



ACCEPTANCE FOR APPLYING TECHNOLOGICAL LIVING
ASSISTIVE DEVICES IN DIGNITY CARE -
EVIDENCE FROM CENTRAL TAIWAN

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Abstract

People who need long-term care often require living assistive devices to improve their daily lives. At present, footrests, or Ankle-Foot Orthoses (AFOs), in the global market are made of high-temperature materials or carbon fiber, and are targeted at patients suffering from strokes, traffic accidents, and falls, etc. However, these people often need an affordable and easy to use footrest to support the lower limbs, prevent the feet from sagging, or improve the small movements in life. This study used a revised Technology Acceptance Model to explore whether residents of long-term care institutions could accept the use of technology living assistive devices (based on a new type of footrest to improve their daily living functions) in order to enhance the dignity of their autonomous lives. The empirical results showed that the Technology Acceptance Model could be used to explain the behavioral in-

tention to use and the user's acceptance of technological living assistive devices. At the same time, the results also indicated that conformity had a positive influence on the behavioral intention of the users to use the technology living assistive devices, and that perceived risk had negative moderating effects on attitude toward use and behavioral intention to use.

Keywords: Dignity Care, Long-term Care, Living Assistive Devices

Introduction

People who require long-term care often need living assistive devices to improve their daily lives. At present, the footrests in the global market are made of high-temperature materials or carbon fiber and are targeted at patients suffering from strokes, traffic accidents, and falls, including 6.90 million patients with ischemic stroke, 3.4 million patients with hemorrhagic stroke, 20 to 50 million people injured due to traffic accidents, and millions of elderly people suffering from falls or limited physical activity. These individuals require a footrest to support the lower limbs, prevent the feet from sagging, and improve the small movements in life. However, most patients cannot afford the device or do not have enough insurance coverage to pay for these expensive devices. Although the front-type footrest can be made by pre-cutting low-temperature plastic sheets, the finished product may be very fragile and easily broken when

used for walking support. Technological living assistive devices consisting of new types of footrests can be formulated to achieve the required hardening time and strength levels to meet patient needs for a strong, lightweight ankle-foot orthosis or back frame. Technological living assistive devices offer many soft colors such as lavender, sky blue, sunny yellow, and green. There are also special specifications for everyday living assistive devices. This study explored whether it would be possible to use the revised Technology Acceptance Model (TAM) to explain the behavioral intention of long-term care institution residents to use technological living assistive devices to improve their daily life functions, so as to enhance the dignity of their autonomous lives. In addition, this study investigated whether conformity was influential on the behavioral intention to use, and whether the residents' perception of the use of technological living assistive devices would have the moderating effect to the attitude toward use

and the behavioral intention to use.

Literature Review

This paper reviewed dignity care, TAM theory, conformity theory, and risk perception theory to construct a feasible research method.

Dignity Care

The concept of human dignity has existed in medical ethics for many years. In 1948, the World Medical Association advocated that clinicians should include respect for human dignity while providing comprehensive medical services. In the 1990s, the proposition began that maintaining dignity is no longer just the responsibility of physicians; patients can also demand that health care providers respect their dignity (Graaf & Delden, 2009). In 1985, it was also emphasized in the Code of Nurses of the American Nurses Association that caregivers should provide individualized services that respect the patients' human dignity regardless of their social status, economic status, personal traits, or the nature of their health problems (Yin et al., 2008).

Matiti (2007) pointed out that privacy is important for the maintenance of patient dignity. It is shameful and

uncomfortable for patients in hospital to be exposed to strangers or to be separated only by a curtain during examination or treatment. In addition, it has also mentioned that adults generally expect to be able to control themselves and the situation, but when an individual is ill, these controls are quickly destroyed and disintegrated. When the patient is completely excluded from the treatment plan or care activity arrangement for the disease, it will also create an embarrassing situation. Therefore, providing complete information while planning treatment and care is of great significance to the patient's psychological preparation. The perception of dignity is different between patients and caregivers. From the patients' point of view of the patients' dignity, the patients feel that dignity care is not just suitable clothing or coverage but also includes appropriate time allocation, understanding their views and considering their feelings, and not wanting their bodies to be treated as objects. Matiti and Trorey (2008) found that patients in hospitals believe that dignity maintenance includes privacy (especially avoiding physical exposure), keeping secrets, communicating (and getting the information they need), choosing to control and participating in care, and being respected (which is also given the most concern and consideration by patients).

Patients are concerned about situations such as opening the covered part of a wound without first notifying the patient when performing care, treatment or ward rounds, discussing the patients' condition publicly in double or multi-bed ward areas, or having someone else waiting in the clinic at the time of their visit. All of these behaviors invisibly invade the patient's privacy and harm the patient's dignity in the medical situation.

Nursing staffs believe that the elements of maintaining patient dignity mean to respect patients and their privacy, enhance their sense of control, and give them time. Heijkenskjöld, Ekstedt and Lindwall (2010) pointed out that nursing staffs should treat patients as “people” to maintain patient dignity, such as finding the right time for patients to talk about and share their life experiences, allowing patients to participate in self-care, giving time to patients, and banning other caregivers from performing violations of patients' dignity. Conversely, if the caregivers do not respect the patients' wishes, give up on the patient, are indifferent to the patients, or regard the patients as an object instead of the a human, it is a serious violation of the patients' dignity.

