

# What Factors Are Associated with Autonomous and Controlled Motivation for Hearing Help-Seekers?

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## Abstract

**Background:** Hearing impairment is prevalent in older adults. Motivation is important in people's choice to seek help for their hearing and whether to adopt or not adopt hearing aids.

**Purpose:** To investigate associations between sociodemographic and audiometric characteristics and autonomous and controlled motivation among a sample of hearing help-seekers.

**Research Design:** A quantitative approach was taken for this cross-sectional cohort study.

**Study Sample:** A total of 253 adult first-time hearing help-seekers were recruited to the study.

**Data Collection and Analysis:** Participants provided sociodemographic information and completed questionnaires adapted from self-determination theory that measured autonomous motivation (motivation that originates from within the self and is aligned with personal values and beliefs) and controlled motivation (motivation that stems from external pressures such as rewards or punishment, or conflicted inner feelings such as guilt or shame).

**Results:** Participants with higher autonomous motivation scores were younger, wanted hearing aids more, and reported greater hearing difficulty in everyday life than those with lower scores. Participants with higher controlled motivation scores were more often referred to the service by others and wanted hearing aids more than those with lower controlled motivation scores. Controlled motivation scores were not associated with perceptions of hearing difficulty in everyday life.

**Conclusion:** Relationships among motivation and sociodemographic factors highlight the importance of characterizing autonomous and controlled motivation in first-time hearing help-seekers. Attention to personal characteristics in order to understand motivational processes involved in rehabilitation decisions such as hearing aid adoption may aid in consultations.

**Key Words:** autonomy, autonomy support, hearing aid adoption, hearing aids, hearing impairment, motivation, self-determination theory

**Abbreviations:** 4FAHL = four-frequency average hearing loss; SDT = self-determination theory; TSRQ = Treatment Self-Regulation Questionnaire; WANT = Wishes and Needs Tool

## INTRODUCTION

Hearing impairment is a chronic health condition that becomes more prevalent with age. Chia et al (2007) identified that 36.3% of 60- to 69-yr-olds and 64.6% of 70- to 79-yr-olds had hearing

loss >25 dB HL in at least one ear (pure-tone average of the frequencies 500, 1000, 2000, and 4000 Hz). Hearing impairment may be associated with reduced health-related quality of life (Chia et al, 2007) and poor psychosocial outcomes such as depression (Kramer et al, 2002), yet people sometimes wait years after noticing their

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hearing loss before seeking help for the first time (Davis et al, 2007; Kochkin, 2009). A variety of nonaudiological factors might be behind a person's decision to delay or to seek help, and these factors have been researched elsewhere (Knudsen et al, 2010; Meyer et al, 2014). Motivation is recognized as an important reason behind people's decision to engage with health services, both in audiology (Laplante-Lévesque et al, 2013; Ridgway et al, 2015; 2016) and in the broader health arena (Ryan et al, 2008; Ng et al, 2012).

Our previous studies (Ridgway et al, 2015; 2016) examined associations between motivational factors extrapolated from self-determination theory (SDT; Deci and Ryan, 1985), and hearing aid adoption and hearing aid fitting outcomes. SDT is a theory of motivation that classifies different forms of motivation along a continuum of internalization (Ryan and Connell, 1989; Ridgway et al, 2013). Internalization is regarded as the process of adoption of values and influences as one's own (Ryan and Connell, 1989; Deci and Ryan, 2000). "Autonomous motivation" originates from within the self and is aligned with personal goals, values, or beliefs. "Controlled motivation," by contrast, stems from external pressures such as rewards or punishment, or conflicted inner feelings such as guilt or shame. Autonomously motivated behaviors and actions are more internalized than behaviors that stem from controlled forms of motivation, and SDT health research has consistently reported greater engagement in and maintenance of health behavior when patients are autonomously motivated (Ng et al, 2012). Adding to this work, Ridgway et al (2015) explored autonomous and controlled motivation of a sample of 253 first-time hearing help-seekers using an adapted Treatment Self-Regulation Questionnaire (TSRQ; Williams et al, 1996), a SDT measure of autonomous and controlled motivation. The results indicated that autonomous and controlled motivation were independent of each other, in that autonomous motivation was associated with increased hearing aid adoption while controlled motivation was not. This finding could suggest a two-factor model of motivation that recognizes multiple motives associated with hearing aid adoption.

