A theoretical model to explain the smart technology adoption behaviors of elder consumers (Elderadopt)

Stephen M. Golant

Department of Geography, P.O. Box 117315, 3117 Turlington Hall, University of Florida, Gainesville, Florida 32611, United States

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ABSTRACT

A growing global population of older adults is potential consumers of a category of products referred to as smart technologies, but also known as telehealth, telecare, information and communication technologies, robotics, and gerontechnology. This paper constructs a theoretical model to explain whether older people will adopt smart technology options to cope with their discrepant individual or environmental circumstances, thereby enabling them to age in place. Its proposed constructs and relationships are drawn from multiple academic disciplines and professional specialties, and an extensive literature focused on the factors influencing the acceptance of these smart technologies. It specifically examines whether older adults will substitute these new technologies for traditional coping solutions that rely on informal and formal care assistance and low technology related products. The model argues that older people will more positively evaluate smart technology alternatives when they feel more stressed because of their unmet needs, have greater resilience (stronger perceptions of self-efficacy and greater openness to new information), and are more strongly persuaded by their sources of outside messaging (external information) and their past experiences (internal information). It proposes that older people distinguish three attributes of these coping options when they appraise them: perceived efficaciousness, perceived usability, and perceived collateral damages. The more positively older people evaluate these attributes, the more likely that they will adopt these smart technology products.

Introduction

A report prepared by the consulting firm of AT Kearney for the Consumer Goods Forum, a global membership network of retailers, manufacturers, and service providers (AT Kearney & The Consumer Goods Forum, 2013), rightfully referred to the dramatic pace of aging of the global population as an Agequake. The evidence is in the numbers. In 2015, just over 617 million persons worldwide were ages 65 and older, representing about 8.5% of total population. Fast forward to the private, nonprofit, and public sectors an unprecedented opportunity to supply them with a diverse array of goods, services, and care that can improve the quality of their lives.

This paper focuses on one such category of products variously subsumed under labels such as information and communication technologies, ambient assisted living, ambient intelligence or assistive technology, pervasive computing technologies, telehealth, telecare, domotics, robotics, ubiquitous computing, and gerontechnology. This paper will use the terminology, smart technologies, to collectively refer to this category (Davenport, Mann, & Lutz, 2012; Kaye, 2017).

The functionality of these smart technology options should enable older people to cope better with the vicissitudes of aging and to have more healthy, independent, comfortable, and active lives (Orlov, 2016b). They should be better able to proactively achieve three goals that the experts recommend are critical for them to age successfully: avoid, treat, and manage disease and disability, maintain their high mental and physical functioning, and keep actively engaged in life (Rowe & Kahn, 1998). Those striving to “age in place” in their current dwellings and avoid transitioning into special-purpose group care settings are especially likely to benefit from these innovative products (Golant, 2008).

An ever-increasing number of technology-focused business startups throughout the world are hopeful of convincing elder consumers that their products can help them age more successfully. However, only a small fraction of elder consumers is aware of these new possibilities, and an even smaller share uses them. If their developers expect to reach this fast-growing and diverse population of elder consumers, they must understand the factors that will influence their smart technology
adoption decisions. By drawing on theories from multiple academic disciplines and professional specialties, and an extensive literature of technology acceptance empirical studies, this paper constructs a theoretical model to explain the smart technology adoption decisions of older persons.

The potential of smart technology devices

The operation of these digital devices typically relies on sensor technologies including passive infrared, radio frequency, pressure, accelerometer-based, video, and motion detectors. These continually collect information in real time to monitor, evaluate, and react to the acute and chronic physical health conditions of older persons, their cognitive and sensory (e.g., hearing and vision) performance, physical mobility, activities in their dwellings, social connectedness, and their leisure/personal growth pursuits. They also monitor the comfort, safety, and security of their dwellings and buildings by measuring their allergens, toxins, air pollutants, dampness, water leaks, mold, bacterial infections, poor lighting or visibility, accident risks, and extreme temperature conditions (Demiris & Hensel, 2008; Orlov, 2016b; Schulz et al., 2014). The information collected by these digital devices not only informs older persons about their unmet needs or problems but also connects them to family members and designated professionals who help them manage their risks and who offer them assistance and interventional strategies (Fig. 1).

These devices include wearables or clothing attachments, such as smart fabrics, bracelets, necklaces, anklets, smartphones, watches, and belt buckles. Another category includes body implants including epidermal, tissue-embedded, and ingestible sensor devices (Reh, Korenka, & Cruse, 2016). Environmental sensors may be inserted into the walls, floors, ceilings, appliances, furniture, and other objects in their dwellings (Gokalp & Clarke, 2013). Sensors can also be placed in their plumbing, electrical, lighting, or heating and air infrastructures (Bitterman & Shach-Pinay, 2015). Many of these devices are so unobtrusive that users forget they are there (Portet, Vacher, Golanski, Roux, & Meillon, 2013). Robots that are human-like in appearance may incorporate many of these different types of sensors.

A distinguishing feature of these smart technology options is that their information collection, communications, and responses happen without the manual actions of older persons. In the example of “smart” emergency response devices, when the older woman falls, perhaps because of a stroke, she does not have to push a button, pull a cord, or issue a verbal command to get help. Rather, sensors will “passively” detect and communicate to others the occurrence of the fall. More generally, these devices generate alerts when they detect data patterns that deviate from pre-established thresholds, such as when the blood pressure of older persons unexpectedly increases, the air quality of their dwellings reaches dangerous levels, when older persons do not predictably open their refrigerators, when they get out of bed too many times during the night, do not take prescribed medicines, spend an inordinate amount of time sitting on their sofas, or stop communicating with other persons.

These products offer four ways by which older persons can age in place more enjoyably, safely, securely, and independently. First, they help older individuals prevent problems before they happen or at least become too severe, such as, for example, by measuring blood pressure, blood sugar, changes in gait behavior, allergic reactions, and the operation of equipment in their dwellings and buildings. Second, they identify existing problems such as physical and mental health issues, falls, inactivity, social isolation, poor ventilation, improperly operating appliances, insufficient food, and damaging environmental pollutants. Third, they help older people manage or compensate for their current health problems, declining physical or cognitive capabilities, social isolation, social inactivity, or boredom. For example, they help them adhere to their medication regimes, offer them stroke care, remote depression treatments, psychotherapy, insulin monitoring, coaching or counseling (e.g., on fall prevention or care protocols), cognitive exercises, home modification assistance, and emergency response visits. They also connect older persons to social and learning opportunities to help insure they are as engaged as possible (Künemund & Tanschus, 2013; Totten et al., 2016). And fourth, they can dramatically change the extent to which older persons are dependent on the on-site physical assistance (that is, in their homes) of either informal (e.g., family, friends) or formal care providers (e.g., direct aid workers, professionals).

Synopsis of smart technology adoption model

The theoretical model proposed in this paper formulates a set of constructs and relationships to explain the likelihood that older people will adopt smart technology as opposed to traditional coping options, such as caregiving help or low-tech assistive devices (Fig. 1). Today’s older population mainly relies on these traditional coping solutions even though many experts believe that using smart technology options results in better outcomes. The model assumes that these two categories of coping solutions are potentially substitutable and seeks to predict why some share of today’s older population is likely to adopt smart technology rather than traditional coping solutions.

The model proposes that four factors will directly influence whether older people will positively evaluate their alternative coping options. First, it differentiates older people by how stressed they feel because of their individual and environmental problems. When older people feel that their problems are more serious, imminent, or longer in duration, they are predicted to evaluate their coping options more positively.

The model secondly differentiates older persons by their level of resilience, that is, by how confident they are in their abilities to deal with adversity and by how open they are to new solutions. Older persons with greater resilience are predicted to evaluate their possible coping solutions more positively.

The third and fourth explanatory factors distinguish older people by how persuaded they are by the information they acquire about their coping options. Marketing professionals and social psychologists distinguish between external and internal information sources. Older people receive external information from media sources, internet connections, friends, family, and professionals; and they acquire internal information by remembering personal experiences from their earlier lives (“direct experiences”) from which they form attitudes that inform their future coping deliberations. Older people obtain both decontextualized and evaluative information from these two information sources. That is, they are informed about the types and characteristics of their possible coping solutions, but also about how well they are likely to work or function.

Older people’s assessments of their coping options will be shaped, changed, or modified by this information (Bostrom, 1983). How persuaded they are by their external information will depend on how they perceive its utility (that is, relevance to their coping deliberations), credibility (that is, the trustworthiness of information sources), and powerfulness (that is, how coercive is its messaging). How persuaded they are by their internal information will depend on the relevance and one-sidedness of their past direct experiences. Older people are predicted to evaluate their coping options more positively or more negatively when they are more strongly persuaded by their external and internal information.

The model also proposes that two indirect factors will influence how older people evaluate their coping options. First, when older people feel more stressed because of their unmet needs, they will be more motivated to attend to and evaluate information about their possible coping solutions. Consequently, they are predicted to be more strongly persuaded by both their external and internal information. Second, more resilient older persons are predicted to be differently persuaded by the utility, credibility, and powerfulness of their external information.