Respecting patient dignity are the primary elements of nursing ethics, as

well as basic elements of human interaction. The principle for respecting others is that one should pay attention to others and treat them with empathy, instead of regarding others as tools or methods to achieve personal goals. Otherwise, it is the exploitation of others, which is a manifestation of disrespect (Jameton, 1984). Respectful behaviors from the perspective of nursing activities includes both language and non-language behaviors, such as using proper terminology (avoiding inappropriate words), being frank and honest, being willing to make good use of time to listen to the patients' voice, giving patients the opportunity to express their feelings, and supporting the independent spirit of the patients' attempts. On the contrary, labeling patients, talking about patients' conditions, treating patients with an attitude of granting a boon, and selective listening are all disrespectful behaviors.

Autonomy is the basic ethical principle of medical staffs in caring for patients. Before providing any medical care to the patients, the medical staff should provide all the information related to medical care to the patients and let the patients make the decision. In the medical system, the definition of patient autonomy is when the patient is conscious, does not harm his or her own body, and excludes non-recovery

obstacles. Everyone has the right to choose the treatment method for the condition of his or her own body, request the explanation to the disease and the provision of relevant medical information, or participate in the entire medical process according to his or her own wishes. Chochinov (2010) also proposed that the best strategy for maintaining patients' dignity is to support their sense of autonomy and control in order to enhance the patient's self-reliance and spiritual comfort. Kuo, Huang and Hsu (2019) found in their dignity care survey of residents in long-term care institutions that the residents' needs for self-management of life are particularly significant, and that the residents of long-term care institutions are eager to live autonomously.

Matiti and Trorey (2008) proposed that maintaining the dignity of patients in hospitalization provides emotional comfort and promotes rehabilitation. For every individual in society, dignity is the foundation of health (Chochinov et al., 2002). The results of the research on the dignity of terminal cancer patients showed that 7.5% of patients feel they have lost their dignity. The more they feel they have lost their dignity, they more psychological stress and symptoms they will have. And, they will have higher needs for dependence and may lose their desire to survive. On

the contrary, the more dignified they feel, the less emotional depression, hopelessness and anxiety they will feel. And, the stronger their desire for survival will be, the higher satisfaction they have in quality of life. Khatib and Armenian (2010) studied the relationship between dignity and health, finding that physiological and psychological health status is positively related to the degree of dignity. The more dignity an individual has, the more energy he or she will have, as well as less tiredness and fewer emotional problems.

Technology Acceptance Model Theory

The TAM was proposed by Davis (1989) to explore the individual's acceptance of specific technology behaviors. The purpose is to use this model to explore the impact of variables such as external influence factors on the users' personal beliefs, attitudes, and intentions, and then predict whether the intention will affect the individuals' use behavior of new technology. According to the TAM, when users believe that the use of information technology would improve work efficiency or improve performance and that the information technology is easier to use, their attitude of adopting this new information technology would be stronger, thereby further enhancing the users' attitude towards the new information technol-

ogy. The users' personal attitude toward information technology, positive or negative self-perception, further affects the user's adoption of information

technology. The theoretical framework of TAM is shown in Figure 1. The definitions of each construct are as follows:

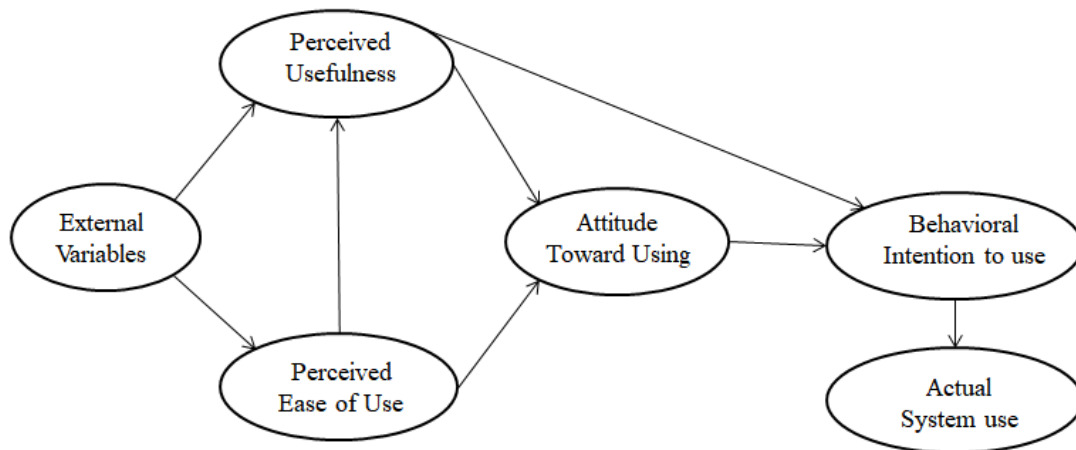


Figure 1. Technology Acceptance Model (TAM)

Source: Davis (1989)

In the TAM, External Variables are external factors that may affect the users' Perceived Usefulness and Perceived Ease of Use, such as personal variables, system characteristics, environmental characteristics, convenience, and user habits, which directly or indirectly affect the users' cognitive beliefs (Venkatesh & Davis, 1996).

The construct of Perceived Usefulness refers to the users' subjective expectation of using technology in the organizational environment to improve their work performance or learning performance. That is, when users use a technology system, they believe that the new information technology can

improve the current work or increase future work efficiency and performance. This means the higher usefulness of the technology will cause the users to naturally increase the willingness to use the system, and the attitude to adopt it will also increase. Venkatesh and Davis (2000) defined Perceived Usefulness as users' perception of assessing the ability of a particular information technology to increase job performance. Perceived Usefulness has a significant positive impact on attitude toward using mobile payment.

