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Promoting Physical Activity Among Underserved Populations

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Abstract

Underserved populations, including racial/ethnic minorities, individuals with low socioeconomic status, and individuals with physical disabilities, are less likely to engage in sufficient moderate to vigorous physical activity (MVPA), and are thus at increased risk of morbidity and mortality. These populations face unique challenges to engaging in MVPA. Learning how to overcome these challenges is a necessary first step in achieving health equity through health promotion research. In this review of the literature we discuss issues and strategies that have been used to promote MVPA among individuals from underserved populations, focusing on recruitment, intervention delivery, and the use of technology in interventions. PA promotion research among these vulnerable populations is scarce. Nevertheless, there is preliminary evidence of efficacy in the use of certain recruitment and intervention strategies including tailoring, cultural adaptation, incorporation of new technologies, and multi-level and community-based approaches for PA promotion among different underserved populations.

Keywords

health promotion; review; minorities; socioeconomic status; disabilities

Introduction

A majority of the population in upper-middle and high-income countries engages in an insufficient amount of physical activity (PA), resulting in increased morbidity and premature mortality and making it one of the most pressing public health problems of the 21st Century (51). Although all types of PA are associated with better health, moderate to vigorous PA (MVPA) is considered especially crucial to the prevention of chronic disease and premature mortality (34). Although the population as a whole engages in insufficient levels of MVPA, certain segments of the populations engage in particularly low rates of MVPA. Underserved populations, a broad term that includes individuals with minority racial/ethnic backgrounds, low socioeconomic status (SES), and physical disabilities, among others, are more likely

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than others to engage in insufficient MVPA (19, 21, 39, 86). Therefore, they are considered high priority populations to target for MVPA promotion and intervention.

In the United States, one of the central goals of the National Health Objectives (Healthy People 2020) is to eliminate health disparities and to achieve health equity. For such purposes, and given the health benefits associated with regular engagement in MVPA, physical activity promotion efforts must target these high priority populations, who are at higher risk of physical inactivity and chronic conditions associated with it. Racial/ethnic minorities, low SES populations, and individuals with disabilities face unique challenges to engaging in MVPA. Learning how to overcome these challenges and how to meet the needs of underserved populations is a necessary first step in achieving health equity through health promotion research.

Individuals from minority racial/ethnic backgrounds, such as Hispanic/Latino, African American, American Indians and Alaska Natives, Asian Americans, and Pacific Islanders, usually report lower levels of MVPA, compared to non-Hispanic white individuals (13). Until relatively recently, these racial/ethnic minority groups were underrepresented in health research. While various institutions, including the National Institutes of Health (NIH), now have regulations for the inclusion of racial/ethnic minorities in research studies, there are persistent recruitment challenges in research with certain racial/ethnic minority groups, who are still less likely to participate in health research (68). Moreover, beyond recruitment, adaptations may be warranted to ensure that the needs of these populations are met through PA interventions. These adaptations include the use of linguistically appropriate materials for non-English speakers, as well as cultural adaptations through the inclusion of values relevant to specific cultures (e.g. the importance of family, group needs, and conflict avoidance in the Latino culture (59)).

Individuals with low SES report substantially lower levels of MVPA compared to those with higher SES; for example, 55.4% and 62.6% of individuals living in low vs. high SES areas engaged in recommended levels of MVPA, representing a 26% lower likelihood of sufficient activity among low SES individuals (36). Moreover, low SES has been associated with an elevated risk of various lifestyle-related chronic illnesses, such as diabetes and obesity (28), as well as an elevated risk of all-cause mortality (16). Many reasons to account for higher risk of physical inactivity among low SES populations have been identified, including less access to facilities (e.g., gyms, parks & recreation facilities), less time to engage in recreational activities, lower levels of education (i.e., lack of knowledge about health and health behaviors), and higher levels of stress (5, 7, 14, 27, 61). Additionally, *perceptions* of lack of safety in low SES neighborhoods may negatively affect individuals' engagement in physical activity, even though these perceptions might not always correspond to objective measures of safety (96). These barriers to PA engagement among low SES populations might influence recruitment and intervention response, and thus need to be addressed in PA promotion research.

