

Origins and Pawns Scales: A Pilot Study Assessing Perception of Control in Adults with Hearing Problems

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Abstract

Purpose: The main purpose of this pilot study was to determine if a content analysis of locus of control (Origins and Pawns Scales) can be used reliably with a population of older adults with hearing impairment. A second purpose of this pilot study was to determine the relationship between locus of control using this content analysis and audiologic variables such as hearing aid adoption and self-perceived hearing handicap. Finally, the third purpose of this pilot study was to determine if there were any differences between older men's and women's perception of locus of control as measured by this content analysis.

Methods: A total of 30 adults with hearing impairment between the ages of 52 and 71 years participated in this study. Information regarding hearing ability, participant demographics, hearing aid adoption, and self-perceived hearing handicap were obtained. To obtain data for the content analysis, participants were required to respond to a single prompting question, which was transcribed verbatim and coded according to the refined Origins and Pawns scoring guidelines.

Results: The content analysis of locus of control (Origins and Pawns Scales) had high internal consistency and intra-class correlations. Additionally, participants who adopted hearing aids had significantly higher origins scores than those who did not adopt. Conversely, participants who did not adopt hearing aids had higher pawns scores, however this finding was not statistically significant. There was no significant relationship between Origins and Pawns Scales and self-perceived hearing handicap nor were any gender differences found.

Conclusions: Results of this study indicate that the Origins and Pawns Scales can be used reliably to assess the perception of locus of control for older adults with hearing impairment who present for clinical services. Both the Origins and Pawns Scales differentiated older adults who adopted hearing aids from those who did not. The Origins and Pawns Scales may prove to assist clinicians in addressing hearing aid adoption rates through targeting perceptions of control.

Keywords: Hearing impaired; Content analysis; Locus of control; Origins and pawns scales

Abbreviations: PTA: Pure Tone Average; IPC: Internality, Powerful Others and Chance scales; CAS: Cognitive Anxiety Scale; HHIE: Hearing Handicap Inventory for the Elderly; HHIA: Hearing Handicap Inventory for Adults

Introduction

Hearing impairment is a common chronic condition affecting many adults [1]. The prevalence of hearing impairment is estimated to be between 16-17% for people living in Western countries [2]. However as the global population ages, the prevalence of hearing impairment increases [3,4]. It is widely recognized that hearing impairment can negatively impact those individuals experiencing it. Ramifications of hearing impairment may be felt across the home, workplace and in the community [5]. Everyday communication may become strenuous or even impossible as hearing impairment has a detrimental effect on the ability to converse with people. Tasks that individuals with normal hearing take for granted, such as casual conversations, using the telephone and talking with sales assistants are often more effortful and frustrating for a person with hearing impairment. Numerous studies have found that individuals with hearing impairment are more likely to become depressed, have life dissatisfaction and have a reduced quality of life [6]. Negative implications of hearing impairment are also felt by significant others. Even mild hearing impairment impacts on the quality and quantity of communication, negatively affecting relationships [7]. Communication problems with significant others

manifest as constant repetitions, continual misunderstandings and decreased intimate talking and joking [8].

In light of these findings, there are a number of rehabilitative options known to enhance daily functioning of people with hearing impairment [6]. Audiologic rehabilitation focuses on restoring or preserving an individual's quality of life by reducing, eliminating or bypassing the limitations and deficits associated with hearing impairment. Goals of audiologic rehabilitation are based on collaboration of sensory management, instruction, perceptual training and counseling. Sensory management targets and enhances auditory function through the use of hearing aids, cochlear implants and assistive listening devices. Sensory management is generally supplemented with instruction. This ensures that people are effective and knowledgeable users of their hearing devices and effective and knowledgeable controllers of their communication context. Furthermore, deficits of auditory perception maybe addressed through perceptual training to improve

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speech perception and communication. The final mechanism of audiologic rehabilitation is counseling. Counseling addresses deficits of participation and quality of life, with the aim to enhance participation and to manage both emotional and practical residual limitations. The success of audiologic rehabilitation is influenced by numerous factors related to the person with hearing impairment. These factors include: motivation, expectations, readiness, personality, sense of entitlement, perceived locus of control, lifestyle, adaptability, cognition, tactile perception, visual perception, auditory ecology, resources and support from significant others. The level of effectiveness for each mechanism of audiologic rehabilitation varies [9].

There is extensive evidence available to support the use of instruction in aural rehabilitation. Several studies have found that instruction in hearing aid and accessory administration leads to increased usage and, therefore, improved function and activity when summated across time [9]. In comparison, the overall effectiveness of perceptual training is unclear [10]. There is considerable evidence that perceptual training boosts performance on formal speech perception assessments. However it is not known whether these improvements are generalizable to communication skills, as transference of perceptual training skills to participation and quality of life are generally assumed rather than measured [9]. There is significant evidence supporting counseling as part of an aural rehabilitation plan for adults. A systematic review conducted by Hawkins [11] found that counseling provides a short-term reduction in self-perceived hearing handicap and better use of hearing aids and communication strategies. However, the effectiveness of counseling is highly influenced by characteristics of the individual with hearing loss, rapport with professionals and content of the syllabus [9].