The construct of Perceived Ease of Use refers to the degree of difficulty that users experience in learning to use

a technology. In other words, it refers to the degree of subjective cognition of the user's use of the technology system. When users feel that the new technology is easier to use, they would have more confidence in the new technology, and hold a more positive Attitude toward the use of this technology system. Their Attitude toward the new technology would be more positive. Pavlou (2003) confirmed that Perceived Usefulness and Perceived Ease of Use have a synchronous positive impact on Attitude Toward Using.

The construct of Attitude Toward Using refers to the users' personal satisfaction as well as positive and negative evaluations would affect the users' attitude after subjective judgment of their perceived usefulness and perceived ease of use, thus influencing their behavior of adopting the new technology system.

The construct of Behavioral Intention to Use is the willingness to use. It refers to the tendency and extent of an individual's willingness to try or use time and effort to engage in a particular behavior. TAM suggests that the adoption of technology systems is determined by the Behavioral Intention to Use, and that Behavioral Intention to Use is simultaneously influenced by individuals' perceptions and attitudes

toward the use of technology systems. If attitudes and subjective norms are more positive and the perceived behavior control is stronger, the intention of the individual to complete the behavior will be stronger. The Actual System Use indicates that when the behavioral intention to use is more obvious, the user would increase the frequency and times of using the information system (Ajzen and Fishbein, 1980).

Teo (2009) proposed that TAM is most effective in its predictive and explanatory power with new technology products. Ou (2012) explored the willingness to purchase smart phones with TAM. Hsu (2017) explored the influencing factors of consumers' use of mobile payment behavior with TAM. Therefore, based on the theory of TAM, this study explored the relationship among Perceived Usefulness, Perceived Ease of Use, Attitude Toward Using, and Behavioral Intention to Use of technological living assistive devices by the residents of long-term care institutions.

Perceived Risk

Bauer (1960) extended the concept of perceived risk from psychology for the first time to explain consumer purchasing decisions and behaviors and to

introduce this concept into the field of marketing management. He proposed that consumer behavior can be regarded as a risk-taking process, and that consumer behavior has unpredictable risks, including the degree of risk perceived before and after consumption, and the uncertainty of the outcome of all the decisions made by consumers, that is, the concept of the initial perceived risk of prevalent consumer behavior.

Cox (1967) suggested that consumers follow goal-oriented consumption. When consumers realize that their purchase may not meet the expectations of the original purchase target, they would have a perceived risk. Cunningham (1967) further interpreted the definition of perceived risk as uncertainty, that is, the possibility and severity of the consumer's subjective perception of whether a certain risk will occur, as well as the degree of damage caused by the risk. Most research related to consumer risk is based on the concepts of Cox and Cunningham, who used perceived risk to detect consumer behavior. Chen, Yang, and Lin (2009) studied the influence of perceived risk on consumers' willingness to buy fruit vinegar. Hsu (2017) added perceived risk to TAM to explore the influencing factors of consumers' behavior of using mobile payment.

Roselius (1971) was the first to include time loss into the content of perceived risk, suggesting that consumers may have to bear four perceived risks including time loss risk, dangerous loss risk, self-loss risk, and money loss risk. Stone and Bauer (1960) introduced the concept of perceived risk into the field of marketing management for the first time, which enabled many scholars to begin exploring consumer behavior with perceived risk. Bauer (1960) argued that consumer behavior is risky because any decision taken by the consumer will produce uncertainty. Cox (1967) continued Bauer's research and clarified perceived risk as a function of two factors. First, prior to purchase, consumers are aware of the possibility of unfavorable results after purchase, which is the so-called uncertainty. The second factor is the consumers' personal subjective perceived loss when the purchase result is unfavorable, which is the so-called consequence.

Bauer proposed the idea that perceived risk affects consumers' decision-making, but did not suggest which elements are included in perceived risk. After continuous research and discussion, follow-up scholars have continuously added new risk factors for perceived risk, including performance risk, physical risk, time risk, convenience

risk, and privacy risk, to the initial two risks of social psychology risk and financial risk. According to Jacoby and Kaplan (1972), perceived risk includes the following five types of risks, which together explain 74% of the perceived risk variation.

- (1) Financial Risk: The value of the product does not meet the cost of the consumers, and the consumers may have a loss of money.
- (2) Functional of Performance Risk: After the product is purchased, it is found that the performance of the product does not meet the expected results.
- (3) Physical Risk: The product may cause harm to the consumers or others when being used.
- (4) Psychological Risk: The purchased product does not match the consumers' self-image and creates a psychological burden.
- (5) Social Risk: The use of the product results in the consumers not being accepted by their peers.

Herd Behavior

Herd behavior means that consumers agree with and meet group expectations and adopt thoughts or behaviors similar to those of other people in the group. For example, after receiving information on popular products that the group loves, individuals

would have ideas or actions to buy the same products or similar products, to generate identity.

Herd behavior was first proposed by Solomon Asch (1951), who stated that “when the group discusses a topic together, when the answer chosen by the majority is wrong, the individuals may still obey the opinions of the vast majority of people.” The field of finance explains the vast majority of potential financial phenomena with herd behavior. Most investors do not make decisions based on the information they have acquired, but are driven by the psychology of the masses instead (Keynes, 1936). Social psychology emphasizes that herd behavior is a manifestation of social influence, the impact of which is that individuals are influenced by other members of the group, so that the individuals' thinking will act with the group's pattern (Allen, 1965; Tseng, 2014).