The model proposes that older people distinguish three attributes of
1) **SMART TECHNOLOGY COPING SOLUTIONS**
   a) Telehealth and telecare physiological performance to prevent, diagnose, and manage health problems (e.g., pulse, blood pressure, sugar levels, urination chemistry)
   b) Telehealth and telecare behavioral health performance to prevent, diagnose, and manage mental health problems (e.g., depressive symptoms)
   c) Cognitive and sensory performance to prevent, diagnose, and manage problems (e.g., hearing and vision levels, medication and appointment reminders, task instruction, memory enhancement, speech-equipped and visually oriented devices)
   d) Activity performance including monitoring and enabling Activities of Daily Living (ADLs) (e.g., eating, bathing, dressing, grooming, toileting, walking, transferring), Instrumental Activities of Daily Living (IADLs) (e.g., grocery shopping, preparing meals, doing housework, using a telephone, managing money, taking medications), preventing wandering behaviors, fall assessment and detection, identification of inactivity or unusual behaviors
   e) Dwelling equipment, infrastructure, and security performance (e.g., enabling automatic lighting levels, appliance functioning, and smart locks)
   f) Environmental quality performance (e.g., detection of temperature levels, carbon monoxide, gas leaks, moisture, humidity, lead presence)
   g) Information access performance (e.g., searching for information about services, products, and care resources)
   h) Social communication and networking performance (e.g., communication with loved ones, participation in group and forum social activities and virtual reality activities)
   i) Learning, education, volunteerism, employment opportunities, and improved emotional health performance (e.g., helping others, playing games, learning new subjects and skills, enabling creativity, new avocation opportunities)

2) **TRADITIONAL COPING SOLUTIONS**
   a) **Help and Assistance Solutions Offered by People and Organizations**
      Family, friends, neighbors, volunteers, professionals, direct care workers, service vendors; and, churches, private, nonprofit, and public organizations
      i. Physical and mental health care
      ii. Rehabilitation (physical, occupational, speech)
      iii. Long-term care services and supports
      iv. Provision of personal goods and services (e.g., groceries, home items, repair, personal grooming, home security)
      v. Transportation and communication connectivity (e.g., paratransit services, escort services, ride-sharing, home care matchup services)
      vi. Social, entertainment, intellectual, and recreational opportunities
   b) **Aging in Place Assistance Solutions Offered by Low-Technology Assistive Equipment and Devices**
      i. Locomotion and Physical Support: canes, walkers, scooters, wheelchairs, prosthetics, stair climbing devices
      ii. Communication Aides: speech recognition software, hearing aids, volume control devices
      iii. Interior Design Modifications: raised toilet seats, shower seats, grab-bars, ramps, nonslip floor surfaces, easier physical access and wayfinding, minimizing clutter, better lighting and signing, more aesthetically pleasing and stimulating
      iv. Health Management: pill boxes, medical devices (without sensors)
      v. Environmental Quality: carbon monoxide, smoke, and other pollutant detectors
      vi. Emergency Alerts: consumer-activated personal alert response devices
   c) **Relocation Coping Solutions**
      i. To dwelling occupied only by older person (and spouse)
      ii. To dwelling occupied by family members other than spouse (e.g., adult child, sibling)
      iii. To shared household with nonrelatives
      iv. To active adult community or cohousing neighborhood
      v. To senior housing facilities (Independent living community, assisted living, board and care, continuing care retirement community) without smart technologies
      vi. To nursing homes (both for long-term and short-term rehabilitative stays) with and without smart technologies

The model argues that the more positively older people evaluate their coping options, the more likely they will adopt them, that is, engage in one of the following three assimilative or action-oriented coping processes:
1. Adopt one or more smart technology coping solutions
2. Adopt one or more traditional coping solutions
3. Adopt some combination of smart technology and traditional coping solutions

However, some older people will not engage in assimilative coping processes. Rather, they rely on cognitive strategies or accommodative coping processes by which they deny or rationalize their problems to make them “disappear.” Consequently, they cope in a fourth way with their stressful circumstances.

4. They take no concrete actions and engage in adaptive mind or accommodative coping strategies

How proposed model improves upon past theoretical treatments

Most empirical research investigating the factors influencing the acceptance of smart technologies by older adults has operationalized the constructs and relationships of the Technology Acceptance Model (TAM) (Davis, 1989) and its updated formulations, the Unified Theory of Acceptance and Use of Technology models (UTAUT and UTAUT2) (Venkatesh, Morris, Davis, & Davis, 2003; Venkatesh, Thong, & Xu, 2012). To a lesser extent, empirical research has relied on the conceptual arguments found in Rogers’s (1995) diffusion theory. Still other empirical investigations of older people’s acceptance behaviors have evaluated the effects of individual and environmental influences not addressed in UTAUT OR UTAUT2 or other model formulations (Lee & Coughlin, 2015; Venkatesh et al., 2012).

Despite their merits, many researchers have generally criticized UTAUT or UTAUT2 as conceptual frameworks (Ajzen, 1991; Chen & Chan, 2011; Chen & Chan, 2013; Chen & Chan, 2014; Conner & Armitage, 1998; Czaja, Beach, Charness, & Schulz, 2013; Davenport et al., 2012; Dearing, 2009; Demiris & Hensel, 2008; Demiris, Oliver, Giger, Skubic, & Rantz, 2009; Fischer, David, Crotty, Dierks, & Safran, 2014; Fishbein & Ajzen, 1975; Flandorfer, 2012; Heart & Kalderon, 2013; Joe, Chaudhuri, Chung, Thompson, & Demiris, 2014; Kerbler, 2014; Kramer, 2014; Künemund & Tanschus, 2013; Lê, Nguyen, & Barnett, 2012; Lee & Coughlin, 2015; LeRouge, Ma, Sneha, & Tolle, 2013; Linner, Güttler, Bock, & Georgouzas, 2015; Novitzky et al., 2014; Peek et al., 2014; Rogers & Fish, 2010; Skubic, Alexander, Popescu, Rantz, & Keller, 2009; van Hoof, Kort, Rutten, & Duijnstee, 2011; Vichitvanichphong, Talaei-Khoei, Kerr, & Ghapanchi, 2014; Walden, Eun Hwa, Sundar, & Johnson, 2015; Walsh & Callan, 2011; Wilson, 1999; Wu et al., 2016; Zejda, 2014;
argue that these formulations make unrealistic or oversimplified individual and environmental (contextual) assumptions about how older persons decide to accept new technologically oriented products. They point to the limitations in the psychological foundations of UTAUT2 and their theoretical underpinnings (Fishbein & Ajzen, 2010), these include stress-appraisal coping theory (Lazarus & Folkman, 1984); the Health Belief Model (Rimer & Glanz, 2005); diffusion theory (Rogers, 1995); information-seeking models (Robson & Robinson, 2013; Wilson, 1999); personality differences (Skodol, 2010); life span coping process dynamics (Brandstädter & Rothermund, 2002); and, social cognitive theories, particularly persuasion and social influence models (Bandura, 1982; Fishbein & Ajzen, 1975; Glasman & Albarracin, 2006; O’Keefe, 2016).

Summarized below is how this paper’s theoretical approach attempts to improve upon these past tech-acceptance frameworks:

- Past models implicitly assume that all consumers of smart technologies have the same unmet needs and thus are equally motivated to seek out and adopt these solutions. This model conceptualizes older people as having very different motivations to act because they do not perceive themselves as having the same individual or environmental problems.

- Past models implicitly assume that when older persons confront stressful circumstances, they have the same abilities to find solutions. This model proposes that older people are not equally resilient. Consequently, they are not equally open to new solutions, do not have the same confidence in their abilities to find and evaluate effective coping solutions, and do not have the same capacity to bounce back from adversity.

- Past models primarily predict the acceptance intentions or behaviors of highly self-selected individuals in laboratory or clinical settings or tightly controlled survey settings. This model recognizes that the market for these technologies is consumers who do not have the same awareness, exposure, or physical access to information about potential solutions.

- Past models treat the adoption behaviors of older people as static, point in time decision-making events. This model recognizes that the acceptance behaviors of older people are temporally-occurring decision-making processes that represent a messy sequence of ongoing appraisals and reactions occurring in complex real-world situations (Peck et al., 2014).

- Past models usually ignore a large marketing and social psychological literature emphasizing that older persons differently interpret the information they receive about these smart technology options. This model recognizes that how older people appraise their coping options depends on how persuaded they are by their information sources.

- Past models ignore how the past caregiving and technologically-related experiences of older people differ. This model argues that how older persons evaluate and react to new technological solutions depends not just on their current product appraisals, but additionally on their earlier experiences with both traditional and technological solutions.

- Past models implausibly assume that older people will adopt a singular (technological) solution to address their problems. This model argues that when older consumers seek to remedy their unmet needs, they may adopt multiple solutions.

- Past models implausibly assume that when older consumers seek solutions to remedy their unmet needs, they only deliberate about alternative smart technology options. This model argues, however, that older people will consider a host of traditional and nontechnological products and services as coping solutions.

- Past models recognize that older consumers will evaluate the usefulness and usability of potential smart technology products. This model, however, argues that when older people make their adoption decisions, they also worry about the unintended and harmful consequences (referred to as collateral damages) of their adoptions, which may have little to do with a product’s usefulness or usability.

- Past models assume that when deliberating about whether to adopt (or intend to adopt) a potential technological innovation, older people are making a simple binary (that is, yes-no) decision. This model argues that some older people believe that they can successfully cope with their unmet needs without taking concrete actions. Consequently, they engage in cognitive processes such as denial and rationalization (that is, accommodative coping processes), whereby they understate or ignore their unmet needs and take no concrete actions.

- Past models fail to include constructs and relationships that would "predict behavior over and above intentions" (Sniehotta, Presseau, & Araújo-Soares, 2014:3). Consequently, they do not explain the connection between the intent of older persons to accept new technologies and their actual acceptance or adoption behaviors. This model is robust enough to predict actual behaviors as opposed to just behavioral intentions and it offers constructs and relationships to explain the etiology of these behaviors.

- Past theoretical models often include a confusing array of both constructs and variables (that is, empirical indicators) that make it difficult to generalize the factors influencing individual adoption behaviors. This model includes only theoretical constructs and researchers must formulate variables or indicators to operationalize the model.