Of the four rehabilitative options available, sensory management in the form of hearing aids is the most common option utilized by adults [12]. There is an extensive amount of evidence to support the effectiveness of sensory management to enhance auditory function [13]. Studies have shown that hearing aids and cochlear implants have given the typical adult an improved ability to comprehend the speech of others and to communicate effectively [9]. The overall advantage of activity and function is clear and there is also substantiated evidence to support transference to participation and quality of life [14]. However, it is important to note that hearing aids and cochlear implants do not reinstate normal hearing. Deficits of temporal and spectral resolution exist and the severity differs for each individual. These deficits are particularly noticeable when listening to speech in background noise. If the hearing aid user's expectations exceed reality and they experience unresolved deficits of speech perception, this will limit carryover to satisfaction, perceived benefit, participation and quality of life [9]. Utilization of hearing aids has been associated with an enhanced hearing related quality of life and reduced consequences of social, emotional and psychological effects of sensorineural hearing loss [15]. A veteran study also found that adults who used hearing aids had sustained effects for over one year in emotional functioning, communication functioning, social functioning and reduced levels of depression [14].

Despite the benefits of utilizing hearing aids, the uptake of the device is low. The global reportage of hearing aid use is estimated at approximately 10%. In developing countries less than 1% of hearing impaired individuals use hearing aids, whereas in developed countries the proportion varies from 10% to 40% [1]. This indicates a large proportion of adults with hearing impairments are not employing hearing aids, despite the advantages of doing so. The reason for the

somewhat modest number of adults who own hearing aids is not fully understood. However, what is known is that adults' experience of hearing impairment varies. Some individuals readily accept that they experience hearing problems, seek services and respond positively to rehabilitation. Others have difficulty adjusting to their problems [6].

Accordingly, researchers and clinicians alike are continuously seeking answers as to why hearing uptake is so low. Furthermore, Fisher et al. [16] found that (1) self perceptions of hearing loss; (2) perceived degree of handicap related to hearing; (3) high pure tone average (PTA) frequencies and (4) high education attainment are strongly associated with hearing aid acquisition. In addition to these findings, Fisher et al. [16] found four recurring themes for individuals not acquiring hearing aids: (1) perceived benefit; (2) cost; (3) inconvenience and (4) poor hearing aid experiences of others.

Laplante-Lévesque et al. [17] investigated possible predictors to hearing impairment intervention uptake and outcome. Participants in this study were guided through the process of selecting from: hearing aid uptake, participation in a communication programme, and no intervention. They reported that application for subsidized hearing services, hearing impairment, and disability perceived by self and others were positive predictors of hearing aid intervention decision and/or uptake. Perceived communication program effectiveness and suitability were positive predictors for the selection and/or uptake of communication programs. The negative predictors of selecting and uptaking no intervention were hearing impairment, application for subsidized hearing services, socioeconomic status, and contemplation stage of change.

One unique contribution this study made to the literature is that these researchers also examined factors that were related to intervention outcomes. The positive predictors of intervention outcomes were related to self-perceived hearing difficulties, the negative predictors of intervention outcomes were related to stages of change and locus of control. Locus of control was assessed via a questionnaire [18] that target three scales: Internality (locus of control is internal), Powerful others (locus of control is external with other people), and Chance (locus of control is left to fate). The results of this study indicated that the participants who reported their locus of control to be left to fate (i.e., the chance scale) exhibited lower outcomes for both hearing aid and communication programs interventions.

The concept of locus of control refers to the extent to which individuals believe they have control over their rewards [19]. While there are many ways to define locus of control, most researchers agree that an individual may present with an internal or external locus of control. Internal locus of control refers to the perception that people control their own rewards by modifying their behavior. These individuals consider themselves as having control over their lives and destinies [19]. Individuals with an internal locus of control would generally agree with the following statement: "When I make plans, I am almost certain to make them work" [17]. External locus of control refers to the perception that rewards are controlled by external factors such as fate, luck or society, all of which are perceived as out of the person's control [20]. People with an external locus of control generally feel as if they have a reduced sense of control and would agree with the following statement: "When I get what I want it is usually because I am lucky" [17]. It is important to note that, locus of control is related to personality and as a result is not stable over an individual's lifespan [21]. Life experiences and circumstances can affect an individual's impression about their control over events. As a result, therapeutic

intervention goals can focus on learning new and more practical coping strategies [22,23].