Economists define herd behavior as that people make decisions continuously; when individuals observe that others' behavior or decisions are different from themselves, they tend to refer to others' decision-making information to follow the same behavioral tendency of others in the decision-making process and ignore their own information. herd behavior is de-

finer by the marketing field as: in order to obtain the identity of the group and meet the expectations of the group, the consumer adopts the same willingness, behavior or evaluation as the relevant people in the group to meet the expectations of the reference group (Wilkie, 1994). Lasca and Zinkhan (1999) proposed the model of herd behavior, and suggested that the main cause of herd behavior is the establishment of group norms, which in turn, trigger the individuals to conform to the norms.

Therefore, they divided consumer herd behavior into compliance, identification, and internalization, and they proposed a model suitable for explaining herd behavior in the field of commercial marketing to explore whether personal characteristics, group characteristics, brand characteristics and work/situation characteristics have any significant effect on herd behavior and the purchase of personal items.

The earliest research related to herd behavior appeared in the "automatic effect" experimental design by Muzafer Sherif in 1936. In the experiment, each subject was left alone and again with more than one other subject in a dark room, and was asked to observe a small light spot that did not move on a wall located 15 feet away from the subject. The subject was asked to indicate the movement of the spot. It

was a mere illusion if the subject felt that the spot was moving, but the response of single subject yielded to the answers of two or more subjects. The group situation allowed the subject to provide similar answers to other members, and each group had different group norms that would make the members unconsciously affected. In another design experiment in 1951, Asch asked the subjects to answer a series of cognitive-related questions and arranged insiders who knew the correct answers in the experiment to provide obviously wrong answers to some of the questions and advocate these answers to other subjects to cause a dilemma. The study found that individuals under the pressure of the group would change their own ideas and obey the opinions of the group. Even if the answer was obviously wrong, "the same by all" was the main cause of herd behavior, which was also called the majority effect. If someone had a different or even opposite opinion, herd behavior would be reduced. After the publication of this research, the follow-up and in-depth study of herd behavior began in the field of social psychology, which spread to sociology, finance, marketing, consumer, and other fields, and has been widely observed and applied in various disciplines.

Herd behavior was first proposed by Asch (1951). At that time, the definition of herd behavior was not clearly defined. It was pointed out that when the group discuss a topic together, although the individual can freely express opinions, when the individual's opinions are not shared with the majority, even if the majority's claims are incorrect, individuals may still obey the opinions of the majority. Different areas have similar concepts of herd behavior, but they also have different interpretations because of different priorities. The field of social psychology considers herd behavior as a manifestation of social influence. The source of influence is that individuals are influenced by other members of the group, therefore the individual's thoughts, emotions, and behavior are dependent on the group's mode of thinking and action (Allen, 1965). In the field of consumer behavior, herd behavior is considered to be "similar ideas or behavior to those of other members in the group adopted in order to obtain the identity of the group and meet the expectations of the group" (Wilkie, 1994).

Individuals interact with others in the whole, and it is inevitable that they would change their thoughts or behaviors by being influenced by others. The changes in herd behavior can generally be divided into two levels (Mowen &

Minor, 1998): public compliance, in which individuals act in accordance with the expectations of the group, but their inner beliefs have not changed because of behavior, and private acceptance, in which the inner heart and behavior of the individual are influenced by the group, thus changing their beliefs and behaviors to make them consistent with the group.

Lascu and Zinkhan (1999) collated the research on herd behavior over the years and summarized the factors that influence herd behavior and the forms of herd behavior. They believed that herd behavior causes a tendency to group norms, and that this tendency makes individuals tend to follow the norms of the group. This herd behavior model divides consumer behavior into three forms: compliance, identification and internalization. Compliance refers to the herd behavior that occurs when the consumers are being observed, but if the consumers leave the situation, the compliance behavior would disappear. Identification is the herd behavior generated when the consumer chooses to take the same behavior as the group because he or she agrees with the group. Compliance and identification are types of normative herd behavior, which is more similar to the "public compliance" level of herd behavior caused by the external norms of the group. This is

an extreme type of norm. Internalization is a process in which consumers changes their original beliefs to produce a socialized process and then changes the action to produce herd behavior. It is an informational herd behavior, which is similar to the “private acceptance” level of herd behavior, where internal and external thoughts and actions are consistent with the group. This is a moderate type of norm.

Application of Technological living assistive devices

At present, front-mounted footrests or Ankle-Foot Orthoses (AFOs) in the global market are made of high-temperature materials or carbon fiber, and the target users are patients suffering from stroke, traffic accidents, or falls. They require a footrest to support the lower limbs and prevent the feet from sagging, but most patients do not have enough insurance coverage to pay for these expensive devices.

Technological living assistive devices consisting of footrests (ankle foot orthosis or footrest) are front-mounted footrests that are formed by low-temperature color plastic bone plate material at a low temperature. They are a newly developed and innovative product protected by patents. This eye-catching product was researched, de-

veloped, and designed by a team at Presine Co. led by Dr. Larry Lai (Presine Co., 2019).

