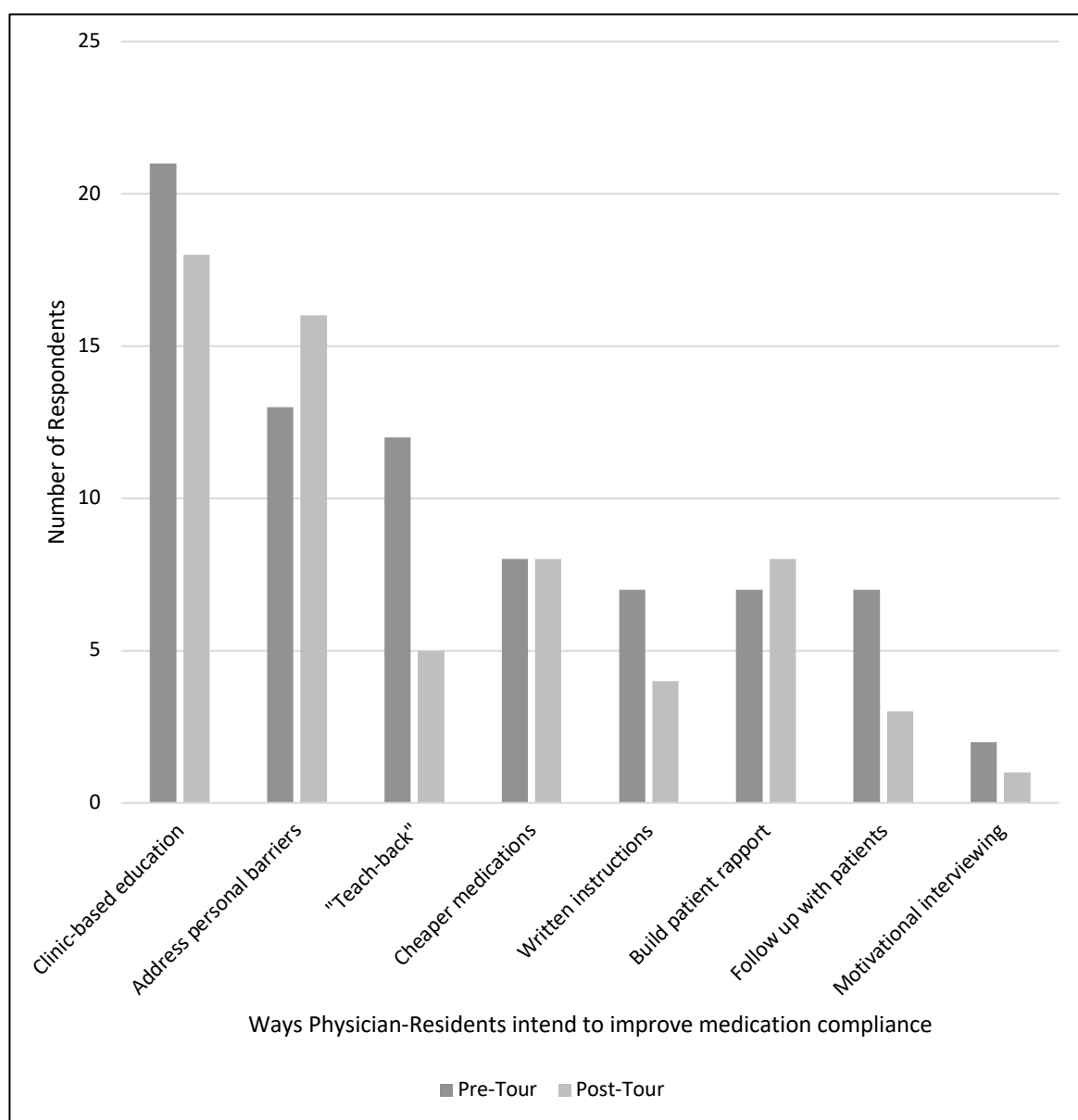


Figure 6. Free responses to survey question: How would you improve patient medication compliance?