Not only does locus of control impact on the intervention outcomes, it has also been found to influence the uptake of hearing aids [21,24]. Cox et al. [21] compared personality profiles of hearing aid seeking adults to the general elderly population. Locus of control was measured [25] by administering the Levenson [18] generalized Internality, Powerful Others and Chance (I, P and C) scales [18]. They found that hearing aid seekers had significantly higher scores for internal locus of control compared to the general elderly population. In comparison, they found no differences across the groups for Powerful Others and Chance scales nor reported any gender differences. Garstecki and Erler [24] also found differences in locus of control for hearing-aid seeking behavior in the elderly, however this was only true for older women, not men. In this study, locus of control was measured directly through Rotter's Internal-External scale [19] and indirectly through self-perception of hearing handicap, depression and ego strength. Garstecki and Erler [24] found that women who elected to pursue amplification after a recommendation demonstrated a greater orientation toward an internal locus of control than all other study participants, which may suggest that they are more likely to assume responsibility for the management of their hearing problems. They also found that women who did not pursue amplification after a recommendation exhibited the weakest internal locus of control compared to other participants, suggesting they experienced a reduced sense of control over their hearing.

One limitation in many of these studies is that researchers have used self-reported questionnaires to measure perception of control. Self-report measures inherently have limitations. Kelly-Campbell et al. [26] reported the following limitations for self-report questionnaires: (1) a self-report questionnaire relies on individuals' conscious awareness of their perceptions; (2) self-report questionnaires are valid only for the population on which they were created; (3) self-report questionnaires only assess the constructs included on the questionnaire; (4) self-report measures are only specific to the context under investigation; (5) self-report questionnaires assume a relatively high level of health literacy.

This present study differs from previous research as locus of control is measured through the use of content analysis. Content analysis is a research tool used to ascertain the presence of concepts of interest within texts [27]. It most commonly encompasses the systematic coding of information from interviews [28]. The first phase of content analysis is transcribing the interview verbatim. The researcher then reads the transcripts several times, identifying the emerging themes and codes them. The coding categories utilized are objectively described to ensure consistency and reliability across different texts and an assortment of coders [26,28].

Content analysis does not require the respondent to be consciously aware of his or her perceptions; therefore it provides a more sensitive source for addressing psychological or emotional states [29]. In addition, content analysis techniques can be applied to several different populations and across multiple constructs. For example, the same methodology can be used with younger and older adults, whereas many self-report questionnaires contain items that are specific to one age group. Because content analysis is conducted on interviews, the data derived from them are specific to the interview topic. For example, this methodology can be used to assess locus of control that is specific to hearing impairment, rather than a generalized construct of locus of control. Finally, the participants are not required to have any health

literacy, since they are being asked to simply talk about their lives rather than fill in a questionnaire.

Several studies within the field of communication disorders have utilized content analysis. Kelly et al. [30] studied the construct of cognitive anxiety through the use of a content analysis scale called Cognitive Anxiety Scale (CAS). The results of that study suggest state anxiety levels as measured via content analysis differed for groups of older adults who occupied different places along the consultation process. Specifically, scores were lowest for experienced hearing aid wearers, higher in non-consulting individuals and highest in first time consulting individuals. Another study in communication disorders conducted by DiLillo et al. [31] utilized content analysis to study the cognitive complexity of adults who stutter. In their study, participants were required to answer a number of questions through a one-on-one interview with the researcher. Results indicated that, the average person who stutters demonstrates a less complex cognitive system related to their fluent speaker role than their stutterer role. The outcomes of these studies indicate that content analysis can and has been used successfully within the discipline of communication disorders.

One method of measuring locus of control with content analysis is through the use of the Origins and Pawns Scales [32]. The Origins and Pawns Scales were devised to monitor the success of intervention programs and assess people's experiences of stressful life situations [33]. While the concept of Origins and Pawns Scales and self-perception of locus of control are similar, they do in fact, measure different constructs [29]. DeCharms [34] originally developed the notion of origins and pawns to explain the causation or motivation of human behaviours. He recognized that individuals tended to act as the originator of their behaviours or act as if the social environment influences their behaviour. The person who is seen as an origin of his/her behaviour is assumed to be personally responsible for it. In comparison, the person who feels their behaviour is influenced by forces beyond their control is seen as a pawn [32]. The Origins and Pawns Scale is two-dimensional, as origins and pawns do not represent opposite ends of a single continuum. This is because an individual may score high on both origins and pawns measures, or score high on one but not the other. DeCharms [34] suggests people have a preference for either origins or pawns, but the preference fluctuates accordingly to the situation.