Low-temperature color plastic bone material is a non-toxic, reusable, and biodegradable material. When immersed in 60-70°C (140 ~ 160°F) water for about two minutes, the low-temperature color plastic bone plate material becomes soft with a clay-like consistency, and it can be easily used for deformation and shaping. After cooling at room temperature for 4-15 minutes, the footrest will return to its original strength and can be as strong as a hard board. Although the front-type footrest can be made by pre-cutting low-temperature plastic sheets, the finished product may be fragile and easily broken when used for walking support, because the front-mounted support plate around the sides of the ankle is only supported by the sheet folding with mutual adhesion. Presine’s integrated front footrest can be used for either the left or right foot, and the device is often used to treat the mild to moderate symptoms caused by cerebral vascular accidents (stroke), peroneal nerve palsy, or paraplegia.

Low-temperature color plastic bone plate materials can be formulated to achieve the desired hardening time and strength levels to meet the patient's

need for strong and lightweight ankle-foot orthoses.

Research Method

Research Model & Hypotheses

The research model in this paper used the TAM as revised by Hsu (2017). The construct of Perceived Risk was added to the original model to explore the impact of the Perceived Risk faced

by users of technological living assistive devices on their intended use. At the same time, this article also added the construct of herd behavior to explore the impact of peer acceptance on new products. This herd behavior construct was used to replace the social risk construct in the aforementioned constructs of perceived risk in order to explain the peer effect more completely. The theoretical model of this research is shown in Figure 2.

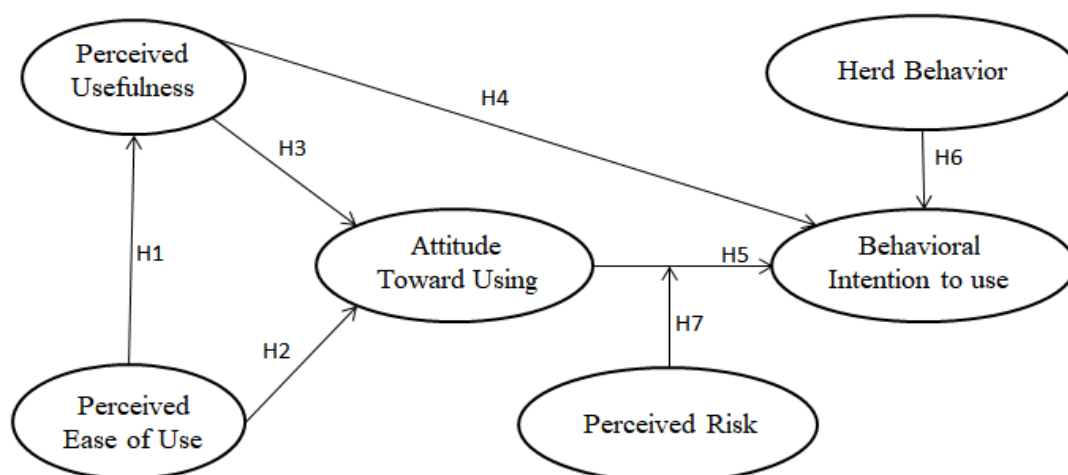


Figure 2. Research Theoretical Model
Source: Hsu (2017)

According to the research purpose, literature review, and research model, the following research hypotheses were proposed:

H1: The Perceived Ease of Use of users of technological living assistive devices has a positive impact on Perceived Usefulness.

H2: The Perceived Ease of use has a positive impact on user Attitude toward Using technological living assistive devices.

H3: The Perceived Usefulness has a positive impact on user Attitude toward Using technological living assistive devices.

H4: The Perceived Usefulness has a positive impact on the Behavioral Intention to use technological living assistive devices.

H5: The Attitude toward Use of technology life aid users has a positive impact on Behavioral Intention to Use.

H6: The Herd Behavior has a positive impact on the Behavioral Intention to Use of users of technological living assistive devices.

H7: The Perceived Risk has an interference effect on the Attitude toward Use and the Behavioral Intention to Use technological living assistive devices.

H8: The Attitude toward Using has a mediating effect on the Perceived Usefulness and Behavioral Intention to Use technological living assistive devices.

Data Collection

This study conducted a questionnaire survey on the residents of five care institutions in the Yunlin and Chiayi areas, in the central of Taiwan. The total number of valid questionnaire responses recovered was 196. The implementation of the question-

naire was from May 9 to June 15, 2019. Before the implementation of the questionnaire, the operators of technological living assistive devices demoed the production and its use of technological living assistive devices to the institutional residents and their caregivers. The questionnaire was implemented for the residents of the institutions who participated in the demonstration of the production and its use of the technological living assistive devices. If the residents were unable to complete the questionnaire on their own, the caregivers were requested to read the questionnaire items to the residents and then complete the questionnaire according to the resident's answers. The following is the data analysis on the basic information of the questionnaire respondents and the survey on the acceptance of technological living assistive devices. After the questionnaires were collected, confirmatory factor analysis was performed on each construct to verify its reliability and validity. Finally, a hypothesis check was made for each construct. Reliability, validity, and hypothesis verification were performed using SmartPLS software for the structural equation model analysis.