**Primary appraisal: perceived stressfulness of older people’s unmet needs**

Aging adults are continually at risk of confronting individual and environmental changes that threaten their quest to live comfortably and independently. Assaults on their physical or mental health and their ability to conduct their everyday activities often top their concerns. They struggle managing the symptoms associated with new chronic health problems and worry about the interaction effects of their multiple medicines. They continually confront new challenges using or negotiating their everyday physical environments. They have difficulty climbing the stairs in their dwelling, safely showering in their bathrooms, or getting to their doctors or grocery stores. They worry about falling without anyone noticing or caring. They are anxious because their dwellings are in physical repair, unsafe, too hot, cold, or damp or have inadequate lighting. They feel lonely, depressed, or unhappy because their spouses have recently died or they lack friends, family, or neighbors living nearby. They fear being abused or victimized even by those closest to them. They may feel bored because they lack stimulation from job-related, volunteer, or intellectual activities (Cornwell, 2014; Federal Interagency Forum on Aging-Related Statistics, 2012; Golant, 2015a; Joint Center for Housing Studies of Harvard University, 2013).

Environmental gerontologists and occupational therapists argue that these problems become magnified when older persons occupy places of residence with physical and social environments that are not supportive of their limitations (Iwarsson et al., 2007; Leipold & Greve, 2009; Magnusson, 1985; Scheidt & Windley, 1985). For example, older people are more likely to forget to take their medications when they lack a spouse to remind them. They feel constrained by their arthritic hands primarily when they must negotiate poorly designed utensils or faucets. They perceive the stiffness of their leg or thigh muscles when they must negotiate their stairs. Their health problems worsen if they cannot easily access a clinic or doctor. Their nutrition suffers when they...
lack information about correct dietary practices.

The self-assessments by older persons of their problems or unmet needs are the focus of the primary appraisal process outlined by Lazarus and Folkman (1984) in their stress-appraisal coping theory. They distinguish three possible individual outcomes resulting from these evaluations: irrelevant, benign-positive, and stressful. When older persons judge their individual or environmental outcomes as irrelevant to their well-being or benign-positive, they will have little motivation to pursue any corrective or ameliorative actions. However, when they now or imminently are experiencing harms, losses, anxieties, or damages that they perceive as “taxing or exceeding [their] resources and endangering [their] well-being” (Lazarus & Folkman, 1984:19), they will feel threatened or stressed.

The model proposes that three factors will influence how stressed older people feel because of their unmet needs or goals. First, it will depend on how serious they judge their unmet needs, that is, how harmful or damaging they perceive are their expected outcomes (Rosenstock, 1966). Public health models have often formulated perceived susceptibility or seriousness as constructs to identify the unmet needs of individuals at risk of health problems (Rimer & Glanz, 2005).

Second, it will depend on how older people perceive the timing of their unmet needs, that is, the imminence of their adverse outcomes. The onset of a sudden and crippling physical health event, the sudden inability to perform an activity of daily living such as dressing, an emergency room visit or a hospital admission often communicate a heightened urgency to act and find solutions. In contrast, and perhaps surprisingly, older persons may not feel that a diagnosis of early-stage Alzheimer's disease is a problem requiring a “quick” solution, despite its seriousness and poor long-term prognosis.

Third, how stressed older persons feel will depend on their perceptions of how long they must endure any unmet needs and associated adverse outcomes. Older persons, for example, are likely to perceive the mobility limitations resulting from knee replacement surgery as a short-term problem despite its seriousness and immediacy. Similarly, their perceptions will depend on whether “help is around the corner” because a family member is willing to function as a caregiver. In contrast, a diagnosis of congestive heart failure has obvious long-term consequences typically demanding permanent medical and care solutions. The above discussion leads to the following proposition:

P.1. THE MORE SERIOUS, IMMINENT, AND LONGER IN DURATION ARE THE PERCEIVED UNMET NEEDS OF OLDER PERSONS, THE MORE STRESSED THEY WILL FEEL.

Most technology acceptance models have not included the “unmet needs” of individuals as a theoretical construct, but some empirical studies have focused on these individual influences (Davenport et al., 2012; Lorenzen-Huber, Boutain, Camp, Shankar, & Connelly, 2011; Rogers & Fisk, 2010; Sintonen & Immonen, 2013; Sixsmith & Sixsmith, 2000; van Hooft et al., 2011; Wu & Ware, 2015; Wu et al., 2016). One study compellingly argued that “the steep learning curve associated with new technologies is not worth the climb unless there is evident perceived vulnerability” (Lorenzen-Huber et al., 2011:247). Another investigation found that when older people’s capabilities improve, they are less motivated to use smart technology (Czaja et al., 2013). Other research shows that older people had more favorable attitudes toward a technology when it was offered shortly after a loss and if it assisted with activities they could not perform (Davenport et al., 2012). For example, when older persons felt more isolated and lonely, they were more willing to have robots fill their companionship needs (Walden et al., 2015). This literature also emphasizes the importance of relying on how older persons self-assess their unmet needs, rather than relying on expert appraisals, which may differ substantially (Gilbertson, 2015; Joe et al., 2014; LeRouge et al., 2013).

Perceived stressfulness of unmet needs: direct and indirect effects on the coping appraisals of older people

The model proposes that how stressed older persons feel because of their unmet needs will have both indirect and direct effects on how they appraise their coping options. The problems experienced by older persons are assumed to be motivational, influencing their readiness to react, take actions, or to become agents of change in their efforts to cope with their incongruent lives or environments (Berlyne, 1960; Rosenstock, 1966). Consequently, as the model will detail below, the presence of stressful feelings will indirectly influence their coping appraisals by motivating their information-seeking behaviors and increasing the likelihood that they will be more strongly persuaded by their external and internal information. How stressed older people feel will also directly influence their coping appraisals. When older people worry more about their problems, they are predicted to evaluate their coping solutions more positively.

Secondary appraisal: selection and evaluation of alternative coping solutions

Human development theorists argue that when confronted with assaults on their individual or environmental well-being, older people adapt to these challenges. They respond by initiating either assimilative or accommodative coping strategies (Brandstätter & Greve, 1994).

When older persons initiate assimilative coping strategies, also known as problem-focused coping (Lazarus & Folkman, 1984) and primary control strategies (Heckhausen, 1997), they search for one or more externally directed corrective actions to solve their problems. For example, worried about falling, they search for solutions to alert family members, or when they miss their medication doses, they look for ways to receive regular reminders. Feeling lonely, they explore ways to increase their social networks. As one group of experts expressed it (Heckhausen, Wrosch, & Schulz, 2010:32):

“Most people have a sense of being actively involved in shaping their lives... Even when confronted with setbacks, disappointments, and failures, humans have a remarkable capacity to stay on course and maintain a sense of personal agency.”

Stress-appraisal coping theory similarly argues that when older people feel stressed or threatened they engage in a secondary appraisal process whereby they become aware of their possible coping action strategies, judge their viability or prospects for successful implementation, and assess which ones will best manage or successfully resolve their discrepant individual or environmental circumstances (Lazarus & Folkman, 1984). The model refers to the totality of the actions appraised by older people as possible solutions to their problems as their coping repertoires (Golant, 2015b; Pearlin & Schoolder, 1978).

When older people initiate accommodative or inner-directed mind adaptive responses, also known as emotion-focused coping (Lazarus & Folkman, 1984) and secondary control adaptation strategies (Heckhausen, 1997), they attempt to ignore, deny, or rationalize their problems (Leipold & Greve, 2009). They downgrade or de-emphasize their expectations or aspirations, devalue their existing goals or plans, or less harshly judge their lives or environments. Alternatively, they downplay their problems by comparing themselves more favorably to others, or they look to their religious or spiritual beliefs to palliate their losses or problems. By these cognitive strategies, older persons make their problems “go away” without taking any concrete actions.

Those coping in this way often feel overwhelmed by their problems (Bandura, 1982). They judge possible remedial actions as overly taxing, stressful, futile, or too emotionally costly to achieve, so they give up trying (Brandstätter & Rothermund, 2002; Seligman, 1991). Some persons are so distressed by their problems that they do not even initiate information-seeking behaviors for possible solutions (Case, Andrews, Johnson, & Allard, 2005).
From an outsider's perspective, older persons relying on accommodative coping strategies are doing nothing to deal with their problems. Life-span theorists argue, however, that these responses help support the self-esteem of older adults, regulate their burdensome emotions, or increase (if only deceptively) their perceived control over their circumstances.

Although older people may view these responses as successful efforts to deal with their adversity, professionals usually disagree. These mind strategies do not eliminate their harms or future sources of threat. The older person with an unsteady gait may dismiss the slippery bathroom floor as unlikely to increase her risk of falling, but the hazardous conditions remain.

Two categories of assimilative coping solutions

Older persons may become aware of and evaluate multiple coping solutions in their efforts to address their unmet needs. The model would be much simplified if these solutions only consisted of smart technologies, but given today's realities that would be an untenable stance. In practice, we can divide older people's coping repertoires into two broad categories: (1) smart technology solutions and (2) traditional coping solutions.

Smart technologies differ from traditional coping solutions because of their more advanced design, functioning, performance goals, and because they usually operate passively in real-time. The model distinguishes nine subcategories of these devices (Fig. 1) (Bitterman & Shach-Pinsly, 2015; Demiris & Hensel, 2008; Gokalp & Clarke, 2013; LeadingAge, 2014, 2016; Orlov, 2016b).

The model subsumes all other available options under the category, traditional coping solutions. These include the conventional assistance or services offered by either informal (e.g., by families or friends) or formal care providers (e.g., by professionals and direct care workers) often hired or sponsored by private, nonprofit, or public organizations. They also include low technology equipment, infrastructure, design elements, and devices used by older persons or placed or installed in their dwellings. These might include assistive devices such as canes and walkers, activity and mobility aids, medical devices (e.g., conventional blood pressure instruments), most home modifications (e.g., grab bars), and lighting and wayfinding solutions. They also encompass various low-tech smoke and carbon monoxide detectors (Spillman, 2005).