Westbrook and Viney [32] examined the experience of control in a group of participants who were experiencing nine different life situations. These participants were asked to speak freely for five minutes about the most interesting aspects of their life. Speech samples were transcribed and clausal for coding. A clause is a unit of language that contains both a noun and a verb, or a complete thought. It is the unit of analysis for most content analyses. The clauses were coded if they contained evidence of the perception of either origins or pawns. Results indicated statistically significant differences in origins scores and pawns scores. In addition, Westbrook and Viney [32] were able to establish high reliability and construct validity for the Origins and Pawns Scales.

The Origins and Pawns Scales have not received much attention in the field of communication disorders. Lee et al. [29] used the Origins and Pawns Scales during formal stuttering treatment to determine changes in speaker's locus of causality. For participants in that study, origins scores significantly rose and pawns scores reduced from pretreatment to post treatment. Overall, these authors reported that the Origins and Pawns Scales provided a reliable and valid indicator of changes in their participants' locus of causality during stuttering treatment. To date, no previous study in audiology has employed the

use of the Origin and Pawns Scales. The purpose of this present study was to investigate the viability of using this scale as a possible factor in hearing aid uptake for older adults with hearing impairment.

Specifically, the study questions were: (1) Can the Origins and Pawns Scales be used reliably with a population of older adults with hearing impairment? (2) Is there a relationship between hearing aid uptake and either the Origins or the Pawns Scales among older adults who sought services for hearing impairment? (3) Is there a relationship between self-perceived hearing handicap and either the Origins or the Pawns Scales among older adults who sought services for hearing impairment? (4) Are there any differences between older men's and women's Origins or Pawns Scales?

Methods

Participants

This project received approval from the Human Ethics Committee at the University of Canterbury. Participants for this study were recruited from an audiology-based private practice in Phoenix, Arizona, USA. Inclusion/exclusion criteria for this study were: (1) over the age of 18 years, (2) reports an adult-onset hearing impairment, (3) reports having no prior hearing evaluation, (4) reports no sudden hearing impairment, (5) does not exhibit a profound hearing impairment (PTA > 90 dB), and (6) reports no greater than moderate tinnitus. Data was collected over a 7-month period. Consecutive clients meeting the study inclusion/exclusion criteria were invited to participate in the study. A total of 42 clients met the study criteria, 30 of whom consented to participate in the study. The age of the participants ranged from 52 to 71 years, with a mean of 63.73 years (SD=4.54). There were a total of 19 men and 11 women in the study. The better ear puretone average (air conduction thresholds at .5, 1, and 2 kHz) ranged from 30 dB HL to 55 dB HL, with a mean of 40.17 dB HL (SD=7.33).

Procedures

After gaining consent to participate in the study, participants were interviewed alone in a quiet consulting room. The interviews were recorded on an Olympus DS-5000 digital voice recorder, using the internal microphone. The data were stored on a micro-SD card, which was later transferred to a desktop computer for transcription and analysis. One clinician conducted the interviews with all study participants. To elicit the interview data, participants were asked to respond to the following prompting question derived from Viney and Westbrook [35].

"Thank you for agreeing to talk with me about your experience. I want to make sure I fully understand your experience, so I'm going to record this interview. I'd like you to talk to me for about 5 minutes about your life at the moment – the good things and the bad things – what is it like for you, as a person with hearing problems? Once you start talking, I'll be here listening to you; but I'd rather not reply to any questions you may have until 5 minutes are over. Do you have any questions now, before we begin?"

Participants then discussed their experiences relating to hearing impairment. The clinician did not interrupt the participants nor did she ask them any follow-up or prompting questions. When the participants indicated they did not have anything further to say, the interview was terminated. The length of interviews varied considerably. The minimum number of words was 106, the maximum number was 648, with a mean of 274.92 words (SD=123.87).

Following the interview, the clinician obtained an audiologic

evaluation for each participant. The audiological evaluations were carried out in a double walled sound-attenuating booth. The clinician performed otoscopic examinations and immittance testing for each ear. Puretone air conduction thresholds were obtained bilaterally with ER-3A insert earphones at octave intervals between 250 and 8000 Hz. Puretone air conduction thresholds were also obtained at 750 and 1500 Hz whenever the adjacent octave thresholds differed by 20 dB HL or more. Puretone bone conduction thresholds were obtained at octave intervals between 250 and 4000 Hz. The degree of the hearing impairment was determined by calculating the pure tone average (PTA): average air conduction thresholds at 500, 1000 and 2000 Hz. All participants exhibited a sensorineural hearing impairment, with no underlying otologic conditions.

Lastly, the participants completed a self-report questionnaire regarding the perception of hearing handicap and an intake interview with the clinician. Through the intake interview, the clinician determined that none of the participants had a history of exposure to noise or ototoxic substances. No family history of hearing impairment was reported by any study participant. In all cases, the clinician deemed the major underlying contributor to hearing impairment was presbycusis. In addition, all study participants were considered to be candidates for amplification, based on information from the audiological evaluation, and the intake interview.