A growing body of audiology research has applied models of health behavior such as the health belief model (Rosenstock, 1966) and the transtheoretical stages of change model (Prochaska et al, 1992) to understand how behavioral constructs and clinical processes influence actions such as hearing aid adoption and rehabilitation outcomes (e.g., Laplante-Lévesque et al, 2013; Hickson et al, 2014; Ekberg et al, 2016; Saunders et al, 2016). The health belief model provides a framework for conceptualizing health-related attitudes and beliefs (Janz and Becker, 1984). This model encompasses six constructs to explain and predict health behavior: (a) perceived severity, (b) perceived susceptibility, (c) perceived benefits,

(d) perceived barriers, (e) self-efficacy, and (f) cues to action. The transtheoretical model describes the processes for changing health behavior (Prochaska et al, 1992). Five stages through which people progress when attempting behavior change are depicted: (a) pre-contemplation, (b) contemplation, (c) preparation, (d) action, and (e) maintenance. People are hypothesized to move through stages sequentially, although they may revert to earlier stages during the behavior change process. Together, both models may therefore help practitioners understand and predict hearing health behavior by identifying characteristics that contribute to behavior change.

The health belief model, transtheoretical model, and SDT all recognize the importance of understanding determinants of behavior for an intervention to be effective. However, SDT is the only model that explains behavior by contrasting forms of motivation, and which emphasizes autonomy as central to engagement in activity and personal well-being (Ryan and Deci, 2000; 2006; Deci and Ryan, 2008; Ryan et al, 2011). Further, SDT argues that patient-centered practitioners can facilitate autonomous motivation with patients by supporting their psychological needs for autonomy, competence, and relatedness (Ryan et al, 2008). Autonomy is experienced when a person's actions are aligned with their personal values and beliefs. A person experiences competence when feeling confident and capable of action. Relatedness is experienced when a person feels connected with others. Clinical support for these three psychological needs is known as "autonomy support" (Williams et al, 2000). In the clinic, autonomy support is a counseling approach that encourages active involvement from patients in rehabilitation, accepts patients' perspectives, provides a range of meaningful intervention options, and minimizes pressure (Williams et al, 2000; Markland et al, 2005; Patrick and Williams, 2012). Studies in a range of health-care settings have linked autonomy support with increased autonomous motivation and positive health outcomes (see Ng et al, 2012, for a summary). Ridgway et al (2016) reported that in the audiology clinic setting, autonomy support was not associated with increased hearing aid adoption, but for hearing aid adopters it was associated with improved outcomes. Specifically, these were (a) increased perceived competence with hearing aids, (b) reduced activity limitations, and (c) increased satisfaction with hearing aids. In summary, it seems that first-time hearing help-seekers have high autonomous motivation, but do not report additional motivational support from their interaction with the clinician in relation to hearing aid adoption. However, if help-seekers adopted hearing aids, perceptions of greater practitioner support were linked with greater confidence with hearing aids, fewer difficulties with hearing aids, and a greater belief that getting hearing aids was worth the trouble.

In addition to motivational characteristics, Ridgway et al (2015; 2016) both included sociodemographic and audiometric characteristics in their analyses. Ridgway et al (2015) reported associations between greater self-reported hearing difficulty, higher four-frequency average hearing loss (4FAHL, measured at 500, 1000, 2000, and 4000 Hz) in the better ear, and increased hearing aid adoption. In that study, desire for hearing aids was associated with hearing aid adoption at the univariate level, but there was no significant association with adoption when autonomous motivation, gender, perceived difficulty, and 4FAHL were taken into account. In Ridgway et al (2016), younger age and greater self-reported difficulty were both associated with higher reported hearing aid use (hours per day) and greater reported benefit. Together, these results highlight the need to take into account a range of personal factors that might influence motivation for engagement with hearing services and successful hearing aid use.