Traditional coping solutions divide up into those that enable older persons to age in place and those that offer opportunities for them to relocate to other shelter and care settings. This latter category might include smaller, more accessible and energy efficient dwellings. It would also include the home of an adult child engaged in caregiving responsibilities. Lastly, this category includes purposely planned senior housing that care for more vulnerable older adults. In the United States, these are known as independent living communities, assisted living developments, continuing care retirement communities, and nursing homes (Golant, 2015a). At least presently, these shelter and care options rely little on smart technologies.

The coping solution substitutability assumption

The model assumes that smart technology and traditional coping options are potentially substitutable because despite how differently they look, function, and perform, older people may perceive them as achieving similar outcomes.

Because of its substitutability assumption, the proposed model deviates from the theoretical and empirical formulations found in the smart technology acceptance literature. These treatments usually assume that the coping repertoires of older individuals consist only of smart technology solutions. However, currently, most older people are unaware of these coping options, and only a very small share are users (Orlov, 2016b).

Although space does not allow any exhaustive discussion, it is easy to identify scenarios whereby older persons might favor one category of solutions over another. For example, an adult child wanting to “give back” to her older parents may view the caregiving responsibility as a labor of love and believe that it is her responsibility, indeed her obligation, to care for an older mother. She will feel that her time and energy will result in a better job than any use of smart technology options (Quinn, Clare, & Woods, 2009). One caregiver’s response to a national poll succinctly makes this point: “I call her 24,000 times a day. I don’t think I need any monitoring technology” (AARP, 2016:20). On the other hand, when older persons lack reliable family caregivers, they may be more open to substituting smart technology solutions for traditional care approaches (Hayes, 2002; Joe et al., 2014; Lorenzen-Huber et al., 2011; van Hoof et al., 2011). Similarly, older persons may feel that allowing family or professional caregivers into their dwellings would infringe more on their privacy than would smart technology solutions (Davenport et al., 2012).

Information-seeking behaviors

The coping repertoires of older people will depend on their ability to acquire and evaluate information about “what might and can be done” to address their problems (Lazarus & Folkman, 1984:35). Information behavior and marketing theorists interpret these information-seeking behaviors as a response to uncertainty because older persons are motivated to fill a perceived gap in their existing knowledge of possible solutions (Schmidt & Spreng, 1996; Wilson, 1999).

Older persons often feel challenged when they conduct their searches for possible solutions because they must acquire knowledge about unknown and untried strategies. They usually do not know who to call, what options are available to address their problems, what their advantages or disadvantages are, and how or where to secure them—especially at affordable prices (Resnick, 2011). Obtaining information about smart technology options can be especially difficult because these solutions are less widely known, are not now marketed to a mass audience, are continually changing, and there are relatively few users who can act as “word-of-mouth” sources of communication (Lee & Coughlin, 2015). However it may be just as true that older individuals are unaware of their traditional coping options, unless they have a personal history of earlier caring for a loved one (e.g., an older parent) (Heinz et al., 2013).

Older persons acquire their information from two very different sources. External information refers to messaging from all communication sources outside of the individual, such as other persons or media sources (Schmidt & Spreng, 1996). Internal information refers to the messaging communicated by the memories recalled by older people of their past experiences and the attitudes they have formed or reconstructed as a result of these recollections (Glasman & Albarracin, 2006).

External information sources

Marketing theorists refer to the process by which individuals receive or acquire information from outside sources as external consumer information searches. Other researchers have variously referred to these sources as social influencers, facilitators, advocates, opinion leaders, the social system, and change agents (Dearing, 2009; Venkatesh et al., 2003; Venkatesh et al., 2012). Rogers (1995) model of innovation diffusion early introduced the construct of “awareness-knowledge” to distinguish this source of outside information. He emphasized that this awareness-knowledge was not just notative but also evaluative. That is, it included information not only about the availability of coping solutions, what they do, look like, and how they function, but also how well they worked. Consequently, this information informs older people not only about the availability of different coping options but also helps them judge their functionality.

Older persons receive this external information from multiple
sources: the media, medical and long-term care professionals, companies, and vendors promoting their products, government agencies administering social programs, family, and friends. They may also receive communications from nonprofit and philanthropic organizations, such as AARP, churches, and senior centers. Today's older consumers have more potential sources of external information than ever before because they can access messaging not just from traditional print, video, and audio media but also from the internet and social media.

However, older people still heavily depend on low-tech information sources, such as radio and television advertisements, local community newspapers, and the bulletins or notices found in libraries, churches, and retail stores (Delello & McWhorter, 2015). At least up to now, these media sources have not seen sources of smart technology marketing (Orlov, 2016a). Older persons are less likely than younger populations to rely on internet and computer searches, but trends suggest the gap is narrowing. In 2016, 67% of ages 65 and older persons reported using the internet, and this was up from 12% in 2000 (Anderson & Perrin, 2017). However, these rates are higher among the young-old as opposed to those in their mid-70s and older.

Most smart technology acceptance theoretical formulations have not defined information-seeking behaviors as an explanatory construct (Peek et al., 2014; Venkatesh et al., 2003; Venkatesh et al., 2012). At least partly this is because researchers conduct technology acceptance studies in laboratory or other artificially-controlled settings. Here, older individuals are simply “presented” with information about some smart technology product and then asked to report on their attitudes (Bitterman & Shach-Pinsky, 2015; Portet et al., 2013).

However, empirical research has considered how information-seeking factors influence the acceptance of new technologies (Barrett, 2008; Bruce, 2012; Chen & Chan, 2013; Dearing, 2009; Kramer, 2014; Peek et al., 2014). Several have concluded that how aware potential users are about smart technologies may be more important than their assessments of their usefulness and ease of use (Chen & Chan, 2014; Czaja et al., 2006; Fischer et al., 2014; Kramer, 2014).

**Internal information sources**

Marketing theorists refer to the earlier remembered experiences and activities of older persons as their internal information. Psychologists similarly refer to the mental representations, memories, private knowledge, or the “direct experiences” remembered by individuals about “things” (e.g., people, events, activities, objects) (Albarracin & Vargas, 2010). Based on these transactions, individuals form and reconstruct favorable or unfavorable attitudes toward these things, which they can then access or remember (Albarracin & Vargas, 2010). Thus, the awareness and evaluations by older people of their current coping options will be partly influenced by beliefs and attitudes they formed much earlier in their lives (Ajzen & Fishbein, 1980).

The diffusion theory by Rogers (1995) similarly referred to the compatibility of an innovation, that is, its consistence with the past experiences of potential adopters. However, most technology acceptance models have not defined internal information as an explanatory construct. Although they have recognized the influences of experience and habit, they only narrowly conceptualized both these constructs. Experience referred to “the passage of time from the initial use of technology by an individual.” Habit referred to “the extent to which people tend to perform behaviors automatically because of learning” (Venkatesh et al., 2012:161).

**Persuasiveness of external information**

Older people will be differently persuaded by their external information, referring to its ability to shape, change, or modify the appraisals or evaluations of their coping options (Bostrom, 1983). More specifically, it will differently influence how they decide what attributes of these options are the most salient for them to evaluate, whether they should positively or negatively evaluate these attributes (their valence or polarity), and the strength of their evaluations (their valence strength).

How persuaded older people are by their external information will initially depend on how motivated they are to acquire information that will inform their coping behaviors. The model argues that when older people feel more stressed because of their perceived unmet needs, they will have stronger incentives to attend to and evaluate information that will reduce their uncertainty about their coping decisions (Pett, Haugvedt, & Smith, 1995:97). This relationship leads to the following proposition:

**P2.** **THE MORE STRESSED OLDER PEOPLE FEEL, THE MORE PERSUASIVE WILL BE THEIR EXTERNAL INFORMATION.**

How persuaded older people are by the messaging of their external information will also depend on how they perceive three of its attributes: utility, credibility, and powerfulness (Perloff, 1993).

**Perceived utility of external information**

According to the Elaboration Likelihood Model in social psychology, when older people evaluate the utility of their sources of information, they are being “persuaded” by a “central” route to information processing. That is, they engage in a high degree of elaboration or issue-relevant thinking, whereby they thoughtfully consider the arguments and evidence for adopting a coping option, that is, its expected merits, benefits, or strengths versus its downsides, costs, or weaknesses (Li, 2013; O’Keefe, 2016; Petty & Cacioppo, 1986). Older persons will engage in such high elaboration or issue-relevant thinking when they feel more motivated to judge the arguments or evidence for selecting potential coping solutions (Petty & Cacioppo, 1986).

External information will have greater utility when older persons perceive it as more useful, relevant, accessible, and easier to use (Robson & Robinson, 2013). Various factors will be influential such as its timeliness, clarity, and supportiveness (positivity or negativity), and if it reduces the uncertainty of selecting their coping actions (Chen & Chan, 2014). Some older occupants will have difficulty obtaining useful information about the merits of their coping options because they occupy rural or remote locations with few media sources or poor internet connections. Language barriers may be critical. In the United States, recently settled ethnic minorities (e.g., Hispanics and Asians) may have difficulties accessing information because of their limited English comprehension or because they feel intimidated when communicating with organizations that may question their motives. As one Chinese study respondent lamented (Finkelstein, Garcia, Netherland, & Walker, 2008:22):

“I’m blind because I cannot read documents written in English. I’m deaf because people speak to me in English and I don’t understand. And I’m mute because I cannot communicate with anyone who does not know my language.”

An important caveat: information utility depends on the subjective assessments of older people. Consequently, it does not speak to whether the information they acquire is useful from an outside expert’s perspective. Although older individuals rationally act in their best interests, their satisfying behaviors (Simon, 1972) may result in their setting for acceptable or “good enough” (Spink et al., 2007:76), but not necessarily the most useful information about their coping options.

**Perceived credibility of external information**

According to the Elaboration Likelihood Model, when older people are influenced by the credibility of their information sources, they are being persuaded by “peripheral” route processes. Rather than thoughtfully deliberating about their information, they are guided by “simplifying decision rules” (O’Keefe, 2016:1440), such as their...
emotional or affective reactions to peripheral cues as indicated by the likability, niceness, or expertise of their communicators (Li, 2013; Petty & Cacioppo, 1986; Petty & Wegener, 1998; Pornpitakpan, 2004).