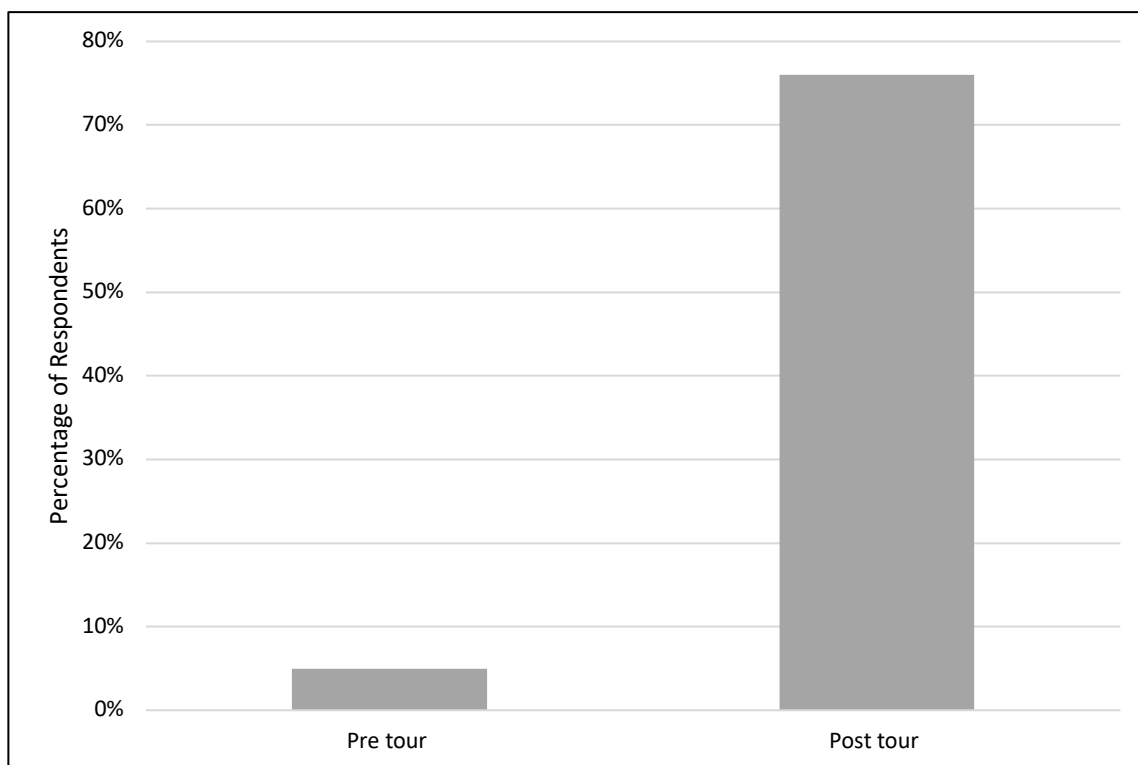


Figure 7. Physician-resident familiarity with New Haven community resources. Pre-tour = 5%; Post-tour = 72%; $p < 0.001$.

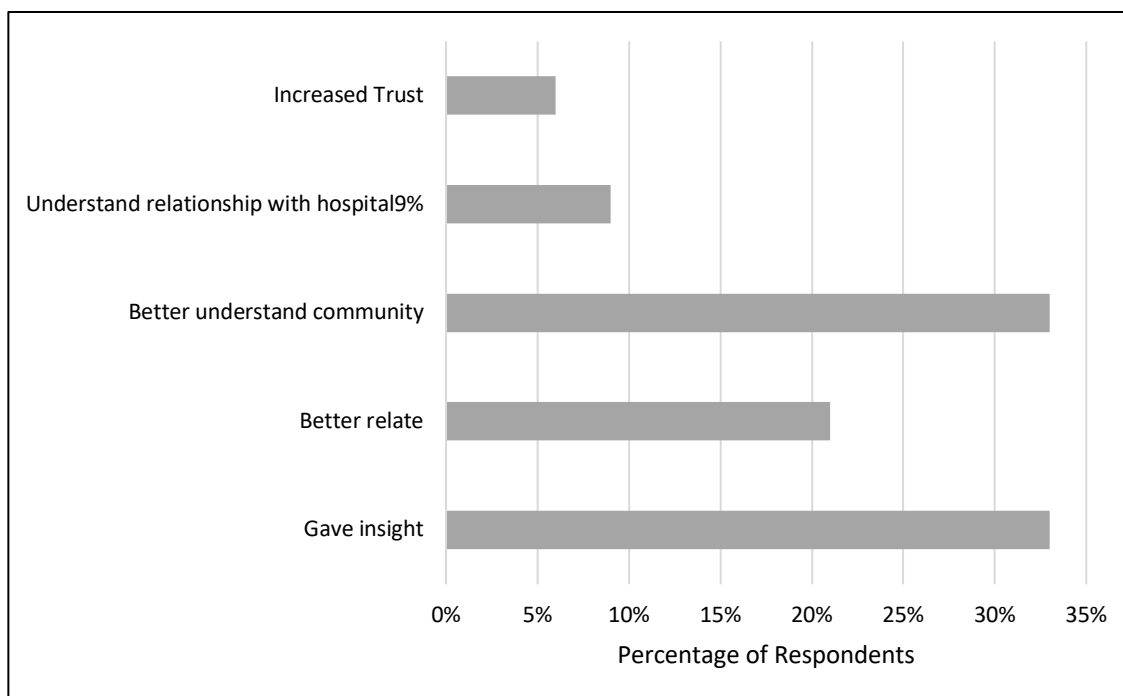


Figure 8. Responses to survey question: In what ways will this tour affect your care of patients?