In Ridgway et al (2015; 2016), sociodemographic and audiometric characteristics were examined in relation to hearing aid adoption and hearing aid fitting outcomes, not motivation scores. Relationships between personal characteristics and motivation are studied here because autonomous and controlled motivation contributed to hearing aid adoption and outcomes in different ways. These differences might influence how participants engage with hearing services, and may also reveal characteristics of potential hearing aid candidates. In SDT health research, personal differences are known to influence autonomy, which is in turn associated with health engagement, well-being, and satisfaction (Ryan et al, 2008; Ng et al, 2012). In audiology research, personal factors such as self-reported hearing difficulty and degree of hearing impairment are associated with internalized decision-making and outcomes (e.g., Knudsen et al, 2010; Meyer and Hickson, 2012; Saunders et al, 2016). These two factors were included in the study because relationships between self-reported hearing difficulty and degree of hearing impairment and autonomous and controlled motivation might explain how help-seekers internalize decisions such as hearing aid adoption. Referral source was also included because in SDT health research, self-referral reflects internalized engagement in health behavior, while non-self-referral indicates external directives for engagement (Ng et al, 2012). Although SDT research has shown no gender difference in autonomy (Chirkov et al, 2003; Guérin et al, 2012), associations between gender and autonomous and controlled motivation for hearing help-seekers were explored here because Ridgway et al (2015) found a univariate relationship between being male and increased hearing aid adoption. Age was added as a variable because hearing help-seekers are typically older adults (Kochkin, 2009), and in SDT, different types of motivation are evident across the life span (Ryan and Deci, 2006). Older adults may exhibit

reduced engagement and internalized motivation with cognitively demanding activities (Hess, 2014) and may experience less autonomy (Custers et al, 2012).

Together, analyses of relationships among sociodemographic and audiometric characteristics and motivation may advise practitioners of factors that might influence motivation. Potentially, this may enable practitioners to tailor their rehabilitation so that motivational factors pertinent to rehabilitation decisions such as hearing aid adoption, and outcomes such as hearing aid use, can be identified and addressed. With this in mind, the aim of the current study is to find out if autonomous and controlled motivation of the sample of hearing help-seekers can be characterized by sociodemographic and audiometric attributes. Given the independence of autonomous and controlled motivation (Ridgway et al, 2015), the impact on the two forms of motivation of the various demographic and audiological factors will be considered separately.

## METHOD

### Participants

Participants were 253 adults (129 females, 124 males) aged between 40 and 95 yr who had sought help for their hearing for the first time, but had not yet consulted with a practitioner. Participants had attended a promotional event or information day organized by participating audiology clinics, or had made direct contact with the clinic, and were recruited to the research if they consented to participate and responded to the study materials. The following criteria were used to determine eligibility for participation in the research: (a) no previous hearing aid experience, (b) did not reside in an aged-care facility, and (c) had sufficient English to understand and reply to the research materials. All participants were aged  $\geq 18$  yr and there was no upper eligibility criterion for age. Participation was open to any adult who attended the event or clinic. The majority of participants (91%) were recruited from a large, Australia-wide audiology service, with the remaining 9% recruited from several other audiology clinics across different states and territories of Australia (see Ridgway et al, 2015; 2016). All participants except one received services through the Australian Government Hearing Services Program. For eligible participants, this program provided subsidized hearing services including hearing assessment, access to a range of hearing aids either partially or fully subsidized, and if hearing aids were fitted, ongoing support, rehabilitation, and maintenance. The current study used the same participant sample described in Ridgway et al (2015) and Ridgway et al (2016). Although all eligible participants had sought help at their chosen clinic for the first time, it is not known if participants had consulted for hearing services

before becoming eligible. Table 1 shows the sample characteristics.

### Self-Report Measures

The following self-report questionnaires were used in the study.

#### TSRQ

TSRQ (Williams et al, 1996) assesses autonomous motivation and controlled motivation. Items from the original TSRQ were modified by Ridgway et al (2015), substituting words such as “medication” or “diabetes” with “hearing” or “hearing aids,” so the TSRQ was applicable to hearing help-seekers. Participants were

**Table 1. Summary Data Showing Participant Sociodemographic, Audiometric, and Motivation Characteristics as Means and Standard Deviations (or N and %) for the Total Sample**

