Problems and Solutions in Home Modifications for those with Physical Challenges[1]

by

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[1] This paper has been modified from an original master's thesis that originally included a full educational unit and statistical evaluation of the educational program.

Abstract

By the year 2030, 72 million Americans will be age 65 or older and a significant number of this population will require a home modification to live safely at home. Certain types of home modification projects have documented value in both increasing safety and life satisfaction; however, such projects are often publically funded and commonly managed agency case managers untrained in home modification project management, thus projects often fail to meet user needs. Similarly, privately funded remodeling decisions often fall to those without proper training in adapting the home environment to the unique physical challenges of the end user with similar results. A targeted program of home modification education can help home modification decision makers better serve those in need.

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Chapter 1:

The Problem of an Aging Population and the Challenge of Accessible Homes

Demographic Trends:

So much has been written about the aging population of the United States that it threatens to numb readers the practical import of this significant demographic phenomenon. This research is intended to address one such real-life aspect of the aging population, that of safe living environments for the increasing number of older Americans.[2] The U.S. Administration on Aging projects that by the year 2030, 72 million Americans will be age 65 or older, and will comprise nearly 20% of the total population (AOA, 2014). Now add to this number a finding from a 2011 study by the National Center for Healthy Housing that most older Americans plan to continue living in their current homes, but at least one in four[3] of this age group has either a mobility challenge or a mobility related safety hazard in the home. These two findings considered together suggest a significant need for home modification services in the present and near future (Horowitz, Nochajski & Schweitzer, 2013; McCunn & Gifford, 2014).

Safe living environments are a basic human need and especially important for vulnerable members of the population, including the older homeowners and those with mobility challenges.

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[2] While the focus of this research is on the United States, aging populations propose a similar challenge in many nations world-wide as will be demonstrated by the number of international studies referenced herein. Furthermore, as mention will be made below, this research generally applies younger Americans with physical disabilities as well as the elderly.

[3] This number is as high as 91% according to one study with a much broader definition of "home modification" (Kamei, Yamomoto, Kozarai & Sugimoto, 2015).

A particularly critical example of this need as it relates to home safety is the number of hip fractures among Americans age 65 and older, for which 2.5 million are treated in emergency rooms each year and 250,000 are actually hospitalized at an annual cost in excess of $34 billion. Ninety-Five percent of hip fractures in this population are the result of slips/falls, and vulnerability to hip fractures increases with age, often resulting in the injured person's inability to live independently afterward (CDC, 2015). Previous research has shown that many such injuries can be prevented with properly designed and installed home modifications (Chase, Mann, Wysek & Arbesman, 2012).

While safe housing for the aging population is a societal problem, it is also a very personal problem affecting many Americans who are related to, or are personally caring for an aging parent or loved one. Such-care giving is a significant source of personal stress for care-givers which is compounded when physical deterioration and/or home hazards are present (Hansen, Slagsvold & Ingerbretsen, 2012).

Much of this researcher's own professional career has involved attention to the living environments of older Americans, beginning with employment at a nursing home design firm, then as a principal in a retirement community developer and finally in 2004 founding a company, Renovations for Life, LLC, specializing in the providing of home modifications so that its clients could live safely in their existing homes and neighborhoods. Since March of 2004, Renovations for Life has performed thousands of home modification projects for those in need, ranging from grab bar installations to room editions, home elevators, lift systems, and related projects. About the time Renovations for Life was founded in Indianapolis, Indiana, there was a movement in Indiana State Government to direct an increased portion state and federal funds previously

allocated for nursing home and assisted living projects, to more in-home healthcare services, including home modifications.[4] This shift in focus was due to several factors, including the conviction by (then) policy and decision makers that nursing home care was too often an expensive and unneeded option with the additional negative effect of depriving communities of lifelong residents and stabilizing influences as older residents relocated to institutional settings.[5] The move to more home-based health services is consistent with the desire of most older Americans to remain in their homes as long as they are able to do so (Lien, Steggell & Iwarsson, 2015; McCunn & Gifford, 2014).

This researcher's first-hand experience over the past 17 years has validated the tangible and the life changing benefits of properly executed home modifications projects as well as the existence of multiple barriers to their successful completion. To know that such solutions are available but inaccessible to some in need due (in many cases) to preventable causes, is to hold forth a tantalizing possibility and present an opportunity for action research. It is hoped that this research will contribute in some way to this vital area by eliminating knowledge barriers preventing those in need accessing this valuable service.

With the nursing home model of senior care occupying a dominant role in resources allocation for older persons, both financial and educational opportunities regarding home modifications for seniors have been relatively slow in emerging. One example of the few such

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[4] This concept was not limited to Indiana, which is but one example. Other articles researched for this study made the same or similar points about healthcare dollars in general (Timmerman, 2012).

[5] This idea was powerfully presented in a speech attended by this researcher and given by former Mayor of Indianapolis, Bart Peterson in 2004.

educational programs is a two day course conducted by the National Association of Home Builders (NAHB) known as Certified Age-In-Place Specialist or CAPS. This researcher was one of the early graduates of the program in 2004 which was less than two years old at the time. The CAPS program continues to be one of the few recognized training courses of its type. While CAPS training is relevant and valuable, it has several limitations in its scope and intention. The program is designed primarily for the NAHB's builder and remodeler members; that is, professionals in the remodeling field (though non-remodelers can also take the training). While this is valuable, non-construction professionals need relevant training as well, and this key point will now be developed further.