Individuals with physical disabilities report significantly lower rates of MVPA than those without disabilities, with rates varying widely depending upon the specific disability (62, 64, 73). Physical disabilities place individuals at higher risk of unemployment and low-wage

employment, discrimination, and other social determinants that may affect their health status (58). Physical inactivity among individuals with physical disabilities might also lead to the development of comorbidities, such as pressure sores, ulcers, obesity, bowel or bladder issues, and depression (9, 11). Given the mobility limitations posed by certain disabilities, specialized training and supervision are often required to address the needs of individuals with physical disabilities (23, 73, 76, 89) in PA promotion interventions.

Research with underserved populations poses unique challenges, which are further discussed in this review. In the pursuit of health equity, it is important to overcome these challenges in health and PA promotion research. This review discusses issues and strategies that have been used to promote MVPA (hereinafter referred to as PA) among individuals from underserved populations, focusing on recruitment, and intervention delivery. Moreover, given that research is increasingly relying on technology for health promotion, and that technology poses promising avenues for dissemination of programs to large groups, we have also examined how technology has and might continue to affect health promotion initiatives for underserved populations.

PA Promotion Among Racial and Ethnic Minorities

Racial/ethnic minority status has been associated with higher prevalence of obesity and related comorbidities (46, 48). Moreover, certain racial/ethnic minorities are less likely to participate in PA, compared to non-Hispanic whites (53). The difficulties in the recruitment of racial/ethnic minorities to research and/or intervention programs have been well documented (10, 45, 68). Inadequate approaches to planning and conceptualization of recruitment strategies are thought to exacerbate the problem of low participation rates among certain racial/ethnic minorities (22, 52).

Recent literature reviews have examined recruitment and retention of racial/ethnic minorities to health promotion interventions, including PA interventions (10, 68). Successful recruitment strategies reported include seeking partnerships with community health centers, addressing safety concerns (e.g. lack of appropriate street lightning at night), using theory-based practices, and using well-funded social marketing campaigns (67, 98). Parra-Medina and colleagues (67) reported successful strategies for the recruitment and retention of African-American women to their study, including partnering with community health centers, hiring research staff that reflect the participants' cultural background, and facilitating attendance (e.g. providing free transportation) (67).

Reports on recruitment of racial/ethnic minorities for PA research and/or interventions cover a range of different settings, from clinical trials, community based programs and home based interventions (32, 67, 94). Frierson and colleagues (31) described successful racial/ethnic minority recruitment and retention strategies for an Internet-based PA study. Predominately Black and Hispanic women responded to advertisements on radio stations and newspapers, as well as word of mouth and "colorful" flyers in churches. Data on recruitment of men who belong to racial/ethnic minority groups are scarce, particularly for men. Future research should explore issues and strategies for the recruitment and retention of minority men and establish better methods of collecting recruitment information.

There is limited yet growing research on PA interventions specifically developed or adapted for racial/ethnic minority groups. Most of the existing research in the United States has focused on PA promotion among Latinas and African American women. African Americans and Latinos are the largest ethnic minorities in the country, and have some of the lowest levels of PA and highest levels of chronic illnesses of all races (50). Women from these minority backgrounds are especially prone to engaging in insufficient PA (85). Thus, they are priority populations for interventions promoting PA.

Racial/ethnic minority populations have been targeted for PA promotion mainly by linguistically and culturally adapting messages and other PA intervention components (19, 20, 54, 57, 65). For example, the Increasing Motivation for Physical ACTivity (IMPACT) Project (2), culturally adapted behavioral class curriculum by targeting the external manifestations of culture (e.g. ethnically matched health educators), as well as values that guide personal and health behaviors (e.g. addressing values related to family responsibilities). Other studies with Latinas have shown community-based approaches using promotoras to be effective (3, 44). Promotoras, or community health workers, are individuals from the target population who are engaged and participate in outreach and health promotion efforts for the research study. Promotoras have often been employed in the implementation of culturally sensitive interventions for Latinos, as promotoras constitute a bridge between the community (and the values embraced by the community) and the researchers (60).

Cultural tailoring has also been used for PA promotion among African American women. The Body and Soul Health Initiative was a 24-week PA and dietary intervention targeting members of predominantly black churches. This intervention also included structured meetings on diet and exercise led by African American staff. Results of this study demonstrated significant within-subject increases in exercise minutes from baseline to 12-weeks and 24 weeks (17). Other church-based PA efforts have demonstrated similar PA improvements (43, 101), supporting the effectiveness of community-based approaches to PA promotion among racial/ethnic minority women.