Definition of Operational Variables

Table 1. List of Definitions of the Construct Operational Variables

Construct Name	Operational Variable
Perceived Usefulness	I feel that using technological living assistive devices can improve the quality of my life and work.
	I feel that using technological living assistive devices can make my life and work more convenient.
	I feel that using technological living assistive devices can make my life and work more efficient.
Perceived Ease of Use	I feel that the use of technological living assistive devices for the innovative functions of everyday living assistive devices, as simple of the shaping of specially-shaped tableware,
	I think it is simple to use the technological living assistive devices to copy or repair the daily necessities, such as making a replicate of a solid footrest.
	I think it is simple to make toys using technological living assistive devices.
Attitude Toward Use	I like the appearance of the specially-shaped cutlery made by technological living assistive devices.
	I like the operating convenience of the specially-shaped tableware made by the technological living assistive devices.
	Technological living assistive devices have become an important partner in my life.
Behavioral Intention to Use	I will continue to use technological living assistive devices.
	I would recommend other people to use technological living assistive devices.
	If there is a new way to use technological living assistive devices in the future, I will be happy to continue to use them.
Herd Behavior	The application of popular technological living assistive device materials will make me want to buy the technology life aid materials.
	My requirements and tastes for the application of technological living assistive devices are similar to others.
	The purchase of technological living assistive device materials gave me a sense of identity with my colleagues.
Perceived Risk	
Financial Risk	The price is too high, and I don't know if the technological living assistive devices are worthy of purchase.
	To buy technological living assistive devices in medical equipment stores, the money I spent on gasoline fuel may be more than the price difference when purchasing elsewhere.
	There may be similar products that are cheaper than the technological living assistive devices.
Time Risk	In case I buy fake products, it may take a lot of time to change them.
	When purchasing technological living assistive devices, I may wait for a long time to get the product.
Functional Risk	I am worried that the function of the technological living assistive devices may not be as good as that said by the manufacturers.
	I am worried that if I don't understand the technological living assistive devices, their use will cause harm to the body.
	Even with great care and attention, it is still dangerous to use technological living assistive devices frequently.
Psychological Risk	Friends will make fun of me for buying products that they think are not good.
	I am worried that using this product will make others discover my physical condition.
	While I go to the fitness equipment store to buy technological living assistive devices, my friends might not go there to buy them.

The definition of the construct operational variables in this study is shown in Table 1. Among them, the constructs of Perceived Usefulness, Perceived Ease of Use, Attitude toward Use, and Behavioral Intention to Use were based on the questionnaire items of Ou (2012), who discussed the Behavioral Intention to use smart phone purchases with TAM. The questionnaire items of Tseng (2014), who studied the Herd Behavior of college students' purchase intention of smart phones, were used for the Herd Behavior construct. The Perceived Risk construct was based on the questionnaire items of Chen, Yang, and Lin (2009), who studied the impact of product involvement, perceived risk, and information dissemination on consumers' willingness to purchase fruit vinegar. However, the Perceived Risk construct of this study adopted a two-order construct design, in which the first-order constructs were Financial Risk, Time Risk, Functional Risk, and Psychological.

Data Collection and Analysis

The following is a basic information analysis of the recovered questionnaires and further analysis of the survey data of the application of technological living assistive devices.

Basic Information Analysis

The number of sampling residents in each of the five long-term care institutions in Yunlin and Chiayi is shown in Table 2. The data shows that between 30 and 47 questionnaires were recovered from each institution, and that a total of 196 were recovered. The questionnaire was implemented for the residents of the institutions who had participated in the demonstration of the production and use of technological living assistive devices. If the residents were unable to complete the questionnaire on their own, the caregivers were requested to read the questionnaire items to the residents, and then the caregivers answered the questionnaire accordingly. As can be seen from Table 4, females accounted for 70.9% of the resident respondents of the long-term care institutions.

Among the 196 questionnaires recovered, the age distribution of most residents was 70-80 years old and 80 years old or above, accounting for 31.6% and 35.2%, respectively, for a total of 66.8%, as shown in Table 3. Their ages were quite high. Table 4.6 shows that 79.6% of the questionnaires were filled by the long-term care staffs on behalf of the residents.

Table 2. Distribution of Samples Filled out by the Residents in Long-term Care Institutions

Institution no.	Number of samples	Percentage
1	39	39
2	35	35
3	45	45
4	47	47
5	30	30
Total	196	196

Table 3. Age Distribution of the Responding Residents in Long-term Care Institutions

Age	Number of samples	Percentage
Below 40 years old	14	7.1
40-50 years old	14	7.1
50-60 years old	23	11.7
60-70 years old	14	7.1
70-80 years old	62	31.6
80 years (including) or above	69	35.2
Total	196	100.0

Table 4. Gender Distribution of the Resident Respondents in Long-term Care Institutions

Gender	Number of samples	Percentage
Male	57	29.1
Female	139	70.9
Quantity	196	100.0

Table 5. Distribution of Education Level of the Resident Respondents in Long-term Care Institutions

Educational Level	Number of people	Percentage
Elementary school or below	148	75.5
Senior high school or vocational school	31	15.8
Junior college or university	15	7.7
Graduate school and above	2	1.0
Total	196	100.0

Table 6. Distribution of Religious Beliefs of the Responding Residents in Long-term Care Institutions

Religious Belief	Number of samples	Percentage
Buddhism	45	23.0
Taoism	138	70.4
Christianity	1	0.5
Catholicism	3	1.5
Others	1	0.5
No Belief	8	4.1
Total	196	100.0

Table 7. Distribution of Financial Sources of the Responding Residents in Long-term Care Institutions

Financial source	Number of samples	Percentage
Themselves	59	30.1
Their children	132	67.3
Social welfare institutions	4	2.0
Government	1	0.5
Total	196	100.0

Table 8. Distribution of Questionnaires filled by the Caregivers of Long-term Care Institutions

Whether filled out by caregivers	Number of people	Percentage
Yes	156	79.6
No	40	20.4
Total	196	100.0

As shown in Table 5, since most of the resident respondents of the long-term care institutions were old (see Table 3), it could be reasonably inferred that their education level was lower too. In Table 6, the religious beliefs of the resident respondents of the long-term care institutions were highest in the Taoist category, which was the most common religious belief of the locals, accounting for 70.4%. In Table 7, financial support from younger generation (their children) was accounted for 67.3%, while 30.1% of the residents paid expenses by themselves. As shown in Table 8, questionnaires filled by the caregivers in the long-term care institutions accounted for the highest proportion (79.6%), due to the residents' higher age and lower education level.