The lack of educational options for home modification training of the non-building professional is a more serious problem than may be obvious at first consideration. This is due to the fact that a significant number of home modification projects are funded with public and charitable money, and such programs require accountability in the form of third party diagnosis and verification that the funds have been spent properly and that home modifications are performed acceptably. While oversight is certainly advisable, a problem arises due to the technical nature of home modifications and the performance context of such which is generally a private residence and involving the unique physical challenge(s) of the client. Often the third party project coordinator for publicly funded home modifications is an agency case manager who has the primary contact and relationship with funded clients and is tasked with assessing the need of its clients and the viability of home modification projects for them. Typically, a case manager's educational background and training is in social work, health care or a similar field and includes no construction training. The complexity of remodeling services in the performance context of the client's home, with the almost limitless variety of conditions and

circumstances creates uncertainty that can challenge even experienced professional contractors. When a typical homeowner or their caregiver-case manager is tasked with designing and managing a remodeling project with the sort of complexity many entail, delayed, uncompleted and/or unsatisfactory projects are a common result. This unfortunate and costly outcome is due at least in part to a deficiency in the training of case managers responsible for publicly funded home modification project coordination. Similarly, a remodeling contractor may be quite familiar with typical remodeling projects (roofing, siding, kitchen upgrades, etc.) but have limited experience in remodeling for those with physical challenges or exposure to the types of products and applications necessary for such customers, and this also contributes to the problem of unsatisfactory (or ineffective) home modifications.

As the next section of this paper will discuss, studies have concluded that home modifications are beneficial to a population in need of such services (Harvey, Mitchell, Lord & Close, 2015; Kamei et al., 2015; Chase et al., 2012). The literature also reveals that there are significant barriers to proper home modification installations and that the field is complex, involving many disciplines and professions (Gucciardo, 2013). Improperly installed modifications are expensive and even dangerous to a vulnerable population, which includes not only the elderly but also younger persons with severe injury or degenerative conditions. With the anticipated significant growth in this population combined with the educational barriers just described, it seems reasonable that something demonstratively valuable as home modifications would be a natural candidate for research and education.

Defining "home modifications" and the impact of publically funded projects

The idea of caring for the aged at home is, of course not new, and yet due to the demographic changes and the financial burden of such care, it has increasingly become the focus

of research. As a relatively recent area of attention, the body of this research is still taking shape both in terms of definitions and methodology, and this creates some challenge in the interpretation of study results (McCunn & Gifford, 2014). One of the first challenges is to develop a standard understanding of the term "home modification," differences in which affect the interpretation of research findings and recommendations. A number of the studies considered in this research were conducted by and for those in the field of occupational therapy in which the definition of home modifications included (in various combinations) components of exercise, safety education, assistive technology, durable medical equipment and actual changes in the physical home environment of the client (structural modifications). Other studies, such as Kamei et al. (2015), broadly defined home modification in a way as to include the removal of clutter, extension cords and loose rugs that create trip hazards. Still others limited the scope of home modifications to the more common definition of durable equipment and changes to the client's actual physical environment (Stark et al., 2015). While the additional elements in many home safety type interventions do include therapy, information, exercise, etc., this project will focus mainly on the structural modifications required to improve safe and independent client living as the essential component of home modifications. This focus is not arbitrary. Public funding for such projects has contributed to such distinctions, recognizing with the federal Medicaid Waiver program, for example, that service providers of home modifications differ in training and expertise from those providing other home care services. While the research reviewed for this project tended to suggest that a combination of services (both structural and non-structural) is most helpful the client, such studies often recognized the difference in expertise and training required for the various components (Stark et al., 2015; Gucciardo, 2013). Structural modifications, the focus of the current paper, are generally performed by professional

contractors, states and sometimes those in the skilled trades such as plumbing and electrical, which are often licensed by state, counties or municipalities.

This is important because public money is a major funding source of home modification services to those in need, yet public funding tends to focus on modifications more limited in scope as in the purely functional, creating the occasional misalignment with end user expectations, needs and sensibilities (Alpin, de Jonge & Gustafsson, 2013). When the interdisciplinary nature of the home modification services is added to a system already tricky to negotiate, it can add up to the all too common investment of public funds in the unsatisfactory project, or the project that never occurs (Stafford & Harlan-Simmons, 2003; Gucciardo, 2013).

Ideally, when a client in need requests consideration for a home modification, the case manager would confidently and expeditiously assess the project for viability, make the determination if additional design/expertise is needed and then efficiently move to the bidding, approval and construction. While the case manager would not necessarily personally design and administer every project, s/he would confidently and efficiently identify the more basic projects and move to construction while drawing on prescribed resources for the more complex project, seeing both types of the projects through to completion.