Older persons will perceive their external information as more credible when it originates from trustworthy, reliable, believable, and unbiased sources (Lee & Coughlin, 2015; Robson & Robinson, 2013). They have legitimate reasons to fear that vendors, service providers, media, and marketers often do not have their best interests in mind (American Psychological Association, 2010; Davenport et al., 2012; Fischer et al., 2014; Rogers, 1995). Consequently, older people are more likely to attend to information from those who are familiar to them, such as close friends or relatives or professionals they have known for a long time (Connaway, Dickey, & Radford, 2011). They also trust spokespersons of products or services they fondly remember as former movie or TV stars. People who perceive similar to them will be more credible, such as members of groups who share their beliefs, attitudes, and values (O'Keefe, 2016). Roger's construct of “homophily” argued, for example, that when individuals “share common meanings and a mutual subcultural language, and are alike in personal and social characteristics, the communication of new ideas is likely to have greater effects in terms of knowledge gain, attitude formation and change, and overt behavior change” (Rogers, 1995:19).

**Perceived powerfulness of external information**

The literature on technology adoption argues that the significant others (e.g., family members, close friends, or trusted medical personnel) of potential adopters will influence their acceptance intentions or behaviors for another reason. Older people will feel coerced to follow the opinions and counsel of these valued persons because of social pressures and their desire to be socially accepted. As Venkatesh et al. (2003:452) argue, a need to comply with these persons “causes an individual to simply alter his or her intention in response to the social pressure (or social influence).” Various cognitive-behavioral models also relate these social influences to people's adoption decisions. The Theory of Planned Behavior, for example, refers to subjective norms and Bandura's social cognitive theory speaks of observational learning. Persuasion theorists refer to the “power of the source over a message recipient” (Petty & Wegener, 1998:346). Technology adoption researchers have distinguished the construct, “voluntariness of use” referring to “the degree to which use of the innovation is perceived as being voluntary, or of free will, [that is] whether individuals are free to implement personal adoption or rejection decisions” (Moore & Benbasat, 1991:195). Rogers (1995:38) also referred to “contingent innovation-decisions” that are dependent on other members of the social system. However, one prominent theoretical formulation dropped voluntariness as a construct arguing that “most consumer behaviors are completely voluntary” (Venkatesh et al., 2012:159).

Because family members (often spouses or adult children) are the predominant caregivers of older people, they often assume outsized roles as significant others. When older persons are highly dependent on their help, they especially feel beholden to their viewpoints. This becomes significant when one spouse does not agree with the other on the desirability of a particular coping option. The religious and cultural values of older persons may be influential. As one expert noted: “Some cultures value familial solidarity in later age; whereas other cultures, like the United States, value individualism and independence” (Yee-Melichar, 2011:139). One study found that Chinese individuals were afraid that their significant others would laugh at them if they adopted modern approaches to their problems. Consequently, they were less interested in information about technological solutions (Chen & Chan, 2014). Other older persons will feel pressure to subscribe to the religious orthodoxy of their leaders. Consequently, they may balk at receiving information on technologically-related products that appear so remote from their traditional religious and spiritual practices.

Complicating generalizations about the role of these significant others is the possibility that their contrarian opinions arouse the reactance motivations of older people. That is, angered or belittled by the recommendation of a family member, the older person responds by opposing their persuasive pressures. In this instance, the individual is persuaded by the powerfulness of the significant other, but not in the intended direction (O'Keefe, 2016).

The above relationships regarding the persuasiveness of external information lead to the following three propositions:

**P3.** **THE GREATER THE UTILITY OF THEIR EXTERNAL INFORMATION, THE MORE LIKELY THAT OLDER PEOPLE WILL BE PERSUADED BY ITS MESSAGING.**

**P4.** **THE GREATER THE CREDIBILITY OF THEIR EXTERNAL INFORMATION, THE MORE LIKELY THAT OLDER PEOPLE WILL BE PERSUADED BY ITS MESSAGING.**

**P5.** **THE GREATER THE POWERFULNESS OF THEIR EXTERNAL INFORMATION, THE MORE LIKELY THAT OLDER PEOPLE WILL BE PERSUADED BY ITS MESSAGING.**

**Persuasiveness of internal information**

The past experiences of older people will also influence how they evaluate their current coping options. Their awareness and interpretations of information about possible solutions and their benchmarks for appraising their viability and success will often be a product of their historical behaviors and experiences. Older people rarely only view their everyday physical and social worlds through contemporary lenses. Additionally, they will rely on “several temporal reference points” (Golant, 2015a: 27) when they evaluate and react to new coping strategies that will influence how they conduct their lives. Consider those older persons who were earlier caregivers to their elder parents or saw the helping efforts of their friends. The favorable or unfavorable outcomes they remember about these experiences have likely produced attitudes that influence whether they would replicate them today as solutions for their own care (Bandura, 1982).

As another example, in the United States, because ethnic minorities typically have stronger extended family support networks, they will likely have more positive attitudes toward their own adult children serving as their caregivers (Federal Interagency Forum on Aging Related Statistics, 2016).

Although the current cohort of older persons—especially those in their mid-70s or older—will not have used smart technology options, most research now debunks the contention that we can stereotype older adults as un receptive to these innovations (Joe et al., 2014; Lee & Coughlin, 2015). Some may have had earlier positive experiences as users of computers, the internet, smartphones, medical devices, and social media, or at the very least have vicariously experienced new technologies through their interactions with children or grandchildren. Consequently, these elders are less likely to exhibit technophobic reactions or anxieties when they now evaluate smart technology alternatives (Bipartisan Policy Center, 2016; Chen & Chan, 2013; Kerbler, 2014; Peine, Rollwagen, & Neven, 2014). More generally, a higher share of the future older population will have positively experienced new technologies through their interactions with children or grandchildren. Consequently, these elders are less likely to exhibit technophobic reactions or anxieties when they now evaluate smart technology alternatives (Bipartisan Policy Center, 2016; Chen & Chan, 2013; Kerbler, 2014; Peine, Rollwagen, & Neven, 2014). More generally, a higher share of the future older population will have positively experienced their society’s “fast-paced technological changes” when they were younger, and thus we can expect them to be more receptive to technologically innovative products (Peine et al., 2014:203).

The model argues that older persons will be more persuaded by their direct experiences or internal information (Glasman & Albarracin, 2006:780) when they are more motivated to remember how they felt about “things” earlier in their lives. Consequently, when older people feel more stressed because of their current unmet needs, they are more likely to look to their past experiences as critical guideposts for their current appraisals. This discussion leads to the following proposition:

**P6.** **THE MORE STRESSED THAT OLDER PEOPLE FEEL, THE MORE PERSUASIVE WILL BE THEIR INTERNAL INFORMATION.**
Just as we speak of the “utility” of external information, we can refer to the “relevance” of an individual’s internal information. Some past experiences more than others will have generated attitudes or reactions that bear more on older people’s current coping deliberations. Older people are more likely to think that their past experiences were relevant when they can connect them to their current coping appraisals. As Glisman and Albarracín, (2006:780) argue, “more thought about an issue increases the accessibility of the attitude associated with that issue.” Studies of individuals of all ages also conclude that the attitudes formed because of past direct experiences will be more accessible when they are less equivocal, that is, they present one-sided evaluations that are more positively or negatively valenced. This discussion leads to the following proposition:

**P7. THE MORE RELEVANT AND LESS EQUIVOCAL IS THE INTERNAL INFORMATION OF OLDER PEOPLE, THE GREATER WILL BE ITS PERSUASIVENESS.**

**Persuasiveness of external and internal information: direct effects on the coping appraisals of older people**

The model proposes that how persuaded older people are by their external and internal information will directly influence their coping evaluations. When older people have greater confidence and less uncertainty about the salience (that is, the utility and credibility) of their denotive and evaluative external information or feel more pressured to prefer one alternative over another, they will more positively or more negatively evaluate their coping alternatives. They will also have stronger appraisals of their coping options when they perceive that their past experiences (internal information) are more relevant and less equivocal. Importantly, we cannot predict the direction or polarity of these coping appraisals. The persuasiveness of older people’s information may result in either strongly positive or strongly negative evaluations. Useful or relevant, credible, powerful, and one-sided information may be both supportive or unsupportive of older people’s coping possibilities.

**Individual resilience**

Developmental psychologists argue that individuals with greater resilience can better cope with the stresses of old age and are more likely to find solutions to their problems (Aldwin & Igarashi, 2012). They have the “capacity to overcome, steer through, and bounce back from adversity” to regain their competence and feelings of being in control (Ong, Bergeman, & Boker, 2009:1782). Although they may not achieve full recovery of their former selves, they reach “new normals” (Golant, 2015b) by adopting new behaviors that enable them to maintain their positive self-image and to feel more congruent with their surroundings.

Although the academic literature does not uniformly define or measure resilience, most researchers agree that it is a multifaceted construct that distinguishes individuals by a constellation of personality traits, but also life events and contextual experiences (Ong et al., 2009; Wiles, Wild, Kerse, & Allen, 2012). In this model more resilient older persons are attributed with having two distinctive features: stronger perceptions of their self-efficacy—that is, beliefs that they can get things done; and a greater openness to new experiences—that is, adaptive flexibility (Nov & Ye, 2008).

**Perceived self-efficacy**

Individuals with stronger perceptions of self-efficacy report that they are happier, more hopeful and optimistic about their lives (Scheier & Carver, 1992). They have higher self-esteem, appraising their self-worth more positively and accepting and liking themselves (Resnick, 2011). Their past experiences may have contributed to their current positive outlook. For example, they may have earlier recovered from economically or socially disruptive life events (Bandura, 1997; Gecas, 1989). Conversely, they display fewer depressive symptoms and negative emotions that result in feelings of withdrawal and resignation.