Materials

Hearing handicap was assessed via the Hearing Handicap Inventory for the Elderly/Adults. The Hearing Handicap Inventory for the Elderly (HHIE) is a self-assessment tool created by Ventry and Weinstein [36] to assess the impact of hearing impairment on the emotional and social adjustment of elderly individuals. The HHIE was later modified by Newman et al. [37] for use with younger adults (<65 years) with hearing impairments. The Hearing Handicap Inventory for Adults (HHIA) serves to quantify the perceived handicap and evaluate the benefit of hearing aids [6]. The HHIA is almost identical to the HHIE but it has three refined questions, which focus on the occupational effects of hearing loss. The inventories are composed of two subscales: a 13 item subscale exploring the emotional ramifications of hearing loss and a 12 item subscale exploring both the social and situational consequences of hearing loss. The scoring systems employed is simple: four points are assigned to a "yes" response, two points for "sometimes" and zero points for "no". The highest raw score that can be obtained is 100 and the lowest is zero [36]. Both the HHIE and HHIA were utilized in this study and total raw scores were used in the analyses.

Interviews were transcribed verbatim and stored in a word processing document for analysis of content. One exception to the verbatim transcription is described below. A researcher defined clauses per the guidelines developed by Viney and Westbrook [35] and refined by DiLollo and Neimeyer [31] for communication disorders. Once the clauses were defined, each clause was coded for evidence of locus of control (i.e., Origins and Pawns). The guidelines for coding were based on those provided by Westbrook and Viney [32]. However, prior to data collection, a set of transcripts from pilot data were used to refine the coding guidelines between the two researchers who would later code the data. The refined guidelines are shown in Figure 1, along with exemplar clauses.

The number of clauses that contained evidence of either origins or pawns was inputted into a formula provided by Westbrook and Viney [32] to derive an Origins Scale score and a Pawns Scale score, respectively for each participant. This formula accounts for both the

- Guidelines for scoring clauses**
- 1) Score each clause only once.
 - 2) When a clause emphasizes another clause, score it separately.
- A person is considered to perceived her/himself as an **ORIGIN** if:
- 1) Self-expressed **intention** (says that he/she intended, planned, decided; mentions plans, purposes, goals). "I started wearing hearing aids" "I'm coming back here in a couple of months"
 - 2) Self-expressed **exertion or trying** (describes his/her efforts to achieve some stated or implied result). "I just try to figure out what they said" "I try to lip-read"
 - 3) Self-expressed **ability** (comments on skill, competence). "I can hear" "I can understand"
 - 4) Self-describes **overcoming or influencing others** or the **environment**. "I go outside where I won't be impeded" "I look for a corner so I can be with one individual"
 - 5) Self-perceived as **cause or origin**. "I took control of my hearing loss"
- A person is considered to perceive her/himself as a **PAWN** if:
- 1) Self-indicates he/she **did not intend an outcome**. "It makes me appear antisocial" "I feel left out of the conversation"
 - 2) Self indicates he/she **did not try** to bring about occurrence. "I'm lucky I can hear"
 - 3) Self-expressed **lack of ability** – describes self as powerless, ineffective, incapable, failure. "I can't hear" "I can't do anything about it"
 - 4) Self-describes as being **controlled, forced, prevented by the mercy** of external forces (Other people, environmental forces, chance). "There is nothing I can do about it" "I can't go around asking people to look at me"
 - 5) Self-perceived as **pawn** – events are described as unpredictable or uncontrollable. "The hearing loss struck me" "Everything is falling apart"
 - 6) Passive acceptance – "It's a handicap I have to live with" "I have learnt to put up with it"
 - 7) Can't hear/Can't understand – "I can't hear" "I can't understand"
 - 8) Bad environment – "All the background noise really interferes with my understanding"
 - 9) Attributed to the hearing aids – "I do have a bit of help with the hearing aids"
 - 10) External cause of hearing loss – "I've been working around machinery my whole life" "I do know that as you get older your hearing goes"

Figure 1: Refined guidelines for identifying and scoring clauses and example clauses.

Variable	Adopted hearing aids (N=21)	Did not adopt hearing aids (N=9)	Effect Size
Age (in years)	64.24 (5.078)	62.56 (2.833)	d = .4085, r = .200
BPTA ¹ *	42.19 (5.899)	35.48 (8.514)	d = .9166, r = .416
Origins Scale score*	1.3754 (0.3275)	0.8386 (0.3033)	d = 2.502, r = .647
Pawns Scale score	1.4194 (0.2998)	1.6544 (0.2657)	d = 0.8295, r = .383
HHI total score ² *	31.52 (10.824)	21.33 (7.280)	d = 1.1047, r = .483

Note: ¹BPTA = average threshold in dB HL at 0.5, 1, and 2 kHz for the better hearing ear.