Currently, since many homeowners and case managers lack the knowledge and confidence to manage the home modification process, unnecessary delays are created at almost every phase of such projects. For instance, when a case manager first evaluates a client for a home modification, bridging the gap between the client's current bathroom (which is almost never designed with accessibility in mind), this includes many variables difficult to navigate without information about standard products and applications (Gucciardo, 2013). Add to this initial uncertainty the standard construction variables such as the home's structural system and

integrity, condition of the current plumbing system, electrical, the age of the home, (for starters) and the potential project's complexity increases quickly. Once these items are evaluated, then the process of communicating with qualified contractors (to be vetted according to funding source requirements) and obtaining the required consistent bids in the form that allows for comparison becomes the next significant challenge. Following this, the management of the actual construction project begins, which depending on complexity, can be challenging at times even for the experienced project manager. Note also that customer expectations and personal sense of design have not yet entered the mix of consideration! For the untrained, these are formidable obstacles and reasons why so many projects are never completed or even started. These issues also cause many projects that do complete to have unsatisfactory results.

The case for home modification education

What has been described above is largely a gap in knowledge and confidence on the part of key role players in the delivery cycle of home modifications, the case managers (and other untrained decision makers, including the end user and family). Such a gap between an ideal state (the need is met with timely service) and the actual state with less than ideal performance is suited for educational programing, especially when the deficiency is caused, partially or entirely by a lack of knowledge (Dick, Carey & Carey, 2015).

The urgency of this task is underscored by an important study which found that once a diagnosis is made recommending an interventional home modification due to a decline in a client's mobility or risk of injury, there is a closing window of opportunity in which to meet that need in a way that truly aids the client (Petersson, Kottorp, Bergstrom & Lilja, 2009). The more time squandered due to inefficiencies of whatever sort, the less likely it is that a home modification will benefit the client as the client's condition degenerates. Thus expediting the

effectiveness of case managers, or any member of the delivery system through education, seems a worthy cause for research and training intervention.

Let's take a step back for a moment, and view this problem through the lens of population shift mentioned at the beginning of this paper. When significant demographic shifts occur, it is reasonable to expect resulting market disruption until an equilibrium is established. The market for home modifications is no exception as demand grows quickly for this specialized service. A relevant example of this market dynamic was evidenced by the conclusions of a study conducted by Indiana University's Center for Aging which found that even though both the need and funding existed for home modification projects for Indiana residents, there was a significant underutilization of such funding (Stafford & Harlan-Simmons, 2003). This same study listed as one key cause that home modification assessments were highly inconsistent and at the same time drew upon "a wide range of disciplines and professions" (Stafford & Harlan-Simmons, 2003, p. 7). Though this study is now 17 years old as of this research, more current research (contained herein) shows a continued "shake-out" process as attempts continue to standardize assessment tools for an a subject as multifaceted as physical challenges in the unique home environment (McCunn & Gifford, 2014).

This researcher has directly experienced numerous occasions since 2004 up to the present, in which potential home modification projects failed for reasons including failure to achieve agreement with the client on a project scope, inadequate project design and specification, an inability to obtain the required contractor bids in acceptable form, and project funding disallowance for non-compliance with funding source guidelines. While it is neither fair nor accurate to assign responsibility for all these factors solely to case managers, their central role in

home modification projects requires the managing of such project variables. Some of these challenges are quite complex and beyond the range of educational training alone to solve, but certainly not all of them, especially those caused primarily by a lack of knowledge in assessing, designing and managing home modification projects. This knowledge gap results in performance problems that may well reinforce the case manager's lack of confidence and even engender an aversion to home modification projects. Unsuccessful or unsatisfactory home modification projects are quite unpleasant for all parties involved.

The case manager's challenge is compounded by the fact that public funding sources understandably place restrictions on the extent of such projects in ways that can conflict with homeowner expectations and sensibilities. The case manager, as the front-line contact and provider of services, is caught in this conflict between public funding restrictions and mandates and the client's personal needs and expectations. Negotiating such a dilemma requires a high level of skill and knowledge both in the area of human dynamics but also of the types of products and services available. A case manager (and contractor or therapist) who is not familiar with the type of home modifications available and the application variables of such, stands little chance of successfully negotiating this challenge (Gucciardo, 2013). It is important therefore to know which home modification services are available and effective, and the lack of such knowledge is one of the prime causes of unsuccessful projects.

There is more. Simply knowing about available home modification options in a general sense is a good start, but that does not insure the successful completion of the project. Once an appropriate project is identified and designed, client agreement must be achieved within the funding source guidelines, and then additional rounds of coordination and management are required to make the project a reality for the client. Perhaps it helps that while the variety of

home modification projects is almost without limit, many such projects exceed the mandates of public program funding programs. The projects most likely to be funded fall into the general categories of ingress/egress, internal home access (door widenings/hallway modifications) and bathroom remodeling to accommodate safe cleansing, toileting, etc. These projects can include related work such as lighting, plumbing, HVAC, etc., but funding sources tend to preclude more extensive remodeling projects (kitchens) and higher end finishes or purely cosmetic improvements.