Characteristic	Sample (N = 253)
Age in years, mean (SD) (n*** = 241)	69.9 (10.5)
<65, n (%)	61 (25.3)
65–74, n (%)	105 (43.6)
>75, n (%)	75 (31.1)
Gender, n (%) (n = 253)	
Male	124 (49.0)
Female	129 (51.0)
Source of referral, n (%) (n = 246)	
Self	148 (60.2)
Spouse or family member	56 (22.8)
General practitioner	20 (8.1)
Other	22 (8.9)
4FAHL, mean (SD) (n = 183)	31.2 (12.7)
≤25 dB HL, n (%)	58 (31.7)
26–40 dB HL, n (%)	86 (47.0)
≥41 dB HL, n (%)	39 (21.3)
Desire for hearing aids*, n (%) (n = 227)	
Don't want them	48 (21.1)
Slightly want them	39 (17.2)
Want moderately	83 (36.6)
Want them quite a lot	35 (15.4)
Want them very much	22 (9.7)
Self-reported difficulty*, n (%) (n = 240)	
No difficulty	20 (8.3)
Slight difficulty	84 (35.0)
Moderate difficulty	84 (35.0)
Quite a lot of difficulty	42 (17.5)
Very much difficulty	10 (4.2)
Autonomous motivation**, mean (SD) (n = 241)	5.52 (1.46)
Controlled motivation**, mean (SD) (n = 229)	2.83 (1.70)
Hearing aid adoption decision (n = 237)	
Adopted hearing aids, n (%)	125 (52.7)
Did not adopt hearing aids, n (%)	112 (47.3)

Notes: Scores are from \*WANT (Dillon, 2012) and \*\*TSRQ (Williams et al, 1996); \*\*\*n values vary due to missing data. SD = standard deviation.

asked to consider how true particular reasons for considering hearing aids were for them, along a scale of 1 (“not at all true”) to 7 (“very true”). Questions were autonomous (“I feel personally that wearing hearing aids is the best thing for me”) or controlled (“I would feel bad about myself if I didn't”) in nature. The two-factor, 13-item TSRQ reported by Ridgway et al (2015) consisted of four autonomous items and nine controlled items. Cronbach's  $\alpha$  was 0.91 for the autonomous motivation factor (factor loadings ranged from 0.69 to 0.84) and 0.83 for the controlled motivation factor (factor loadings were 0.54 to 0.82). These results indicated good scale reliability (Kline, 1999). Participant responses for items in their respective subscales were averaged to determine autonomous and controlled motivation scores.

#### Wishes and Needs Tool

A two-item questionnaire called the Wishes and Needs Tool (WANT; Dillon, 2012) was included in this study to measure desire for hearing aids and self-reported difficulty. The WANT is used in the Australian Government Hearing Services Program with people whose three-frequency average hearing level (measured at 500, 1000, and 2000 Hz) in the better ear is  $\leq 23$  dB HL (more information about the Australian Government Hearing Services Program and its use of the WANT is found at the following URL: <http://www.hearingservices.gov.au/wps/portal/hso/site/about/legislation/other/mhlt/>). The WANT asks how strongly a person wants to get hearing aids (1, *Don't want them*; 2, *Slightly want them*; 3, *Want moderately*; 4, *Want them quite a lot*; 5, *Want them very much*), and how much a person perceives difficulty hearing without hearing aids (1, *No difficulty*; 2, *Slight difficulty*; 3, *Moderate difficulty*; 4, *Quite a lot of difficulty*; 5, *Very much difficulty*). Higher WANT scores suggest greater desire for hearing aids and greater self-reported difficulty.

#### Demographic Questionnaire

Demographic information was collected with a purpose-designed questionnaire that asked about participant age, gender, and whose idea it was to seek services. Referral sources were categorized numerically as follows: 1, *Mine*; 2, *My spouse or family member*; 3, *My doctor*; and 4, *Someone else*.

#### Procedures

Ethical clearance for this study was granted by the University of Queensland Behavioral and Social Sciences Ethical Review Committee, which complied with the Australian Government National Health and Medical Research Council National Statement on Ethical Conduct in Human Research (2007). Before consulting

with a practitioner, participants received an introductory letter describing the research and completed a consent form, the baseline questionnaires (TSRQ, WANT, and Demographics) and an authorization for release of their audiogram. Participants were asked to return the completed consent form, authorization, and baseline questionnaires to the principal researcher at the University of Queensland. Participants then consulted with a practitioner of their choice, at which time a clinical history, hearing assessment, and discussion of rehabilitation needs took place. Audiometric information (i.e., pure-tone air and bone-conduction thresholds at 500, 1000, 2000, and 4000 Hz in both ears) was collected from the audiology clinic that the participant attended.