²HHI total score = Hearing Handicap Inventory for the Elderly/Adults Total Score

* = variable is significant at p<.05.

Table 1: Means and standard deviations for study variables.

length of interview and the positive skew of the distribution found in their earlier work. Using an Apple iMac desktop computer, the data from the interview was entered into Microsoft Excel to calculate the Origins and Pawns Scale scores for each participant. Those scores were then entered into the Statistical Package for the Social Sciences (SPSS) for Mac (version 20) for all data analyses.

Blinding

To reduce potential bias in the coding of the Origins and Pawns Scales, the researchers coding the transcripts were blinded to all participant information. That is, the researchers were not able to identify the participant's age, hearing status, hearing aid status, or gender. To ensure blinding to these conditions, the clinician transcribing the interviews transcribed them in such a way that the reader would not be able to identify this information. For example, when a participant referred to a partner's gender, "he/she" was used instead of the original gender.

Data analysis

Intra-class correlations between the two coders on both the Origins and Pawns Scales will be used to establish the reliability of the methodology with a population of older adults with hearing impairment. Because of the relatively small sample size, normal distribution cannot be assumed. Therefore, non-parametric tests will

be used to analyze the data. A Mann-Whitney U-Test will be used to assess the relationship between the Origins and Pawns Scales using (a) hearing aid uptake and (b) gender as grouping variables. Finally, a Spearman product-moment correlation will be used to assess the relationship between self-perception of hearing handicap and both the Origins and the Pawns Scales.

Results

Reliability

In this study, reliability is conceptualised as the quality of measurement method that suggests the same data would have been collected each time in repeated observations of the same phenomenon. It relates to whether a particular technique, applied repeatedly to the same object, yields the same result each time. Reliability can be thought of as the consistency or stability of a measurement. Intra-class correlations measure the degree to which two raters (or coders) apply the same rating (or coding) to the same observation. It is a measure of the consistency of rating (or coding).

To assess the reliability of the measurement of origins and pawns, two researchers used pilot data to establish the coding guidelines shown in Figure 1. Following ongoing discussion and practice with the guidelines the two researchers independently coded the study data. The intra-class correlation for the Origins Scale was .872, p<.001, and the

intra-class correlation for the Pawns Scale was .806, $p < .001$, indicating the two researchers tended to classify the clauses in a similar manner.

Mann-Whitney U-Tests

Table 1 shows the central tendencies and variance data for the participants' Origins and Pawns Scale scores. The results of the Mann-Whitney U-Tests for independent samples that participants who adopted hearing aids had significantly higher Origins Scale scores than participants who did not adopt hearing aids ($U=19.00$, $p < .001$). Participants who adopted hearing aids also had lower Pawns Scale scores than participants who did not adopt. However, this difference did not reach statistical significance ($U=51.50$, $p=0.05$). There were no significant differences in either Origins or Pawns Scales based on gender ($U=102.00$, $p=.933$, $U=98.00$, $p=.800$, respectively). Additionally, there were no significant differences in age between those who adopted hearing aids and those who did not ($U=64.50$, $p=.173$). However, those who adopted hearing aids did have significantly higher better ear puretone thresholds than those who did not adopt hearing aids ($U=40.00$, $p=.013$) (Table 1).

Spearman's rho correlations

Figures 2 and 3 show the Spearman's rho correlations between the measurement of hearing handicap and the Origins and Pawns Scale scores. Neither Scale score was significantly correlated with the hearing handicap. The Origins Scale had a positive relationship ($\rho=.169$, $p=.372$) with hearing handicap while the Pawns Scale had a negative relationship ($\rho=-.176$, $p=.353$). There was a significant negative relationship between the Origins and Pawns Scales ($\rho=-.451$, $p=.012$).

Discussion

Study questions

The main goal of this pilot study was to investigate whether the Origins and Pawns Scales can be used reliably within the field of audiology. The purpose of using these Scales is to help clinicians ascertain whether or not clients feel they have control over their life events. The results of the intra-class correlations indicate that the Origins and Pawns Scales can be used reliably with a population of older adults with hearing impairment who present for clinical services.

A secondary goal of this pilot study was to investigate the possible relationship between the Origins and Pawns Scales and hearing aid uptake. Results indicate that the uptake rates of hearing aids are greater for those individuals who have higher origin scores. Several studies within the field of audiology, have found similar results to ours. Cox et al. [21] found that hearing aid seekers had significantly higher scores for internal locus of control compared to the general elderly population. Garstecki and Erler [24] also found higher rates of internal locus of control for hearing-aid seeking behavior in the elderly, however this was only true for older women, not men. In addition, like Laplante-Lévesque et al. [17] who found that adults with higher "fate" locus of control had poorer intervention outcomes, we also found that individuals who did not adopt hearing aids were found to have higher pawns scores, however this finding was not statistically significant.