This type of remodeling work, often called "accessibility remodeling," is a specialty, and not all contractors have the experience and training to perform projects tailored to meet the needs of acutely injured or physically challenged (Gucciardo, 2013; Timmerman, 2012). The challenge for the case manager in this regard is the vetting of contractors to determine which are truly able to perform the modification, providing such contractors with clear instruction for bidding and then insuring performance during construction – no small task, to be sure.

Problem Summary:

Given the population growth rate among those age 65 and older, safe and affordable housing options for older Americans are becoming a pressing societal demand. Older Americans typically prefer to remain in their homes as they age and when in their homes where they have often built networks of relationships benefiting families and communities. Thus, modifying the existing home stock is an economically and socially valid priority for investment, training and funding. Due to the cost of such modifications, many are publicly funded requiring the oversight of a case manager, but case managers are seldom trained in home modification project management. This educational gap has resulted in delays and blocks in the delivery system of vital home modifications. A training program for case managers in the area of home

modifications is proposed as a solution to reduce the blocks and delays in the providing of this vital service to those in need.

Chapter 2

What does current research tell us about home modifications?

Overview of the Literature

As the previously referenced McCunn and Gifford (2014) study states, literature in the area of home modifications is not abundant; however, the research that does exist is recent and the subject of increasing interest on the part of occupational therapists, medical professionals, governmental agencies, educational institutions, financial planners and others. The literature tends to cluster around three fundamental questions: "What makes for an effective (and an ineffective) home modification?" "What are the most common home modifications," and "What are the primary barriers to the delivery of effective home modifications?" These questions are directly related to this current paper, and will serve as the organizing determinants for the following literature review.

What makes for an effective (and ineffective) home modification? Most of the studies included in this review concluded that to some degree home modifications are helpful to the client with a mobility challenge or deteriorating physical abilities (Stark, Somerville, Kegolvits, Smason & Bingham, 2015; Horowitz et al, 2013). However, several studies also examined instances of unsatisfactory results of home modifications and explored the cause of such dissatisfaction (Alpin et al., 2013; Petersson, et al., 2009). While differences in the reviewed research were apparent (and will be explored below), there did seem to be consensus that home modifications are most effective when adequate consideration is given to the client's perspective and preferences (Alpin, et al., 2013; Chase et al., 2012) and viewed holistically as part of a comprehensive approach to adapting elders to their environments

(Lien et al., 2015). This factor is perhaps best summed up by one study which drew upon R.D. Laing's more philosophical conception of existential security for design guidance, "A housing adaptation of a disabled person should be like a transformation in which the barriers that have ruined someone's dwelling place into a place of embarrassment and confinement are removed and their home is restored to them." (Heywood, 2005, p. 531) Furthermore, it was the same author's conclusion that remodeling work (even when done well) which ignored the client's personal conception of "home" seriously impacted the satisfaction of the results in a negative way. This is because the essence of the definition of home for most people is intensely personal as indicated by typical identifiers of one's home as "sense of security", "privacy", "control", "freedom" and similar terms. In fact, some of Heywood's study participants, those who had fallen or had the fear of falling, agreed that home modifications had given them "a sense of home restored" (Heywood, 2005, p.539) while another claimed the modification (re-enabling the injured to play with children) had "brought a warmth to the house" (p 543.) Understandably when such important values are ignored, most clients would certainly feel devalued.

Further developing this point, Petersson et al. (2009) found that criteria for truly evaluating the effectiveness level of home modifications required sensitivity beyond the criteria of "functional independence" as the basic measure although this is often the key (if not sole) measure employed in publicly funded home modification design. More specifically, when longitudinal, personal and qualitative data is considered, the factors determining the efficacy of home modifications are different, more varied and personal, are more about satisfaction levels than pure functional efficiency. The same study points to a critical time sensitive feature as well in assessing home modification effectiveness, presenting evidence

that delayed home modifications may well eliminate potential benefits as functional mobility declines in the client. There is eventually a point of no return at which the intervention ceases to provide any tangible benefit to the client (Petersson et al., 2009). Regarding the timing element in home modifications, Horowitz et al (2013) also concluded that planning home modifications early in the period of functional decline, leads to the most beneficial and satisfactory results.

As an example of a study that used the more functional criteria to evaluate home modification effectiveness, Stark et al. (2015) employed terms such as "improvement in daily activity performance, retaining functional dependence, reducing the rate and risks of falls and enhancing care giver efficacy." This was true of other quantitative studies in which improved physical performance measured by such things as fewer falls and increased ability to perform activities of daily living (showering, toileting, etc.) were used as a key measure of effectiveness (Kamei et al., 2015; Sommerville et al., 2016).

Several meta-studies reviewed yielded similar conclusions that home modification interventions were most effective when combined with other facets or disciplines such as assistive technology, education and exercise. Even in these studies, however, there was common emphasis on a client centered approach as essential to the ultimate effectiveness of the intervention. (Chase et al., 2012; Stuckmeyer & Pickens, 2016) The two studies referenced here also noted some inconsistency with the definition of "home modification" discussed earlier in this paper, as clouding the consistency of data interpretation when a broad swath of studies is considered.