Confirmatory Factor Analysis

This analysis used the theoretical model shown in Figure 3.1 as the analytical framework. In this study, the convergent validity and the discrimi-

nant validity were tested. The convergent validity statistics and Cronbach's Alpha statistic shown in Table 4.8 were also used to test the reliability of each construct.

Based on the theory model presented in Figure 1, the partial least squares method (PLS) was used for confirmatory factor analysis of the selection of each construct (Lin, Tu, Wang, & Wang, 2016). The summary of each construct statistic is summarized in Table 4.8. The convergent validity was determined using an average variance extracted (AVE) ≥ 0.7 and a composite reliability (CR) ≥ 0.7 . As can be seen from Table 9, the convergent validity of each construct was within the acceptable range. In addition, the discriminant validity or divergent validity was tested according to Fornell-Larcker's rule (Fornell & Larcker, 1981), which states that the AVE square root value should be greater than the correlation coefficient between constructs. In Table 10, the diagonal is the

AVE square root value of each construct, and the non-diagonal is the correlation coefficient between constructs. As determined from Table 10, totally, Perceived Usefulness, Perceived Ease of Use, Attitude toward Use, Herd Behavior, and Behavioral Intention to Use all had good discriminant validity. The Perceived Risk of the second-order construct failed to meet strict criteria for discriminant validity; however, considering its significant influence on the behavioral intention to use, this study still accepted the determination of discriminant validity in a less strict way.

mean-center indicator values before multiplication to generate the moderating effect term and perform verification of the moderating effect which the second-order construct of Perceived Risk moderates between the constructs of Attitude toward Use and Behavioral Intention to Use. The moderating effect was -0.201 and its t value was 3.139, which showed that the second-order construct of perceived risk had a significant negative moderating effect on the constructs of Attitude toward Use and Behavioral Intention to Use, indicating that Perceived Risk reduced the impact of Attitude toward Use on the Behavioral Intention to Use.

This study further used the

Table 9. Indicator Values for the Convergent Validity Test

	AVE	Composite Reliability	R Square	Cronbach's Alpha
Perceived Usefulness	0.792	0.920	0.501	0.868
Perceived Ease of Use	0.779	0.914		0.859
Behavioral Intention to Use	0.821	0.932	0.741	0.891
Attitude toward Use	0.754	0.902	0.557	0.837
Herd Behavior	0.754	0.901		0.844
Perceived Risk	0.447	0.889		0.860
Financial Risk	0.691	0.870	0.594	0.781
Time Risk	0.891	0.942	0.676	0.878
Functional Risk	0.688	0.868	0.585	0.772
Psychological Risk	0.811	0.928	0.502	0.884

Table 10. Indicator Values for Discriminant Validity Test

	1	2	3	4	5	6	7	8	9	10
1. Attitude toward Use	0.868									
2. Functional Risk	0.010	0.829								
3. Herd Behavior	0.339	0.106	0.868							
4. Time Risk	0.079	0.403	0.096	0.944						
5. Perceived Ease of Use	0.732	0.026	0.357	0.018	0.883					
6. Perceived Usefulness	0.620	-0.176	0.302	0.102	0.708	0.883				
7. Perceived Risk	0.020	0.765	0.103	0.822	0.004	-0.059	0.669			
8. Psychological Risk	-0.260	0.560	-0.117	0.427	-0.275	-0.331	0.709	0.901		
9. Behavioral Intention to Use	0.764	-0.089	0.434	-0.042	0.715	0.690	-0.137	-0.481	0.906	
10. Financial Risk	0.179	0.386	0.161	0.667	0.183	0.168	0.771	0.283	0.126	0.831

Structural Equation Model

After the preliminary confirmatory factor analysis of the sample set, PLS structural analysis was performed. According to the model in Figure 2, it was found that the t-statistic of the path co-

efficient between all latent variables was greater than the significant threshold of 1.96 ($\alpha=0.05$). An analysis graph of the total effect between constructs is shown in Table 11 and the behavioral pattern is shown in Figure 3.