There is growing research in the area of adapting technological innovations for PA promotion, and current evidence has demonstrated preliminary success in using technology to reach racial/ethnic minorities. Technologies such as Interactive Voice Response (IVR) systems, offer the opportunity to maintain frequency of feedback, while automating processes to improve cost-effectiveness, reach, and potential dissemination on a larger scale. One study by Steinberg and colleagues found that IVR improved self-monitoring adherence among low-income black women over other eHealth self-monitoring modalities (84). Nevertheless, there remains a paucity of research examining the efficacy of IVR-based PA interventions specifically developed or adapted for racial/ethnic minority populations (25).

According to the Pew Research Center, 84% of adults in the United States have access to the Internet (69). Moreover, in recent years, mainly due to the rise in smartphone and tablet ownership across all racial/ethnic groups, the gaps in access to the Internet have significantly narrowed. Currently there is little difference in access to the Internet among racial/ethnic groups, as 78% of African Americans and 81% of Latinos have access to the Internet, compared to 85% of non-Hispanic whites (69). Accordingly, Internet-based technology may

also prove to be an appropriate medium for delivering interventions to hard-to-reach populations such as Latinos and African Americans. Although there is currently limited research in this area, there is some evidence that Internet-based interventions can successfully promote PA engagement among racial/ethnic minority groups by addressing commonly reported barriers (e.g., childcare and household responsibilities). One Internet-based study, Pasos Hacia La Salud, was a 6-month randomized controlled trial of a Spanish-language, culturally and linguistically adapted, individually tailored, Internet-based PA intervention for Latinas, compared to a wellness control arm (56). Study results revealed significantly greater increases in PA for the intervention group, compared to the control group (56). Despite early evidence of efficacy, further research is needed to determine the efficacy of Internet-based PA promotion for Latinas and other racial/ethnic minority groups.

PA Promotion Among Individuals with Low SES

Low SES has been associated with high risk of physical inactivity (36), yet limited research has delved into examining how low SES individuals might be effectively recruited into health promotion programs. Low-income populations are more likely to face issues of literacy and unavailability of resources. Thus, properly targeted and well-designed communication strategies specifically addressing these issues, through mass media and word of mouth, have been shown to be particularly important (97). Of note, some commonly proposed recruitment strategies, such as financial reimbursement (e.g. cash or coupons) or convenience strategies (e.g. transportation and flexible scheduling) were infrequently assessed (92). Payments could potentially have a negative impact on trust, especially in vulnerable populations that might already be distrustful of research.

Traditional marketing techniques (posters/outdoor banners/flyers) advertised through community-based participatory approaches have had a positive influence on recruitment in low SES groups (49). Additionally, community opportunities for social interaction via word of mouth communications have been shown to amplify the capacity and reach of traditional marketing promotions, as suggested in a review of current promotion methods (98). Social marketing, as a method to implement programs to promote socially beneficial behavior change, has also been advocated as a recruitment strategy for low SES individuals (88).

Considering the higher prevalence of inactivity among low SES individuals, there is a surprising dearth of research to develop interventions specifically targeting this particular group. The majority have taken place in schools or clinics in disadvantaged areas or focused on environmental changes in low SES neighborhoods (24, 30). These approaches are of course more likely to include low SES individuals than those recruiting from the wider community, but there is still no guarantee that they will include or benefit economically disadvantaged individuals, and few of these studies indicated that the programs were modified for the needs of a low SES population.

It is unclear whether interventions need to be modified for low SES populations to be effective. One primary care-based study in the UK used motivational interviewing to increase PA in patients from a disadvantaged area (37), and recruited a sample that was 75% low SES. There was no indication of whether the intervention was modified in some way to

fit this population; however, attendance in the low SES group was roughly equal to that of the higher SES group, and the intervention was equally effective for both low and high SES groups. Similarly, a comprehensive PA intervention program in Norway used a variety of individual, group, and community-wide approaches in two low SES communities and found that, while the low SES individuals had a slightly less positive view of the intervention, they reported a greater effect on daily active lifestyle than higher SES individuals (41). The authors found that simple elements such as posters to increase stair use were among the most effective. Another study in the UK investigated the effect of stair use posters in high and low SES areas, and also found these to be equally effective in both places (79).