These more “hardy” persons expect that good things or successes will happen to them and they are less fixated on their weaknesses, vulnerabilities or earlier failures (Bandura, 1982; Resnick, 2011). They typically have achievement-oriented and internal locus of control personalities and so do not feel helpless in the face of adversity. Rather, they believe that they can control their lives and environments and do not have to rely on fate, luck, or religious beliefs (Bandura, 1977; Langer & Abelson, 1983; Lefcourt, 1973; Rodin, 1986; Schwarzer & Warner, 2013).

Perceived self-efficacy often correlates strongly with socioeconomic indicators. Consequently, more educated and higher income older persons usually have stronger self-efficacy beliefs. These persons also have their positive self-efficacy assessments reinforced because they surround themselves with significant others who also have more “can-do” personalities. These reported relationships dovetail with other research showing that tech adoption is higher among the better educated and those with higher incomes (Anderson & Perrin, 2017). Race may also be associated with self-efficacy. After controlling for social class, African-Americans were shown to feel less in control of their lives than whites (Gecas, 1989; Hughes & Demo, 1989). Members of cultures with fatalistic beliefs also have weaker perceptions of their capabilities.

The very reasons for why older persons have unmet needs may influence how confident they are dealing with their problems. Consequently, when older people feel physically or cognitively vulnerable because of their limited motor skills, impaired insight, or reduced memories, they tend to feel less certain about their abilities (LeRouge et al., 2013).

**Openness to new experiences or adaptive flexibility**

Rogers (1955) early argued that advocates of innovations had more venturesome personalities, were more open to novel ideas, experiences, and approaches, and were less likely to feel threatened or anxious by change or uncertainty (McCalister & Pessemier, 1982; Rosowsky, 2009; Skodol, 2010; Whitbourne, 1986). Others argue that they find novel experiences as inherently more satisfying (Fiske & Maddi, 1961). These persons are also more willing to give up old habits, stable or status quo patterns of behaviors, and to be “flexible in their ability to adapt to challenges, limitations, and changing life circumstances” (Skodol, 2010:115). These individuals contrast sharply with those who hold rigid beliefs, opinions, and behaviors and who are less willing or able to adjust to new circumstances and are uncomfortable with change or fear losing control (Devaraj, Easley, & Crant, 2008; Oreg, 2003; Stine-Morrow & Chui, 2012).

Level of openness often correlates with age and education (Jackson, Hill, Payne, Roberts, & Stine-Morrow, 2012; Whitbourne, 1986). Some argue that with increased age older persons are more satisfied with the status quo, having “already adjusted their aspirations downward to meet the reality of their actual life situations” (Whitbourne, 1986:166). Technology maven Laurie Orlov (2017) argues that “the eldest today are apparently not in love with ‘new’.” Conversely, higher educational attainment is associated with openness to change and “may be regarded as facilitative of desirable life changes” (Whitbourne, 1986:166).

Religiousness is often associated with optimism, a source of strength, and greater self-efficacy, suggesting an openness to change (Pargament & Cummings, 2010). However, when older persons have more orthodox religious beliefs, they may resist introducing changes in their lives that are so remote from their traditional religious practices and spiritual solutions.
Individual resilience and the persuasiveness of external information

The model proposes that the resilience of older people both directly and indirectly influences their coping evaluations. Directly, more resilient older persons will evaluate more positively their alternative coping options because they are more motivated to find solutions to their unmet needs and have greater confidence in their problem-solving abilities (Kaye, 2017; Nov & Ye, 2008; Rogers, 1995). The coping repertoires of more resilient older persons are also more likely to include options that are consistent with their more positive attitudes, beliefs, and values. Given these incentives to action, the resilience of older people is especially pertinent to their appraisals of smart technology options because they will be less discouraged by the many potential “barriers to adoption” (Lee & Coughlin, 2015:752). Their can-do personalities will also result in resilient older persons less likely relying on accommodative coping processes (Skodol, 2010) as a way to distance themselves from their problems “or wish them away” (Scheier & Carver, 1992:224).

The resilience of older persons will indirectly influence their coping solution appraisals by influencing how persuaded they are by their external information. Research shows that older people's lack of confidence in their ability to learn about (that is, seek information) technological devices is an important barrier to adoption (Anderson & Perrin, 2017). In contrast, as the next section argues, more resilient older people will be more motivated and able to acquire information informing them about their possible coping options and thus are more likely to be influenced by its messaging (Mittelstaedt, Grossbart, Curtis, & Devere, 1976; Schmidt & Spreng, 1996).

Individual resilience: direct and indirect effects on the coping appraisals of older people

The model first argues that resilient older persons will be more persuaded by the utility of their external information. They will have greater confidence that their acquired information will correctly inform their evaluations of their coping options (Brandstätter & Rothermund, 2002; Gist & Mitchell, 1992; van Kessel, 2013; Walsh & Callan, 2011). Furthermore, consistent with dissonance theory and the confirmation bias, this information is more likely to support their beliefs and attitudes (Nickerson, 1998). As one theorist expressed it, “If an information user believes that a source will provide useful information, he or she is likely to be motivated to use it” (Robson & Robinson, 2013:187).

Second, resilient older persons will be less persuaded by the credibility of their information. Because they are more confident in their ability to acquire complete and accurate information, they will selectively exclude or attend less to information that they judge as less credible. Credibility thereby becomes a less important influence when they assess the merits of their information. Consequently, based on the aforementioned Elaboration Likelihood Model (ELM), they will be primarily persuaded by the utility of their information and whether its “issue-relevant thoughts are generally favorable or unfavorable to the position advocated” (O'Keefe, 2016:1440).

Third, resilient older persons will be less persuaded by the influence of their significant others because they believe more strongly in their own abilities to judge the appropriateness of their coping alternatives (Bandura, 1982; Davis, 1989; Eagly, 1981; Fishbein & Ajzen, 1975; Rogers, 1995). Consequently, they will be “more resistant” (O'Keefe, 2016:1441) to the social pressures or expectations of others.

At the other end of the continuum, some share of less resilient older persons is more likely to surrender their decision-making autonomy to a family member or appointed guardian (Morgan & Brazda, 2013). They may assign such proxy control to their adult children “to free themselves of the performance demands and hazards that the exercise of control entails” (Bandura, 1982:142). In so doing, they still hope to influence their coping outcomes, but without shoulldering the stressful decision-making responsibilities. Alternatively, they lose their role of decision-maker.

The exemplar is the adult daughter taking away the car keys from her older father and demanding that he receive frequent home care. By assigning authority to others, older persons no longer “shape or influence a particularly stressful person-environment relationship” (Lazarus & Folkman, 1984:69). Our theoretical model cannot predict the coping behaviors of these older adults because both the stressfulness of their unmet needs and their information-seeking behaviors will now depend on the attitudes and behaviors of their significant others. A failure to recognize this transfer in decision-making authority will inevitably result in the faulty interpretation of the older person's secondary appraisal process and the etiology of their coping decisions (Bruce, 2012).

The above discussion leads to the following three propositions:

P8. The greater the resilience of older persons, the more persuasive will be the utility of their external information.

P9. The greater the resilience of older persons, the less persuasive will be the credibility of their external information.

P10. The greater the resilience of older persons, the less persuasive will be the powerfulness of their external information.

Individual appraisals of alternative coping solutions and direct influences

The model conceptualizes the appraisals by older persons of their smart technology and traditional coping solutions as varying by their valence strength or magnitude. That is, it proposes that older people evaluate their coping options along a more positive to a more negative polarity continuum, such as from extremely favorable to extremely unfavorable. We proposed earlier that four constructs will directly influence these appraisals: the perceived stressfulness of older people's unmet needs, their resilience, the persuasiveness of their external information, and the persuasiveness of their internal information. These relationships can now be formally expressed by the following four propositions:

P11. The more stressed that older people feel, the more positive will be their coping option appraisals.

P12. The greater the resilience of older people, the more positive will be their coping option appraisals.

P13. The more persuaded older people are by their external information, the more positive or more negative will be their coping option appraisals.

P14. The more persuaded older people are by their internal information, the more positive or more negative will be their coping option appraisals.

Appraised attributes of smart technologies influencing the positivity of assessments

The model has so far left undefined the attributes of their coping options that older people distinguish when they positively or negatively appraise them. The theoretical and empirical literature has primarily focused on the perceived efficaciousness and usability of smart technology options to predict their acceptability. However, some empirical studies have recognized a third attribute, what this model defines as perceived collateral damages (Barrett, Thorpe, & Goodwin, 2015; Bitterman & Shack-Pinsly, 2015; Chen & Chan, 2013; Czaja et al., 2006; Davenport et al., 2012; Fischer et al., 2014; Gokalp & Clarke, 2013; Heart & Kalderon, 2013; Jacelon & Hanson, 2013; Lee & Coughlin,
Consistent with the coping substitutability assumption of the model, older people will focus on these three attributes when they evaluate both their traditional and smart technology options. However, because the main purpose of this model is to explain the adoption of smart technologies, and because of space constraints, the following discussion only focuses on how these three attributes have influenced older people’s appraisals of their smart technology coping options.

**Perceived efficacy of smart technology resources**

The literature has referred to this first category of attributes—perceived efficacy—by various labels, including perceived usefulness, performance expectancy, and relative advantage (Bitterman & Shach-Pinsly, 2015; LeadingAge, 2014, 2016; President’s Council of Advisors on Science and Technology, 2016). Older people will appraise smart technology solutions as more efficacious when they reduce how stressed they feel because of their unmet needs (Barrett et al., 2015). Chen and Chan (2013) distinguish three categories of efficacious or useful consequences: hedonistic, social, and utilitarian.