In our study, the p-value for the Mann-Whitney U-Test was .05 for the comparison of the Pawns Scores between those who adopted hearing aids and those who did not. This lack of statistical significance warrants some discussion about statistical power. An analysis was conducted prior to data collection to determine the sample size required to complete the study. For two dependent variables (Origins and Pawns Scales), with an alpha-level of .05 and power at 80%, 21 participants were required in each group to reach statistical significance, given an effect size of at least $d=1.0$. Because this was a pilot study and the main focus was on establishing reliability of the Origins and Pawns Scales, only 30 participants were recruited into the study. In addition, only 9 of those participants did not adopt hearing aids, so the study was under-powered in terms of participants required to address the second and third study questions. Furthermore, the small sample size necessitated the use of non-parametric statistics, which also contributed to the reduced power. Interestingly, a statistically significant difference was found between those who adopted and those who did not for the Origins Scale because the effect size was much larger than anticipated ($d=2.5$). However, the effect size for the Pawns Scale was slightly smaller than anticipated ($d=.8296$), further contributing to the lack of statistical power for this study. Now that reliability of the Origins and Pawns Scales and effect sizes between has been established, further research can explore the relationship between locus of control and hearing aid adoption.

Despite the lack of statistically significant differences on the Pawns

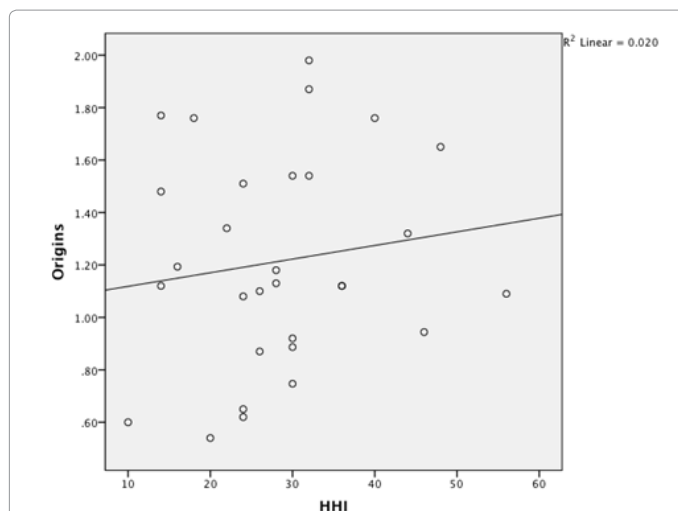


Figure 2: Scatterplot showing correlation between participants' scores on the Hearing Handicap Inventory for the Elderly (HHI) and their Origins Scale scores.

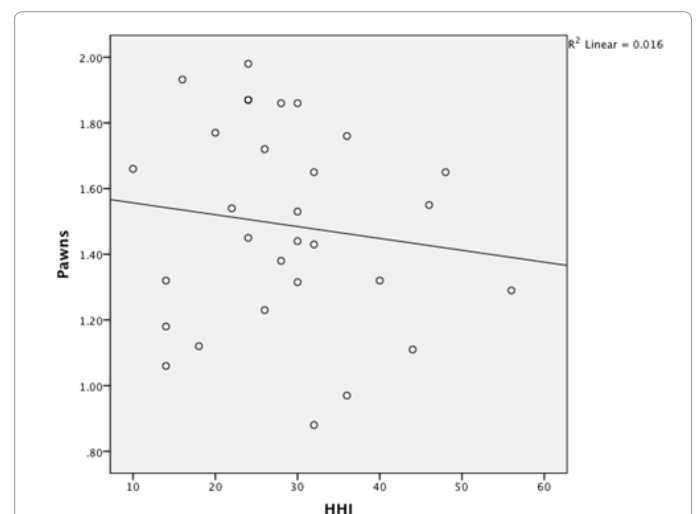


Figure 3: Scatterplot showing correlation between participants' scores on the Hearing Handicap Inventory for the Elderly (HHI) and their Pawns Scale scores.

Scale between clients who adopted hearing aids and those who did not, there is clinically significant information that can be drawn from these findings. Our results indicated there was a very small relationship between the two scales (-.451). This supports Westbrook and Viney [32] idea that the Origins and Pawns Scales are two distinct constructs and not simply two ends of a single continuum. In their study, they found no significant relationship between six of the nine groups studied and therefore concluded that there was no support for origins and pawns scores having a negative correlation.