While the content of psychosocial based interventions may be appropriate for individuals across the SES spectrum, additional environmental interventions may be necessary to fully include and benefit low SES individuals. Focus groups conducted in rural Appalachia, for example, highlighted the barrier of limited facilities in the immediate area, and limited transportation to reach distant facilities (49). Participants strongly felt that greater availability of gyms and PA classes would increase their participation in PA. Along those lines, researchers found that after the construction of a series of walking trails in rural Missouri, low SES individuals were less likely to have used the trails overall but were more than twice as likely to have increased their PA by using the trails (6). Various interventions for individuals with low SES have focused on encouraging working PA into everyday life rather than making a separate time to exercise and communicating basic knowledge about health and health behaviors (18, 38, 81, 99).

Use of technology to promote PA in low SES groups may seem paradoxical, as low SES groups often have more limited access to technology. For example, both within and across countries, access to the Internet often increases with income and education status. This so-called “digital divide” has narrowed in recent years. In 2000, only 34% of households making <$30,000/year reported using the Internet; in 2015, this number had grown to 74% (69). In households making ≥$75,000/year in 2015, however, Internet use was nearly universal (97%), emphasizing that, while low SES groups have increased access to this valuable technology, differential rates of access are still present, particularly at the lowest end of the SES scale.

Use of mobile phones, however, does not appear to differ greatly by income level. Recent studies show mobile phone technology has become internationally pervasive, with 97 mobile phone subscribers per 100 people worldwide, and 92% penetration in developing countries (compared to just 35% of individuals using the internet in developing countries) (82). This universality, however, does not appear to include smartphones: while 84% of adults in the U.S. making >$75,000 report owning a smartphone, this number is 50% in the <$30,000 bracket (83), and just 37% in developing nations (82).

The most appropriate use of technology to promote PA in low SES groups, then, will likely employ more simple mobile features, such as text messaging. The use of text messaging and mobile phones allows participants to receive intervention material in real time in their typical environment, circumventing common barriers such as demanding work schedules, limited transportation and childcare. A recent review of mHealth for PA promotion found

that text messaging was a common element in successful PA interventions (66). Few of the reviewed interventions, however, included low SES groups, and while one specifically recruited from a disadvantaged neighborhood, few participants were low SES (30). This channel, then, appears to be underutilized, and could be especially effective for promoting PA in low SES populations, particularly in conjunction with other tested methodologies such as face to face, telephone, or print-based approaches.

PA Promotion Among Individuals with Physical Disabilities

Conditions associated with physical limitations and/or physical disability include: multiple sclerosis, spinal cord injury, stroke, cancer, spina bifida, Parkinson's disease and cerebral palsy, among others (11). PA promotion among individuals with physical disabilities is important, as physically inactive individuals with such disabilities are more likely to develop comorbidities (9, 11). The PA guidelines for Americans call for individuals with disabilities to engage in 150 minutes per week of PA or 75 minutes per week of vigorous PA (9, 42), as well as muscle-strengthening activities (42), similar to recommendations for the general adult population. Despite the health benefits and specific recommendations, rates of inactivity are high among adults with physical disabilities, especially compared to adults without physical disabilities (9, 11, 55). Multilevel, theory-based PA interventions that incorporate technology are needed to address these disparities (15, 93).

Complex barriers challenge efforts to effectively recruit and retain adults with physical disabilities in PA interventions, resulting in small sample sizes (47, 63, 74, 80). Even interventions using convenience samples struggle to reach enrollment targets (15, 33, 90, 100). The high prevalence of comorbid conditions often leads to many interested individuals being excluded from intervention participation (63, 77); thus, more flexible inclusion criteria may be necessary to increase enrollment (63, 74). Marketing via multiple platforms increases intervention visibility: this includes media advertisements, soliciting the help of health care providers and agencies that have contact with the target population, distributing brochures, encouraging snowball recruitment and interacting with the target population at events (i.e. support groups and doctor's offices) (33, 63, 100). Once recruited, retention poses an additional barrier; retention rates for PA interventions are lower for adults with physical disabilities than adults without physical disabilities (33). Establishing rapport through active communication and collaboration with participants, community gatekeepers, and other stakeholders is important for accomplishing both recruitment and retention targets (47, 63).