First, hedonistic outcomes increase the pleasure experienced by smart technology users, such as making their places of residence more enjoyable or stimulating places to live. For example, robots could function as card or chess players or as purveyors of social media. Second, social outcomes contribute to the individual’s status or image. More broadly, social outcomes in this model include the greater opportunities available to elders who need companionship, emotional support, feel lonely, or who would benefit from a confidant relationship (Walden et al., 2015). Third, utilitarian outcomes, undoubtedly the most encompassing category, refer to smart technology outcomes that older people perceive as “instrumental in achieving valued outcomes” (Chen & Chan, 2013:4651). Examples include: a pill box dispenser that alerts older persons with memory problems to regularly take their medicine and informs their families or physicians when they do not comply; wall mounted motion detectors that detect when older persons fall and set in motion appropriate responses (Skubic et al., 2009); physiological sensors enabling older people to practice better preventive health behaviors; devices that detect gait problems and enable older people to interface quickly and securely with their long-term care professionals (AARP, 2016; Carretero, 2015; Chen & Chan, 2013; Lorenzen-Huber et al., 2011); and dwelling-based sensors that detect dangerous environmental contaminants and alert the appropriate professionals. This category would also include the assurances given to older persons that their family members would be less burdened by their care demands (Kaye, 2017).

Research shows that older people may narrowly perceive the efficacious functions of smart technology solutions (Rogers & Fisk, 2010). In her study of robotic solutions, Smarr et al., 2014 emphasizes that older people may be open to receiving help with tasks related to chores, information management, and manipulating objects, but be less receptive to help with personal care and leisure activities. Similarly, they specifically evaluated why they favor robots helping them with medication management. They were accepting of robots to remind them to take their medications but were reticent about taking counsel about which medicine to take.

**Perceived usability of smart technology resources**

The literature has referred to this second category of attributes—perceived usability—by various labels, including effort expectancy (Venkatesh et al., 2012), perceived ease of use, or perceived behavioral control (Ajzen & Fishbein, 1980). These offer insights into whether older people perceive their coping options as viable strategies. Their usability appraisals will depend on four factors (Carretero, 2015; Chen & Chan, 2014; Czaja et al., 2006; Czaja et al., 2013; Georgetown University McDonough School of Business, 2013; Peek et al., 2014; Venkatesh et al., 2003; Venkatesh et al., 2012).

The first is the availability or accessibility of these options, that is, how easily older people can buy, lease, or rent these products (and related services) given where they now live. Because researchers have often conducted their studies in artificially controlled research settings, they have infrequently examined this access or connectivity issue. However, awareness of an option does not necessarily translate into ease of usability. To make these products easier to obtain, Lee and Coughlin (2015:752), for example, suggest the possibility of placing “technology in general mainstream stores, instead of selling only through specialty stores or institutions.” The usability of these smart technology solutions also depends on their having monitoring or response capabilities, but reliable digital or internet services may be unavailable in remote rural counties.

Second, older people must perceive smart technology resources as being affordable—both their purchase price and monitoring service functions. Higher income older persons will be less dissuaded by cost barriers when they make their usability evaluations. However, low-income elders will often be unable to afford private market prices. These financial barriers may be blunted if government programs (e.g., in the United States, Medicaid and Medicare) make these solutions more affordable (Bipartisan Policy Center, 2016; Dearing, 2009; Georgetown University McDonough School of Business, 2013; LeRouge et al., 2013; Schulz et al., 2014). However, the largest consumer group, the middle-income old, may have the most difficulty financially accessing smart technology options because they cannot afford private market prices but will be ineligible for subsidies offered through public programs (Golant, 2014). Third, older persons must assess if they can install, operate, maintain, or interact with these options without feeling anxious, frustrated or incompetent (Anderson & Perrin, 2017). An overall positive user experience is crucial. Older consumers want these devices to fit seamlessly into their lifestyles. Consequently, they favor products with “human-centric” designs that are sensitive to their inevitable idiosyncrasies (Novitzky et al., 2014). Designer/developer solutions must match the preferences of users and their task performance capabilities (Carretero, 2015; Czaja et al., 2013; Georgetown University McDonough School of Business, 2013; Lee & Coughlin, 2015; LeRouge et al., 2013; Peek et al., 2014; Rogers & Fisk, 2010; Schulz et al., 2014; Venkatesh et al., 2003; Venkatesh et al., 2012; Wang, Rau, & Salvendy, 2011; Zejda, 2014). As older people opt for a more active way of life, they will also favor devices that are portable and can function outside their dwellings (Joe et al., 2014; Lee & Coughlin, 2015). These options must also be compatible not just to active and independent older persons, but also to those disadvantaged by physical and cognitive impairments and sensory deficits (van Hoof et al., 2011).

Research finds that older persons favor smart technologies that have simple interfaces, fewer design features, and demand fewer user skills. They should be reliable and easy to understand, learn and use without extensive training (Demiris et al., 2009). Older persons want clear and readable printed instructions (Lee & Coughlin, 2015) and assurances that tech support is readily available when they have difficulties using a product. If their devices are measuring individual or environmental outcomes, they want to feel confident that the results are complete, correct, interpretable, and do not yield false positive findings (Czaja et al., 2013). They also want devices that will not overwhelm their caregivers because of their complex operating or monitoring demands (Davenport et al., 2012). Fourth, the usability assessments of older people will depend on how enjoyable they are to use. The extended technology acceptance model (UTAUT2) introduced the construct of “hedonic motivation” to distinguish how much fun or pleasure that individuals are expected to derive from using a new technology, whatever their intended outcomes (Venkatesh et al., 2012).
Distinguishing hedonic motivation as a basis to evaluate usability emphasizes the importance of a whole host of possible smart technology features. Studies, for example, emphasize that older persons favor devices that are physically attractive and comfortable to wear and use (Chen & Chan, 2013; Gokpal & Clarke, 2013; Lee & Coughlin, 2015; Wang et al., 2011). Similarly, older people's positive appraisals of robotic solutions depend on their ability to communicate attractive human-like qualities but at the same time not be perceived as overly dominant (Smarr et al., 2014).

**Perceived collateral damages from using smart technology solutions**

The third category of attributes—collateral damages—refers to the unintended and harmful damages that older people worry will result if they adopt smart technology options (Heckhausen et al., 2010; Lieberman, 1991). These collateral damages include assaults on their lifestyles or threats to their ability to control their lives or environments. Importantly, they may have these concerns even if they evaluate their coping options as efficacious and usable. Although empirical studies have identified these unintended effects (Barrett et al., 2015; Bitterman & Shach-Pinsly, 2015; Chen & Chan, 2013; Czaja et al., 2013; Heinz et al., 2013; Lee & Coughlin, 2015; Louie, McColl, & Nejat, 2014; Portet et al., 2013; Walsh & Callan, 2011), technology acceptance theoretical frameworks have not recognized this category of attributes as a formal construct (Venkatesh et al., 2012).

Other people worry about being under surveillance by impersonal machine technologies operated by anonymous persons treating them as sterile data summaries (Novitzky et al., 2014). They are anxious about having digital devices in their homes in a world where identity theft, hacking, and fraudulent behavior are frequent and widespread (Bitterman & Shach-Pinsly, 2015; Chen & Chan, 2013; Lorenzen-Huber et al., 2011; Peek et al., 2014). They find disconcerting the prospects of having “strangers” monitor their medical conditions, functional limitations, and the most intimate aspects of their bodies and behaviors (Barrett et al., 2015; Bruce, 2012; Chen & Chan, 2013; Georgetown University McDonough School of Business, 2013; Peek et al., 2014). Consequently, they are not sure they want to be continually monitored and measured by “wearable computing and wireless applications” (Demiris & Hensel, 2009:39).

They worry that the professionals, providers, and family members monitoring their medical or long-term care conditions and dwelling conditions will have too much power to make life-changing decisions (Novitzky et al., 2014). Although advocates believe that these smart technology solutions will make it easier and safer for older people to age in place in their current homes and thus postpone moves to more medical-like care settings, older people see crucial downsides. Paradoxically, they worry that by adopting these technologies to improve their chances of aging in place, they will offer compelling evidence to others that they cannot safely maintain their independent households or assume responsibility for their care. They are concerned that by being under constant surveillance, they will embarrassingly broadcast their vulnerabilities and that these coping solutions will unintentionally accelerate rather than delay their transitions to more supportive and institutional settings (Demiris et al., 2009; Forlizzi, DiSalvo, & Gemperle, 2004; Lee & Coughlin, 2015; Novitzky et al., 2014).

Other older individuals worry about the dehumanizing effects of these devices and fear that they will inevitably and undesirably replace their human contacts and interpersonal interactions with professionals or family members (Novitzky et al., 2014; Portet et al., 2013). They worry that by introducing these smart technologies, their homes will look like the sterile and controlling environments that they are so anxious to avoid (Greenhalgh et al., 2015; Linner et al., 2015; Skubic et al., 2009; van Hoof et al., 2011). They fear that when professional caregivers manage them from a distance, they will forget that they are dealing with real people (Walden et al., 2015). Without face-to-face intimate connections with their family or professional caregivers, they worry that their only social company will be their machines with the result that they will feel more socially isolated. Those older persons who believe that caregiving should be a family responsibility feel especially alarmed (Pinquart & Sorensen, 2005; White-Means & Rubin, 2008).

**Positivity of assessments and the adoption of smart technology solutions**

The model proposes that older people will adopt smart technology coping options when they more positively assess them, that is, when they perceive them as more efficacious, useable, and without collateral damages. These relationships lead to the following three propositions:

**P15. The more positively older persons appraise the efficaciousness of their smart technology coping options, the more likely they will adopt them.**

**P16. The more positively older persons appraise the usability of their smart technology coping options, the more likely they will adopt them.**

**P17. The less negatively older persons appraise the collateral damages from their smart technology coping options, the more likely they will adopt them.**

Interpreting these three propositions is not necessarily straightforward. It is very likely that older people will not assign equal salience or importance to these three appraisal attributes. The challenges to interpretation arise when for example older persons appraise two attributes positively and the other negatively. So, for example, they may judge a coping solution very positively because of its efficaciousness and usability but equally negatively because of its perceived collateral damages. However, the model is silent on the possibility that suffering collateral damages is a much more salient issue for some older persons. Consequently, despite positively appraising a coping option as efficacious and useable, these older persons could reject this alternative. The literature offers no clear-cut metrics or propositional relationships on how to resolve such conflicting appraisals and how the unequal salience of these attributes might influence the coping adoption decisions of older persons.