What type of home modifications are helpful? As one who has been personally involved in many home modifications over the years, this researcher was not completely

surprised by the diversity of answers to this question found in the research. Szaton et al., (2015) identify the top home modifications as including the addition/repair of interior stairwell railings, exterior stairway railings, tub/shower grab bar installation, non-skid surface installation in bathroom, improved lighting, flooring repairs, raised toilets and flexible shower hoses. Kamei et al., (2015), employing one of the broadest definitions of home modification, found that simple and basic changes, such as the elimination of home clutter and extension cords in areas of frequent travel contributed statistically to a reduction of falls in the home, and also noted improved lighting and the elimination of elevations changes in showers and between room were all important and helpful modifications. This study, as did a number of others, considered such physical changes in conjunction with an educational program of home hazard awareness and safety.

Lien et al., (2015) identified the following as top environmental barriers: high shelves (kitchen), steps (especially when used as the sole or primary ingress/egress route for client), lack of shower and toilet grab bars and high thresholds. The Lien study used an evaluative rubric developed by one of its authors in Sweden and produced perhaps the most unique findings in terms of area of focus. Interestingly Petersson et al., (2009) a Stockholm based study, focused on three areas of home modifications, ingress/egress to and from home; movement inside home and self-care in the bathroom, areas much more like unto typically funded modifications in the United States.

While most of the studies included consideration of the client's activities of daily living or more broadly on aging in place in general, several studies focused primarily on fall prevention, understandable, given the rather startling statistics on broken hips among the elderly and life-expectancy presented in the topic section above. Harvey, Mitchell, Lords and

Close (2014) studying older Austrailian adults, found that handrail/grab bar installation was the most common modification undertaken by the population most as risk for falls, with ramp installation second. Interestingly, the percentages of households in which these modifications had been performed nearly doubled for those aged 85 and older when compared to the entire population 65 and older. In the aggregate, the comparison of actually completed modifications showed handrail/grab bar installation at 21% of all respondents (65 and over), but over 40% for those 85 and older. Similarly, ramp installation was at 5% for the group as a whole and almost 10% for the 85 and older group. (Perhaps it is worthy of note that this rise in modifications with age corresponded inversely to a drop in prescribed therapeutic exercise regimens between the same age groups.) Chase et al., (2012) also found evidence for the effectiveness of the same type of home modifications (especially grab bars) in reducing fall prevention, especially when combined with education and assistive technology.

Gucciardo (2013) focused on home modifications for yet another category of clients, the catastrophically injured. While there are many similarities (and overlap) between this population and the elderly in terms of physical barriers and needs, the physical challenges of the catastrophically injured are not the result of a degenerative disease or aging but due to physical injury. This has several implications for home modification planning such as the fact that the client's condition does not necessarily degenerate over time and that the client may live the greater part of life dependent on the modifications. Since this type of project may involve one time cash settlements to cover a lifetime living with such injuries, the author emphasizes the importance of involving multiple related specialties to assist with such consideration. Specifically, the author identifies common home modifications for this population as modular ramps, lifting devices (stair and wheelchair lifts), tub to shower

conversions, etc. but also including major space planning changes such as room additions and home elevators.

In an interesting article focused primarily on the financial aspects of older persons aging in place, Timmerman (2012) mentions the addition of a first floor bathroom and bedroom to homes without such. This particular modification, not often discussed in other literature reviewed, has been a fairly common consideration for those in multi-level homes in the experience of this researcher, and a modification that while more expensive than many discussed herein, can add great utility to the existing home. The same author also mentions the addition of grab bars, re-arrangement of furniture, improved lighting as beneficial modifications.

Summarizing the findings as they relate to the question of which home modifications are the most helpful, this depends largely on the definition of home modifications employed by the researcher, the assessment tool used and the unique needs of the population. It was a common enough finding, however, that bathroom modifications relating to the activities of daily living (including grab bars), home ingress/egress and interior home mobility (door widenings, stairway rails, lighting), to consider them to be generally effective modifications, especially when client input is carefully considered. These modifications are mentioned specifically here since they are also the most common publically funded projects and important to the educational unit under consideration.

What are the basic challenges in the field of home modifications? Much of the literature reviewed discussed barriers to procuring needed and satisfying home modifications encountered by clients in need. This question seems particularly relevant both to those researching home modifications in general and those involved in the providing of such

services, and so this section will present some of the key barriers to the implementation of desired home modifications.

Gucciardo's (2013) analysis is relevant here with its' emphasis on the complexity of services and the necessity of an interdisciplinary approach for home modifications. The lack of such an approach threatens to limit a project and its benefit to a client in need, especially in the complicated instances of severe, long term physical impairment. To this point, the previously referenced Szaton et al., (2015) study is interesting in its focus on a program known as "CAPABLE" which combines the services of an occupational therapist registered nurse and "handyman" for each home modification intervention in an apparently effective manner. A key difference in these two studies, however, is that the CAPABLE program is generally very limited modifications, with a top price tag of $1,300.00 whereas the types of modifications described by Gucciardo could easily run into the hundreds of thousands of dollars. Though these studies respectively present home modifications approach at different ends of the cost spectrum, both conclude that the interdisciplinary approach is important and the lack of such as a barrier to satisfactory home modification completion.