The third goal of this study was to investigate the possible relationship between self-perceived hearing handicap and perception of control. Previous studies have reported that perceived degree of hearing handicap is strongly related to hearing aid adoption [16,17]. Findings from this study suggest that perception of locus of control as measured by the Origins and Pawns Scales is also related to hearing aid adoption. However, results from this study indicate that neither scale was strongly nor significantly correlated with self-perception of hearing handicap as measured by the HHIE. This finding supports the notion that locus of control is a distinct construct from self-perceived effects of hearing impairment, and that both constructs may contribute to a person's decision to adopt hearing aids.

Because Garstecki and Erler [24] found a relationship between gender and perception of locus of control, a further goal of this study was to investigate the possible gender differences in Origins and Pawns Scales. Garstecki and Erler [24] reported that women who pursued amplification had a greater tendency for internal locus of control than those who did not. However, like Cox et al. [21] the results of this study did not indicate any statistically significant difference between men and women in terms of perception of locus of control. Unlike the lack of statistical significance based on hearing aid adoption, these findings were not under-powered. The effect sizes between men and women in this study were relatively small, indicating there were no clinically significant differences based on gender.

Study limitations

One of the main limitations of this study was the relatively small sample size. Because of the lack of recruitment of participants into the study who did not choose to adopt hearing aids, non-parametric statistics were required to carry out hypothesis testing. The relatively small sample size also precluded the examination of confounding variables such as socioeconomic status and hearing level. That is, the effects of these confounding variables could not be statistically controlled in order to isolate the contribution of locus of control on hearing aid adoption. Further research is needed with a larger sample size to determine the relative effects of each of these variables.

In addition, the participants of this study were not representative of the larger population of older adults with hearing impairment. That is, participants recruited were comprised of a group of older adults who consulted for hearing evaluation. Therefore these individuals had already made a conscious decision to do something about their hearing impairment, whether it was on their own accord or through pressure from significant others. Consequently, this may have influenced the significance of the origins scores, as this study may have found higher rates of origins scores than what would be expected for the general population.

Another limitation to this study is that the rehabilitation outcomes of these clients were not assessed. This study only examined the relationship between perception of control and hearing aid adoption.

Laplante-Levésque et al. [17] found a relationship between locus of control and hearing aid and communication programme outcomes. Further research is needed to determine the relationship between the Origins and Pawns Scales and rehabilitation outcomes.

The results of this study suggest that the Origins and Pawns Scales may serve a valuable function for people with hearing impairment, representing a measure that can be used reliably to determine hearing aid uptake. An important aspect of the Origins and Pawns Scales is that the respondent is not required to be consciously aware of his or her perceptions of control. Therefore, it may provide a more sensitive source for addressing an individual's perception of control than other more traditional self-report measures. As long as clients have the ability to talk about their experiences, it is likely that the Origins and Pawns Scales can be used reliably across the population of adults with hearing impairments.

Understanding the factors that may contribute to an individual's choice to adopt hearing aids may help guide the rehabilitation process [38-43]. While it is unlikely that clinicians will undertake the task of obtaining Origins and Pawns Scale scores, they may listen carefully for indications of both origins and pawns in their client's verbalizations. Evidence of a large degree of Pawns (e.g., little control over their hearing impairment, being forced by others) may indicate the client is not likely to take control of their hearing impairment and therefore not ready to make a decision to adopt hearing aids. Conversely, evidence of a large degree of Origins (e.g., perception of control over hearing impairment, free choice, determined to achieve goals) may indicate a readiness to adopt hearing aids. Determining a client's perception of locus of control may prove helpful, especially in instances when significant others, or other professionals have referred a client for consultation, rather than the client actively choosing to bring about a change to their hearing impairment.

Because it is believed that an individual's locus of control is not static and can be modified [22], one goal of intervention may be to alter a person's perception of locus of control. If individuals with hearing impairments are not ready to take control of their hearing impairment or do not understand how proposed assistance can be of benefit, they may not follow the recommendations to obtain hearing aids. Therefore rehabilitation goals may initially focus on increasing perception of control as origins and decreasing perception of control as pawns before introducing the concept of hearing aids.

Further research is warranted in this area with a larger sample of adults. There are several directions in which this may be explored in the future, including a study with younger adults, investigation into tools to help modify a client's perception of control and determining if there is a relationship between the Origins and Pawns Scales and rehabilitation outcomes.

Conclusions

The results of the current study demonstrate that the Origins and Pawns Scales provide a reliable measure of perceptions of locus of control for older adults with hearing impairment. The modification of the Origins and Pawns Scales by Westbrook and Viney [32] and the establishment of refined scoring guidelines distinct to the individual, lead to a common understanding between the two raters, resulting in good reliability. The finding of most significance for clinicians is that both the Origins and Pawns Scales were found to distinguish older adults who adopted hearing aids from those who did not. Therefore, the Origin and Pawns Scales may prove to be a valuable tool within

the field of audiology as it may serve to assist clinicians in addressing hearing aid uptake rates through perceptions of control.

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