PA promotion programs can be adapted for individuals with disabilities to meet their needs, but these adaptations often require specialized training and a supervised approach to PA interventions (23, 73, 76, 89). For example, individuals with lower limb paralysis or other problems that prevent leg muscle use can engage in upper body exercises such as hand cycling, but they may need to be supervised and assisted with proper technique. Nevertheless, tailored unsupervised interventions can be a viable option for individuals with certain types of disabilities. Plow and colleagues, for example, demonstrated the preliminary efficacy of a tailored intervention to promote PA among women with multiple sclerosis (70).

Interventions for individuals with disabilities must address specific barriers to engagement in PA among this population. The high incidence of fatigue, pain, and weakness, for example, negatively influences engagement in PA and intervention participation (76). Exercising while experiencing fatigue, pain, or weakness can exacerbate the chances of injury or falling, which is already more common in this population (78). PA interventions for individuals with physical disabilities should recommend scheduling exercise when feeling the most energetic (12) and include fall prevention education that focuses on strength, balance, and gait training (76, 78). Depression, low self-efficacy, lack of exercise enjoyment, and negative outcome expectations are common psychosocial barriers that also limit PA and might need to be addressed in PA programs for people with disabilities, along with social support from family, caregivers, peers and healthcare providers (76, 78). Other barriers can include environmental/policy concerns such as difficulty finding disability-friendly PA opportunities (76, 95).

A variety of methodologies have been adopted to deliver PA interventions for physically disabled adults, but individually tailored interventions are identified in the literature as best practice (15, 35, 75, 95). There is a trend of adapting technological innovations to deliver personalized, in-home, interactive PA interventions for individuals with physical disabilities to improve accessibility and addresses participation barriers (e.g. transportation) (26, 29, 33, 35). Telephone and web-based coaching and exercise DVDs are commonly used home-based delivery channels for PA interventions among adults with physical disabilities (15) and innovative approaches such as mobile technology, immediate video feedback (IVF), and gaming systems have also been incorporated into PA interventions for this population. Some interventions have involved providing exercise coaching sessions to individuals with spinal cord injuries through a computer application on adapted Android tablets (35). IVF can also supplement or replace traditional PA instructional methods for adults with disabilities. For example, this technology can be used to display the proper technique to perform a wheelie in a wheelchair via video and then examine ability to perform the behavior correctly (100). Similarly, exergames are a mixture of exercise and digital games (63) that can be designed and adapted to deliver PA interventions for a wide range of functional abilities (71, 91, 93).

Addressing barriers and promoting facilitators though multi-leveled interventions that adequately integrate technology and theory is essential to decreasing the PA disparities for adults with physical disabilities. Currently, there is little research on PA interventions for adults with physical disabilities (15, 78) and the available studies in this area often lack a theoretical framework. Theory increases the likelihood of intervention success and provides a useful road map for studying health behaviors, developing appropriate interventions, and evaluating their efficacy. Future research in this area should continue to adapt technology to deliver PA interventions, as such innovations can help improve reach and overcome barriers to PA participation for this target population. Finally, PA promotion among people with physical disabilities is complex and likely cannot be addressed solely from an individual level but will require interpersonal approaches involving caregivers, medical team, family/friends, building community support, and pursuing policy and environment changes that increase access to PA resources and opportunities.

Conclusions

Engagement in regular PA is associated with decrease risk of various chronic illnesses, including some of the leading causes of morbidity and mortality in the United States (4). Nevertheless, the majority of individuals who belong to underserved populations, including certain racial/ethnic minorities, low SES populations, and individuals with physical disabilities, do not engage in sufficient PA (19, 21, 39, 86). Thus, PA promotion among these underserved populations is necessary to address disparities in health outcomes.

This review analyzed issues and strategies for recruiting and promoting PA to racial/ethnic minority groups, populations with low SES, and individuals with physical disabilities. Our review suggests that PA promotion research among these vulnerable populations is scarce. Nevertheless, perhaps in response to relatively new regulations for the inclusion of racial/ethnic minority populations in research, which have been adopted by NIH and other funding agencies, PA promotion research among racial/ethnic minorities in the U.S. population is growing. Increased interest in funding PA promotion research among underserved communities, including individuals with low SES and individuals with disabilities, is warranted. Future research should seek to justify the need for such funding by continuing to document health disparities and effective interventions among underserved populations.