It was previously mentioned that the lack of consideration for key client variables is a significant problem with ultimate project satisfaction. While this sounds obvious, the problem often naturally arises when public funding limits home modification scope in a way that conflicts with homeowner sensibilities and desires. Such funding guidelines can be quite restrictive and are designed with a one-size-fits-all approach that can result in a focus on functional activities that may not align well with a client who may be more attuned to leisure or "social occupations." (Alpin et al., 2013) Perhaps an even more significant project barrier is that many public funding sources require home ownership for participation, thus precluding

funding for renters (Stafford & Harlan-Simmons, 2003). Even when such funding is available for tenants, landlord approval is generally required but not always granted.

An interesting study regarding the assessment and identification of appropriate home modifications done under a publicly funded program was provided in a single case study by Sommerville et al. (2016), which used a Likert scale type evaluation tool rating the areas of activities of daily task performance, client satisfaction with the task performed and the significance of identified physical mobility barriers. Low performance and/or client satisfaction scores, combined with high barrier ratings, identify and (presumably) prioritize home modifications. The same rating scale was used to evaluate all three areas post modification and scores were compared with pre-modification ratings for an overall effectiveness evaluation. This example is included here to demonstrate one possible approach to including client satisfaction and input considerations into publicly funded projects so that the guidelines of such need not present an insurmountable barrier to project success.

This type of tool may also help solve one of the challenges to consistent home modification services identified the Stafford and Harlan-Simmons (2003) study that "highly non-standard" home modifications assessments were common, leading to an uneven distribution of projects in the area studied as well as an "underutilization" of available funding. The authors concluded that public funding and overly burdensome administrative requirements along with lack of consumer information were the greatest barriers to the delivery of home modification projects. This study called for a significant expansion of training for professionals involved in home modification industry, and indeed offered a fine program, "Fixin' to Stay," attended by this researcher and conducted in seminar form shortly after the time of the study.

The challenge of locating qualified contractors was mentioned as a challenge in several studies, two of which specifically referenced the National Association of Home Builders as a source for remodeling contractors. (Gucciardo, 2013; Timmerman, 2012) The NAHB's CAPS program (certified age-in-place specialist), discussed elsewhere in this paper, is specifically designed training for those serving the older market, but as Gucciardo points out, the CAPS designation (while a good start), does not ensure construction expertise.

Despite the challenges to satisfactory home modifications, the literature showed that a client centered approach, funding procurement, coordinated expertise in project design and implementation along with care-giver training were important elements in producing desirable results in terms of increased client safety, security and independence. The Stuckmeyer and Pickens (2016) study is but one example of this conclusion and the related emphasis on the importance of training the care giver (and by extension- any such project decision maker) in the various facets of home modification, which these authors define as a process including: evaluation, identification, implementation (of the modification), and project assessment.

What Type of Prior Research has been Performed?

The home modification research reviewed for this paper was a mix of qualitative, quantitative and mixed methods studies with qualitative studies as the most common. Qualitative studies focused on the experience of the client, the recipient of home modification services and particularly on client satisfaction as a key determinant as to the home modification's efficacy. In the reviewed research, these studies utilized semi-structured interviews, open ended survey questions, ethnographic approaches with (often) coded results, reviewed for frequency and emphasis (Horowitz et al., 2013; Lien et al., 2015; Sommerfield et al., 2016; Stark et al., 2015; Heywood, 2005). As noted above, the Sommerfield et al.

(2016) study utilized a pre-determined satisfaction rating scale as part of its evaluation.

Where quantitative measures were employed, this was often done via a rubric or home assessment tool of some kind that involved a rating scale utilized by the researcher (or therapist) generating data available for calculation in terms of central tendency and comparison in inferential statistical testing. (Kamei et al., 2015; Harvey et al., 2014) Satisfaction rubrics were also used in several qualitative studies (Lien et al., 2015; Sommerville et al., 2016). Petersson et al., (2009) compared data from two populations, one in which home modifications/interventions had been performed and a control group which had received no intervention and compared client data collected after a significant time interval.

Several studies (Chase et al., 2012; Stuckmeyer & Pickens, 2016) were meta-studies (or "scoping" as the later self-identified) which reviewed previous studies in search of patterns or trends to be identified, specifically best practices or effectiveness of various methodologies. In a particularly interesting and relevant mixed methods nested study, Stark et al. (2015) employed a two phase approach beginning with semi-structured interviews that included a home visit at which time a quantitative assessment tool was employed to identify potential mobility barriers in the home. Later coded data from the interviews as well as observations from the home visit rubric were combined and subjected to an additional round of subject matter expert review, all of which contributed to a home modification effectiveness type evaluation.

While quantitative and qualitative (as well as mixed) methods were used, most of the studies reviewed had the flavor of action research in that the home modifications were considered interventions with an intended outcome of increasing client safety, security and

independence. This same theme is also the focus the current research, though once removed from the ultimate client. The current research regards educating, and empowering care-givers (and others involved) in the home modification process. This is similar to the recommendation of the Stuckmeyer and Pickens study (2016) which had among its findings that training caregivers and focusing on a client centered approach to home modifications would produce the most satisfied clients.