Table 11. Total Effect between Constructs in the Structural Equation Model

	Attitude toward Use	Functional Risk	Time Risk	Perceived Usefulness	Psychological Risk	Behavioral Intention to Use	Financial Risk
Attitude toward Use						0.551	
Herd Behavior						0.168	
Perceived Ease of Use	0.732			0.708		0.574	
Perceived Usefulness	0.205					0.354	
Perceived Risk		0.765	0.822		0.709	-0.171	0.771
Attitude toward Use * Perceived Risk						-0.201	

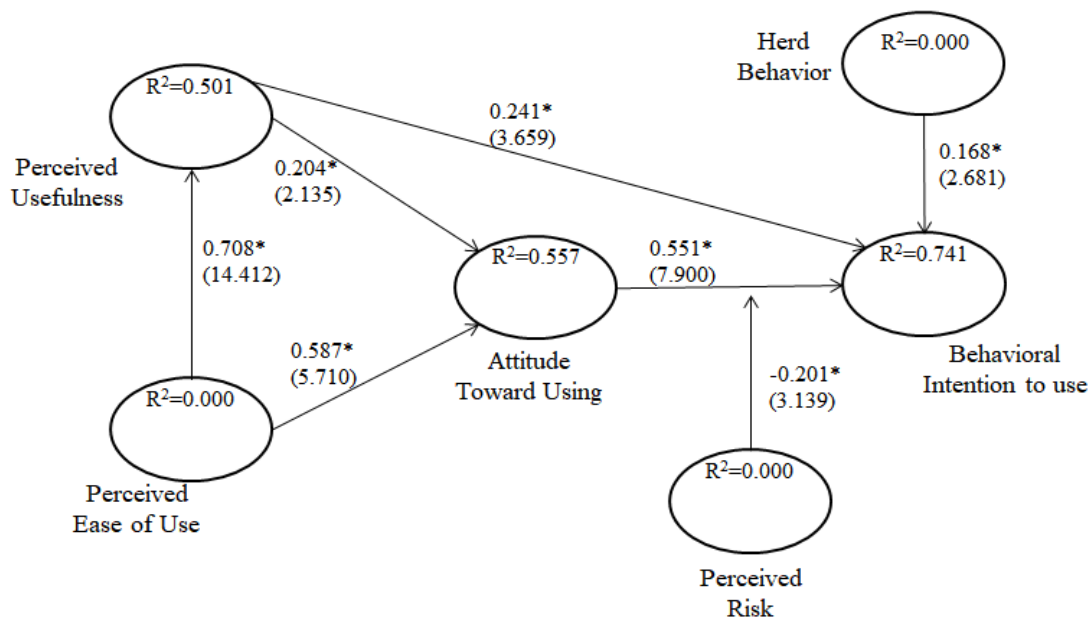


Figure 3. Analysis Chart for the Revised Technology Acceptance Behavior Model

1. The t value is shown in parentheses; if the value is >1.96, the path coefficient is significant, indicated by *.
2. Bootstrapping: 100 cases, 200 samples

The data shown in Table 11 and Figure 3 were used to summarize the hypothetical verification statistics of the revised TAM in Table 12. As shown in Table 12, all path hypotheses were supported. That is, the Perceived Ease of Use for users of technological living assistive devices had a positive impact on Perceived Usefulness (H1); Perceived Ease of Use had a positive impact on the users' Attitude toward Using technological living assistive devices (H2); Perceived Usefulness had a positive impact on the users' Attitude toward Using technological living assistive devices (H3); Perceived Usefulness had a positive impact on the Behavioral Intention to Use techno-

logical living assistive devices (H4); the Attitude toward Use of the technological living assistive device users had a positive impact on Behavioral Intention to Use (H5); Herd Behavior had a positive impact on the Behavioral Intention to Use technological living assistive devices (H6); Perceived Risk had an moderating effect on the Attitude toward Use and the Behavioral Intention to Use technological living assistive devices (H7); Attitude toward Use had a mediating effect on the Perceived Usefulness and Behavioral Intention to Use technological living assistive devices (H8); and Attitude toward Use had a mediating effect on the Perceived Ease of Use and Behavioral

Intention to Use technological living assistive devices (H9).

Table 12. Estimation of Structural Mode Parameters

Path Hypothesis	Path Coefficient	t-Statistics	Result	Remarks
H1	0.708	14.412	Supported	
H2	0.587	5.710	Supported	
H3	0.204	2.135	Supported	
H4	0.241	3.659	Supported	
H5	0.551	7.900	Supported	
H6	0.168	2.681	Supported	
H7	-0.201	3.139	Supported	
H8			Supported	H3, H4, and H5 got support at the same time

Conclusion and Suggestions

This study made a number of conclusions and suggestions based on the results of the data analysis.

Conclusion

Based on the above data collation and analysis, it was found that the nine research hypotheses of this study were supported; that is, the Perceived Ease of Use for users of technological living assistive devices had a positive impact on Perceived Usefulness (H1); Perceived Ease of Use had a positive impact on the users' Attitude toward Using techno-

logical living assistive devices (H2); Perceived Usefulness had a positive impact on the users' Attitude toward Using technological living assistive devices (H3); Perceived Usefulness had a positive impact on the Behavioral Intention to Use technological living assistive devices (H4); the Attitude toward Use of the technological living assistive devices users had a positive impact on Behavioral Intention to Use (H5); Herd Behavior had a positive impact on the Behavioral Intention to Use technological living assistive devices (H6); Perceived Risk had an moderating effect on the Attitude toward Use and the Behavioral Intention to Use techno-

logical living assistive devices (H7); Attitude toward Use had a mediating effect between the Perceived Usefulness and Behavioral Intention to Use technological living assistive devices (H8); and Attitude toward Use had a mediating effect between the Perceived Ease of Use and Behavioral Intention to Use technological living assistive devices (H9).

Suggestions

The analysis results showed that the residents of the long-term care institutions were able to use the TAM to explain their use of technological living assistive devices to improve their quality of autonomous life, and that their acceptance was affected by their peers. Therefore, it is recommended that technological living assistive device suppliers use group demonstration to promote the product in order to get a better promotion effect. At the same time, promotion should focus on reducing the users' perceived risk to enhance their intention to use the product.

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