Researchers should also aim to identify evidence-based practices for recruitment and PA promotion among different underserved populations to address health disparities and to achieve health equity. Table 1 presents some examples of strategies that have been successfully used to recruit and to promote PA among underserved populations, which were identified through this review of literature. Current evidence suggests that tailoring has been effectively used for PA promotion among individuals with disabilities and racial/ethnic minority groups, while community-based approaches for intervention and for recruitment have been successfully used among racial/ethnic minorities and among low SES individuals. Interventions for low SES individuals generally focus on multi-level approaches and environmental changes. Of note, given that racial/ethnic minority status and physical disabilities are risk factors for low SES (1, 72), environmental approaches to physical activity promotion may apply to these underserved populations as well. The built environment has been found to greatly influence people’s ability to engage in physical activity (40). Thus, in the United States and internationally, there is increasing interest in multi-level and environmental-level interventions to promote physical activity and to address health disparities. Various initiatives undertaken for physical activity promotion at the environmental level involve improving access to resources, such as creating trails and bike paths (6, 8, 87). These initiatives might be of particular importance for underserved populations who, as discussed throughout this review, face unique challenges to engaging in physical activity.

Common suggested strategies for the recruitment of underserved populations include the use of multiple recruitment channels, and the inclusion of community members in the development of recruitment plans. Additionally, for low SES individuals and racial/ethnic minorities, suggested strategies include the use of word of mouth, community-based approaches, and social marketing techniques. The presence of multiple comorbidities among

individuals with disabilities poses a unique obstacle in their recruitment, and might require researchers to make eligibility criteria more flexible.

The advent of newer technologies provides exciting opportunities for PA promotion among underserved populations. Newer technologies enable personalized delivery and tailoring of intervention materials, as well as interactivity, frequent feedback, and dissemination capability. Moreover, U.S. national data suggest that accessibility to certain technologies, including cellphones and the Internet, is rapidly increasing. Features such as text messages are now accessible even to underserved populations, and could be explored as potential intervention tools. Nevertheless, evidence supporting the use of technology for health promotion among these vulnerable populations is still scant. Future research should further investigate whether the use of technology for interventions will create new pathways for PA promotion among underserved populations, or whether it will widen the health disparities gap, due to accessibility issues.

There are various limitations to this review. Mainly, this is not a systematic review of literature. Thus, it does not include an exhaustive compilation of relevant information of topics discussed. However, it provides a broad overview of issues and strategies for recruitment and implementation of PA promotion research among racial/ethnic minorities, low SES populations, and individuals with physical disabilities. Another limitation is that, given space constraints, we were not able to include other underserved populations in this review, such as individuals with mental disabilities or women, who are also at increased risk of physical inactivity and chronic conditions associated with it. Moreover, our discussion of PA promotion among racial/ethnic minorities mainly focuses on African American and Latino populations, which are the two largest racial/ethnic minority groups in the U.S. Strategies for recruitment and PA promotion among other racial/ethnic minority groups, such as Asian/Pacific Islander and American Indian/Alaska Natives, were not discussed in this review. Future reviews may focus on examining strategies for the recruitment and implementation of PA interventions among these other at-risk populations, as promoting PA among them is also important in our path to achieving health equity.

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Table 1

Examples of Strategies for Recruitment and PA Promotion Among Underserved Populations

	Racial/ethnic minorities	Individuals with low SES	Individuals with physical disabilities
Recruitment - Strategies	• Partnerships with communities • Research staff that reflects community • Facilitating attendance (e.g. transportation) • Multiple marketing platforms	• Mass media • Word of mouth • Enhancing traditional marketing with community-based participatory approaches • Social marketing	• More flexible inclusion criteria • Multiple marketing platforms • Involving community gatekeepers • Maintaining regular contact
PA Promotion – Strategies	• Theory-based • Home, church, and community-based approaches • Cultural adaptation • Research staff that reflects community	• Multi-level and Environmental interventions	• Include fall prevention education • Address psychosocial barriers and social support • Individually-tailored • Technology for personalized, in-home, interactive interventions