Related research: "Consumer Literacy"

Review of the above referenced studies was critical to locating the home modification process in a conceptual framework of research and identifying its various domains which include occupational therapy, public health & demographics, construction, etc. However, the research to evaluate the effectiveness of a home modification to the general population differs somewhat from the actual training/informing of those who are required to make such decisions as to which home modifications are best suited for the person in need and that person's environment. Such training is as much about home modification "literacy" and confidence as it is about the effectiveness of grab bar installations or tub to shower conversions. Therefore in addition to what is presented above, this researcher is also including several studies related to educational intervention aimed at raising literacy and confidence levels in an adult population, which in this particular example will involve financial literacy and confidence. Such research was previously conducted by this researcher when assessing the effectiveness of various financial literacy programs, which much like the proposed educational training, centered on the learner's literacy and confidence levels.

In one such study, financial confidence levels of widowed women whose husbands (while living) had been the primary managers of household finances, were assessed a series of

statements about confidence levels such as, “I feel confident about my overall financial goals,” and “I am thinking clearly about financial matters.” Participant learners took a pre and post educational survey which asked them to rate their confidence levels on a ten point scale. The study showed a dramatic improvement in 10 out of 10 confidence questions after a period of educational training with a qualified financial planner (Rehl, Moore, Lietz & Grable, 2014). This particular study is mentioned here because of its similarity to the confidence measuring tool used in this current research, a semi-structured self-rating evaluation and open ended survey.

As with home modification related research, definitions were important. Financial literacy was defined by one researcher as the, “...degree to which one understands key financial concepts and possesses the ability and confidence to manage personal finances through appropriate short term decision making and sound, long range financial planning.” (Assad-Tokar, 2015, p.101) The key idea here is that both understanding of key financial concepts and the confidence to employ such knowledge in the context of real financial decision making are both critical to “financial literacy.” Much of the research on financial literacy utilized a 2009 (and a 2012 updated) FINRA study on financial literacy with over 25,000 respondents that asked six multiple choice questions designed to assess the respondent’s grasp of five key financial concepts, risk management, return on investment, time value of money, cash management and debt[6] (Mendell & Klein 2009). Other related studies added to the list of questions, but almost all used some form of multiple choice or fill-in-the-blank assessment tool for measuring literacy. In a similar design, this current

[6] The FINRA study showed a rather frightening lack of financial literacy among American adults.

intervention uses quantitative type questions to evaluate home modification literacy both pre and post educational intervention.

Drawing this concept of consumer literacy back to the home modification concept, it is critical then that educating the decision maker is a matter of information transfer and improving the confidence of such to properly employ the information essential to the decision. Admittedly, this is a complicated challenge. Many consumers (this researcher included) have at times failed to employ critical knowledge or been too high or low on the confidence scale to make the appropriate decision. A poor home modification decision can be quite problematic and even dangerous. At the very least, a patient, structured presentation of standard home modification applications with full consideration of the end user's physical challenges, personal conception of home and of course budgetary considerations are essential to the client making a "literate" decision that will bring satisfaction and security well after the project is completed.

Summary and Conclusions

The qualitative and quantitative literature studies presented as part of this research generally confirm that home modifications, properly performed with client needs fully considered, are of benefit to those in need. While the need is urgent at times, due to deteriorating physical health and a limited time for corrective action, improperly designed or installed modifications result in dissatisfaction and are unlikely to help. Public funding is a significant source of financing for home modifications, and this funding comes with guidelines requiring independent third party coordination of home modification projects. Home modification literacy and confidence on the part of the third party coordinator, the case manager, are important to the

success of such projects, and an educational intervention has been proposed to address a shortfall in this area.

The deprivation of vital home modification services to those in need is often a function of inadequate training, and it was this problem that provided the impetus for this action research project. Case managers, while tasked with project assessment and management, are often trained in social work or a related field, have no background to address the vagaries and complexities of home modification projects; thus, projects often struggle and fail, disappointing and harming the parties involved. An interventional training program is proposed herein as a possible solution to this problem, and a mixed methods research design was employed in this study to assess the effectiveness of the training.

Underlying this research is an epistemological assumption that knowledge – how we know - includes cognitive, structured and objective elements, as well as the personal and subjective. The application of knowledge in the performance context requires the ability to draw upon objective information and to apply it appropriately in situations that may be unstructured, like a home modification which combines the complexity of the client's physical state, the layout and condition of the client's home environment and the rather rigid set of funding guidelines. With this in mind, the above stated research problems involved an element of literacy, that is a command of objective knowledge about home modification and construction guidelines involving space limitations, product knowledge and standard applications etc. This includes both recognition and knowledge of salient factors in the home modification context and also the confidence to apply such knowledge in a way that effectively addresses an often complex and unstructured contextual situation. The research design utilizing quantitative and qualitative instruments to assess these two components in a specific performance context (a case worker in

central Indiana working on publicly funded projects) was the basis for the mixed methods action research.

Key Definitions:

Durable medical equipment: Any medical equipment providing benefit to a patient in need and due to certain medical conditions. In this paper, such equipment is often more long-term in nature and related to client mobility, such as free standing shower seat or power wheelchair.