## Data Analysis

Data were analyzed with Stata version 13 (Stata-Corp, College Station, TX). Sociodemographic and audiometric variables were the independent variables, and motivation variables were the dependent (outcome) variables. Sociodemographic variables were age, gender, referral source, desire for hearing aids (WANT question 1), and self-reported difficulty (WANT question 2). The audiometric variable was 4FAHL in the better ear. Motivation variables were autonomous and controlled motivation (TSRQ subscale scores).

To identify whether sociodemographic or audiometric variables were associated with autonomous and controlled motivation, data from the sample of 253 first-time hearing help-seekers were first screened for univariate relationships with pairwise correlation analysis. Correlation coefficients (Pearson's  $r$ ) and  $p$  values were identified (see Table 2). Relationships that were significant at the 0.1 level were included in the regression analyses. Variables with significant coefficients were tested for collinearity using variance inflation factors to ensure they could be included together in the regression analyses. All variance inflation factor scores were found to be  $<2$ , which was acceptably low collinearity to enable all variables to be modeled together.

Two multivariate linear regression models were then formed, for autonomous motivation and controlled motivation. Finally, regression diagnostic tests were performed to evaluate the validity of the models.

## RESULTS

### Independent Variables and Autonomous Motivation

To identify linear associations among independent variables and autonomous motivation, multivariate linear regression analyses were performed. In the autonomous motivation regression model, the pairwise correlation analysis revealed  $p$  values  $>0.1$  for referral source, gen-

der, and 4FAHL in the better ear, and these variables were, therefore, dropped for the final regression analysis.

The autonomous motivation model with the retained independent variables (age, desire for hearing aids, and self-reported difficulty) was then checked for heteroskedasticity using the Breusch–Pagan test (Breusch and Pagan, 1979). This test revealed a significant  $p$  score  $<0.001$  ( $\chi^2 = 35.8$ ), which predicted heteroskedasticity. Therefore, White's (1980) robust test was run. The quantile–quantile plot, which plotted probability distributions of differences between the predicted and actual values of the outcome variable (Wilk and Gnanadesikan, 1968), indicated that residual values followed a normal pattern of distribution, and were thus acceptable. The studentized residual (Cook and Weisberg, 1982) detected three outliers with absolute values  $\geq 2.58$ . These cases were, therefore, removed from the analysis.

Multiple linear regression revealed 33.27% of the variability in autonomous motivation scores was explained by younger age, greater desire for hearing aids, and greater self-reported difficulty [ $R^2 = 0.33$ ,  $F_{(3,205)} = 28.74$ ,  $p < 0.001$ ; Table 3]. When examining the predictive ability of individual variables, all three variables significantly contributed to autonomous motivation. The  $\beta$  scores indicated that for every 1-unit increase in autonomous motivation score there was a 0.42-unit increase in desire for hearing aids score, a 0.31-unit increase in self-reported difficulty score, and a 0.02-yr reduction in age, after adjusting for other variables in the model.

### Independent Variables and Controlled Motivation

For the controlled motivation regression model, pairwise correlation identified two variables (gender and age) with  $p$  values over 0.1 when screened for significance. These were, therefore, omitted and the multivariate linear regression for controlled motivation retained self-reported difficulty, desire for hearing aids, referral source, and 4FAHL in the final analysis. As with autonomous motivation, the controlled motivation model was heteroskedastic ( $\chi^2 = 12.48$ ,  $p < 0.001$ ). The robust test (White, 1980) was conducted and indicated that quantile–quantile plots were essentially normal distribution of residuals. Five outliers were identified and removed from the final analysis.