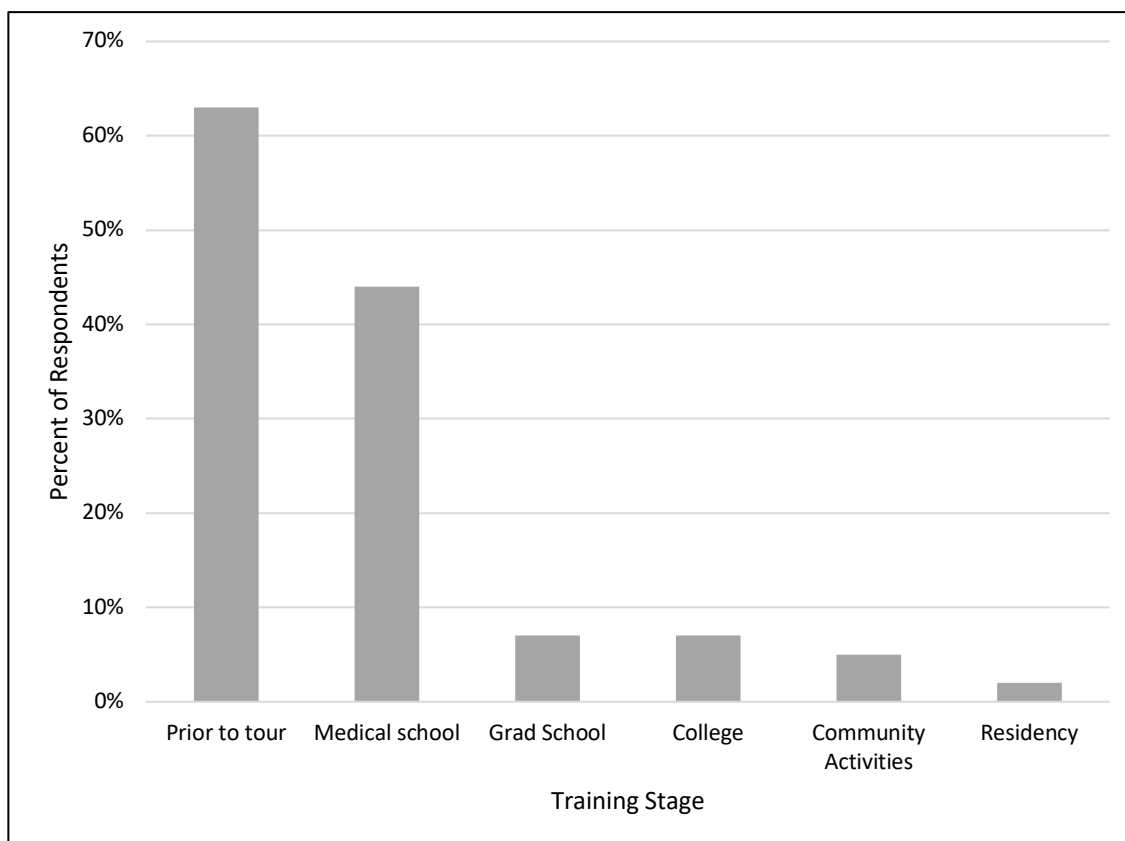


Figure 9. Responses to survey question: At what stage in training were physician-residents first taught about SDOH?

Figure 10. Survey Questions

1. Verbal/Online Consent for Participation in a Research Study

Please select your residency training program

- ☐ Primary Care
- ☐ Traditional Medicine
- ☐ Pediatrics
- ☐ Medicine/Pediatrics
- ☐ Emergency Medicine
- ☐ OB/Gyn
- ☐ I am a fellow or faculty member

2.

In what year of training are you?

- ☐ 1
- ☐ 2
- ☐ 3
- ☐ 4
- ☐ I am a fellow or faculty member

3.

4.

Of the following, please rank the 5 most important factors influencing your patients' health. Add numbers 1-5 to indicate your choices, with 1 being the most important factor, 2 being the second most important, etc. Please use each number only once.

5.

What other factors have an influence on your patients' health?

6.

Please list up to 3 reasons why patients are late for clinic visits.

7.

Please list up to 3 ways that you try to improve patients' compliance with medications.

8.

Please list up to 3 ways that you try to improve your patients' diet.

9.

Please list up to 3 ways that you try to encourage exercise.

10.

Are you aware of community resources available to your patients who live in Fair Haven?

☐ Yes

☐ No

11.

If you answered yes above, please list community resources that are available to your patients in Fair Haven.

Follow-up Survey Only

12.

In 2-3 sentences, please offer some reflections on your walking tour experience.

13.

In what ways do you think the walking tour might change the way you care for your patients?

14.

What, if anything, surprised you during the walking tour?

15.

How would you improve these walking tours?

16.

Have you received training on the social determinants of health?

☐ Yes

☐ No

17.

If you answered yes above, when did you learn about the social determinants of health?

Which, if any, readings did you complete prior to the tour?

- ☐ I completed both readings
- ☐ I completed none of the readings

18.