**Positivity of assessments and the adoption of traditional coping options**

Consistent with its coping substitutability assumption, the model also proposes that older people will adopt traditional technology coping options when they more positively assess them, that is, when they perceive them as more efficacious, useable, and without collateral damages. These relationships lead to the following three propositions:

**P18. The more positively that older persons appraise the efficaciousness of their traditional coping options, the more likely they will adopt them.**

**P19. The more positively that older persons appraise the usability of their traditional coping options, the more likely they will adopt them.**

**P20. The less negatively that older persons appraise the collateral damages resulting from their traditional coping options, the more likely they will adopt them.**

**Adoption decisions: smart technologies versus traditional solutions**

Based on the above appraisals, older persons will decide on whether
their traditional coping solutions have any competitive strengths or advantages over their smart technology coping solutions (Kaye, 2017). As marketing professionals express it: “What products compete with those we are promoting, and how do the benefits compare...” (Grier & Bryant, 2005:322). This discussion leads to the following proposition:

**P21. WHEN OLDER PEOPLE APPRAISE SMART TECHNOLOGY MORE POSITIVELY THAN TRADITIONAL COPING SOLUTIONS, THEY ARE MORE LIKELY TO ADOPT THEM.**

The literature is also silent about the willingness of older persons to adopt multiple coping solutions that they positively evaluated. They have the following choices:

1. Adopt one or more smart technology coping solutions.
2. Adopt one or more traditional coping solutions.
3. Adopt some combination of smart technology and traditional coping solutions.

Some older persons will not engage in this decision-making calculus. Because they feel overwhelmed by the stressfulness of their unmet needs or have no viable solutions, they will take no concrete actions and will neither adopt smart technology or traditional coping solutions. Rather, they initiate a fourth coping strategy:

4. They take no concrete actions but rather engage in adaptive mind or accommodative strategies

**Primary and secondary appraisals often not a simple linear pathway**

It is tempting to view the primary and secondary appraisal processes outlined in this theoretical model (Figs. 2 and 3) as a set of linear stages that are “invariant in sequence” (Lazarus & Folkman, 1984:146). In practice, the decision-making underlying older people’s acceptance or rejection of their coping solutions will not always be so clear cut or orderly. The following factors are likely to muddy the temporal sequence:

- Older persons receive favorable information about a coping solution before experiencing any unmet needs because of a friend’s successful efforts to deal with her problems.
- Older persons only recognize they have unmet needs after learning of a coping solution.
- After receiving information about a coping solution and favorably evaluating it, new precipitating needs of older persons motivate new information-seeking about alternative coping solutions.
- After evaluating information about their coping solutions, older persons decide not to adopt them, but they seek out new information about possible coping solutions.
- After older persons positively evaluate a coping solution, a significant other emerges who persuades them to reconsider their decisions.
- After positively evaluating a coping solution, older people receive new information about a “better” coping solution.
- After positively evaluating a new coping solution, older persons receive external information (e.g., from their close friends) warning of serious collateral damages.
- Older persons do not evaluate the attributes of a coping solution because an influential significant other has already recommended its adoption.

**Conclusion**

Smart technology products have considerable potential as solutions that enable older persons to experience more comfortable and independent lives in their current homes and communities (Dorsey & Topol, 2016; LeadingAge, 2016; Solaimani, Keizer-Broers, & Bouwman, 2015; Totten et al., 2016). Tomorrow’s older population, however, will be demanding consumers who will not be easily persuaded to adopt these products. Consequently, the many private companies hoping to benefit from this lucrative elder consumer market will benefit from better understanding the factors that will influence their decisions (Orlov, 2016b). The public sector also needs to understand whether older persons will be interested in these products and services. With the growth of their aging populations, governments throughout the world will be spending higher shares of their budgets on health, social, and protective services designed to make it easier for older people to age in place in their current homes rather than transitioning to institutional-like care settings. Smart technologies offer the promise of not only reducing the cost of service delivery but also producing better care outcomes.

The proponents of smart technologies argue that their products can substitute for or at least complement the care and assistance now predominantly offered by family members. This is a compelling argument because of concerns that families will play diminished roles as caregivers. Demographers point to future generations of elders with weaker extended families because of higher divorce and lower remarriage rates, and the greater geographic separations of older persons from their adult children. They also argue that because women are more likely to work, they will be less motivated or able to function as caregivers (Dorsey & Topol, 2016; Redfoot, Feinberg, & Houser, 2013). In the United States, between 2010 and 2030, the ratio of family caregivers to older persons is expected to plummet as the baby boomers transition from their traditional role as caregivers to becoming older persons themselves who require care (Redfoot et al., 2013). Alarming, most experts also do not believe that the growth of professionals or direct care workers is increasing fast enough to accommodate tomorrow’s large population of old who will require assistance (Stone & Harahan, 2010). Many experts believe that smart technology solutions will help fill this gap and enable a global society to better care for their older constituencies, especially as they become top heavy with those in their mid-70s and above. However, how quickly older persons throughout the world will adopt these smart technologies is entirely unclear.

To help answer this question, the proposed theoretical model seeks to explain the decision-making processes that are likely to influence the adoption behaviors of older adults. Compared with earlier formulations, it offers a more extensive array of constructs and relationships that are especially relevant to the real-world decision-making contexts of older people. Moreover, it recognizes that a major obstacle preventing the adoption of smart technologies is the presence of those entrenched traditional coping solutions.

The model consists of nine major and nine minor constructs and twenty-one propositions that articulate their relationships (Fig. 4). The model still undoubtedly oversimplifies the adoption decisions of older people. A large social psychology literature points to the many complexities of predicting human behaviors based on individual evaluations or attitudes. Consequently, it may not be possible to generalize the propositions offered in this model to all older individuals with diverse needs, motivations, personalities, and behavioral and contextual incentives and constraints. It may also be unrealistic to expect that older persons can carefully evaluate the attributes (efficaciousness, usability, and collateral damages) of their coping solutions before making their adoption decisions. Each of these attributes requires older persons to consider multiple issues when evaluating their coping options. The predictive power of this model would also substantially decrease if the significant others of older persons (e.g., adult daughters or medical professionals) are themselves appraising and deciding on these coping options.

The theoretical model also draws attention to our gaps in knowledge about older people’s smart technology and traditional solution adoption decisions. Most importantly, we need more empirical research on how older people conduct their information-seeking behaviors—particularly
A. PRIMARY APPRAISAL OF UNMET NEEDS

1. PERCEIVED STRESSFULNESS OF INDIVIDUAL’S UNMET NEEDS (P1, P2, P6, P11)
   i. Seriousness of unmet needs
   ii. Temporal imminence of unmet needs
   iii. Duration of unmet needs

B. SECONDARY APPRAISAL OF COPING SOLUTIONS

2. PERSUASIVENESS OF EXTERNAL INFORMATION (P2, P3, P4, P5, P8, P9, P10, P13)
   iv. Perceived utility of information
   v. Perceived credibility of information
   vi. Perceived powerfulness of information

3. PERSUASIVENESS OF INTERNAL INFORMATION (P6, P7, P14)
   vii. Relevance and valence strength of earlier direct experiences

4. INDIVIDUAL RESILIENCE (P8, P9, P10, P12)
   viii. Perceived self-efficacy
   ix. Openness to new experiences or adaptive flexibility

5. PERCEIVED EFFICACIOUSNESS OF SMART TECHNOLOGY AND TRADITIONAL COPING SOLUTIONS (P15, P18)

6. PERCEIVED USABILITY OF SMART TECHNOLOGY AND TRADITIONAL COPING SOLUTIONS (P16, P19)

7. PERCEIVED COLLATERAL DAMAGES FROM USING SMART TECHNOLOGY AND TRADITIONAL COPING SOLUTIONS (P17, P20)

C. COPING PROCESSES

8. ASSIMILATIVE COPING PROCESSES (P21)

9. ACCOMMODATIVE COPING PROCESSES

on how they acquire, interpret, and prioritize information about their coping solutions. The model, for example, did not attempt to predict the causal linkages between older people’s external and internal information.

Despite our need for better insights into how older people make their adoption decisions, the propositional relationships offered by the model suggest that the following action strategies would increase older people's receptivity to these new technologies:

- Identify those unmet needs that are most likely to motivate technology use by older persons.
- Offer educational and public service programs that increase the resilience of older people and thereby make them less fearful of new technological solutions.
- Insure that older people can better avail themselves of cogent and credible information about smart technology solutions.
- Offer more compelling information that demonstrates the utility and usability of smart technology solutions.
- Identify those external information sources that are likely to influence how older people evaluate smart technology solutions.
- Better understand how the earlier experiences of older people both encourage and constrain their current adoption behaviors.
- Allay the fears older people have about the potential collateral damages resulting from their adopting these new technologies.
- Offer stronger arguments that smart technologies produce better care outcomes than traditional coping solutions.
- Acquire better understanding about why some older people will cope with their problems by using accommodative strategies.
- Design policy strategies to make smart technology options more affordable to both lower- and middle-income elders.

Lastly, although we constructed the theoretical model to better understand and predict the adoption behaviors of older people, it can easily be tweaked to assess the comparable decision-making calculus of their family caregivers (Reh et al., 2016). As emphasized, family members often become the de facto case decision-makers for the elders under their care. The model’s focus would then shift to how these informal caregivers feel about the unmet needs of their loved ones and how they subsequently initiate their information-seeking behaviors and product appraisals.

References