Home modifications (aka "structural" or "environmental" modifications or "home mod"): The term is used in this paper to designate permanent or semi-permanent structural modifications required to improve safe and independent client living as the essential component of the definition. Such modifications include a range of modifications such as basic grab bar installation up to complete bathroom remodels for wheelchair accessibility, to room additions and home elevators.

References

Acrobatiq. (2015) *Research Foundations*. Online Courseware accessed through Western Governors University

Administration on Aging (2014). *Data and statistics*. Retrieved from aoa.gov/Aging_Statistic/future_growth/.aspx#age

Alpin, T., de Jonge, D., & Gustafsson, L. (2013). Understanding the dimensions of home that impact home modification decision making. *Australian Journal of Occupational Therapy 60*(2) 101-109

Assad Tokar, Colleen. (2015). Financial literacy and financial behavior: assessing knowledge and confidence. *Financial Services Review, 24*(2), 101-117

Center for Disease Control. (2015). *Home and recreational safety*. Retrieved from cdc.gov/HomeandRecreationalSafety/Falls/adultfalls.html.

Chase, C., Mann, K., Wysek, S. & Arbesman, M. (2012). Systematic review of the effect of home modifications and fall prevention programs on falls and the performance of community dwelling older adults. *American Journal of Occupational Therapy, 66*(3), 284-291

Gucciardo, F. (2013). A systems based approach to home modifications for the catastrophically injured. *Journal of Nurse Life Care Planners, (13)*4, 138-146.

Hansen, T., Slagsvold, B. & Ingerbretsen, R. (2012) The strains and gains of caregiving: an examination of the effects of providing personal care to a parent on a range of indicators of psychological well-being. *Social Indicators Research*, *114*(2), 323-343.

Harvey, L, Mitchell, R., Lord, S. & Close, J. (2014). Determinants in uptake of home modifications and exercise to prevent falls in community dwelling older people. *Australian and New Zealand Journal of Public Health, 38*(6), 585-590.

Heywood, F. (2005). Altering the house to restore the home. *Housing Studies, 20*(4), 531-547.

Horowitz, B.P., Nochajski, S.M. & Schweitzer, J.A. (2013). Occupational therapy community practice & home assessments: use of the home safety self-assessment tool (HSSAT) to support aging in place. *Occupational Therapy in Healthcare, 27*(3), 216-227.

Kamei, T., Kajii, F., Yamamoto, Y., Irie, Y., Kozarai, R. & Sugimoto. T. (2015). Effectiveness of a home hazard modification program for reducing falls in urban community dwelling older adults: a randomized controlled trial. *Japan Journal of Nursing Science, 12*(3), 184-197.

Lien, L., Steggell, C.D., Iwarsson, S. (2015) Adaptive strategies and person-environment fit among functionally limited older adults aging in place: a mixed methods approach. *International Journal of Environmental Health, 12*(9), 11954-74

McCunn, L. & Gifford, R. (2014). Accessibility and aging in place in subsidized housing. *Seniors Housing and Care Journal, 22(1),* 18-29

Mendell, Lewis & Klein, Linda S. (2009). The impact of financial literacy education on subsequent financial behavior. *Financial Counseling & Planning, 20* (1), 15-24.

Petersson, I., Kottorp, A., Bergstrom, J. & Lilja, M. (2009). Longitudinal changes in everyday life after home modifications for people aging with disabilities. *Scandinavian Journal of Occupational Therapy, 16*(2), 78-87.

Rehl, Kathleen M., Moor, Carolyn C., Leitz, Linda Y. and Grable, John E. (2016). Widows' voices: the value of financial planning. *Journal of Financial Service Professionals, 70*(1), 53-60.

Somerville, E., Smallfield, S., Stark, S., Seibert, C., Arbesman, M., Lieberman, D. (2016). Occupational therapy home modification assessment intervention. *American Journal of Occupational Therapy, 70*(5), 1-4.

Stark, S., Somerville, E., Keglovits, M., Smason, A. & Bingham, K. (2015). Clinical reasoning guidelines for home modifications interventions. *American Journal of Occupational Therapy, 69*(2), 1-8.

Stafford, P. & Harlan-Simmons, J. (2003). *Home modification services: statewide survey results and recommendations for policy and programs*. Retrieved from https://www.iidc.indiana.edu/styles/iidc/defiles/CAC/HomeModReport2.pdf

Stuckmeyer, L. & Pickens, N. (2016). Home modifications for people with alzheimer's disease: a scoping review. *American Journal of Occupational Therapy, 70*(1), 1-9

Szaton, S., Wolff, J., Leff, B., Roberts, L., Thorpe, R., Tanner, E., Boyd, C., Xue, Q., Gralank, I., Bishai, D. & Gitlin, L (2015). Better living for elders: a patient directed, team based intervention to improve physical function and decrease nursing utilization. *Journal of the American Geriatrics Society, 63*(2), 371-374.

Timmerman, S. (2012). To age in place or not…that is the question. *Journal of Financial Service Professionals, 66*(1), 24-26