The controlled motivation model showed 23.49% of total variance in controlled motivation scores was explained by referral source, desire for hearing aids, self-reported difficulty, and 4FAHL in the better ear [ $R^2 = 0.23$ ,  $F_{(4,146)} = 8.00$ ,  $p < 0.001$ ; Table 3]. Two variables were significantly associated with controlled motivation—referral source ( $\beta = 0.31$ ,  $p = 0.016$ ), and desire for hearing aids ( $\beta = 0.27$ ,  $p = 0.018$ ). For each 1-unit increase in controlled motivation, there was a 0.27-unit increase in desire for hearing aids. The referral source score increased by 0.31 units for

**Table 2. Matrix for Pairwise Correlation Coefficients Showing Linear Relationships among Independent and Dependent Variables for the Sample**

Variable	1.	2.	3.	4.	5.	6.	7.	8.
1. Autonomous motivation	1.00							
2. Controlled motivation	0.37***	1.00						
3. Desire for hearing aids	0.52***	0.25***	1.00					
4. Self-reported difficulty	0.45***	0.22***	0.64***	1.00				
5. Age	-0.25***	-0.05	-0.20**	-0.26***	1.00			
6. Referral source	-0.10	0.20**	-0.03	-0.03	0.09	1.00		
7. Gender	0.02	0.09	0.14*	0.17**	-0.11	-0.01	1.00	
8. 4FAHL in the better ear	0.11	0.25***	0.26***	0.34***	0.32***	0.07	0.15*	1.00

Note: N = 253. Significant at \* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$ .

each 1-unit increase in controlled motivation score. That is, the likelihood of participants being referred by someone other than themselves increased by 31% for each 1-point increase in controlled motivation. Self-reported difficulty and 4FAHL in the better ear were not statistically significant.

### DISCUSSION

This study explored the relationships among socio-demographic, audiometric, and motivation characteristics for a sample of first-time hearing help-seekers. On the basis of our previous research (Ridgway et al, 2015), which suggested that autonomous and controlled motivation did not sit on a single continuum but rather represented two separate factors, each type of motivation was compared separately with the sociodemographic and audiological variables in the study. Participants with higher autonomous motivation scores wanted hearing aids more, reported greater hearing difficulty, and were younger than those with lower autonomous motivation scores. Participants with higher controlled motivation scores were referred by others more often and had higher scores on the desire for hearing aids WANT question than those with lower controlled motivation scores.

The positive association between autonomous motivation scores from the TSRQ and scores from both WANT

questions illustrated the complementary nature of these measures when describing motivational characteristics of hearing help-seekers. Four TSRQ questions formed the autonomous motivation variable. Scores for each question suggested participants with higher autonomous motivation scores might have (a) reported giving careful consideration to hearing aids before consultation with a practitioner, (b) believed hearing aids were important for effective communication, (c) felt personally that wearing hearing aids was the best thing for them, and (d) believed doing something about their hearing would improve their quality of life. If considered alongside higher WANT scores, these findings could indicate that participants with higher autonomous motivation scores have reflected on the impact of hearing loss, and the potential influence of hearing aids on their own function and circumstances, when contemplating hearing aids. Together with results from Ridgway et al (2015), which described the association between autonomous motivation and hearing aid adoption, both the TSRQ and WANT could be useful for exploring internalization of decisions such as hearing aid adoption. This finding is also in line with Laplante-Lévesque et al (2013), who investigated an application of the transtheoretical model of behavior change (Prochaska et al, 1992) with hearing help-seekers, and reported that participants in a more advanced stage of change described greater hearing difficulty and were more likely to take up an intervention such as hearing aids.

**Table 3. Regression Model of Independent Variables Associated with Autonomous Motivation and Controlled Motivation**

Independent Variable	Outcome Variable					
	Autonomous Motivation**			Controlled Motivation**		
	$\beta$	SE	$p$ Value	$\beta$	SE	$p$ Value
	$R^2 = 0.3327, F_{(3,205)} = 38.74, p < 0.001$			$R^2 = 0.2349, F_{(4,146)} = 8.00, p < 0.001$		
Age	-0.0230	0.0079	0.004*	ns		
Referral source	ns			0.3055	0.1256	0.016*
Desire for hearing aids	0.4156	0.0908	<0.001*	0.2721	0.1136	0.018*
Self-reported difficulty	0.3087	0.1166	0.009*	0.2608	0.1565	0.098
4FAHL (better ear)	ns			0.0183	0.0104	0.080

Notes: \*Significant at  $p = 0.05$  level; \*\*robust estimates. ns = not significant at univariate level; SE = standard error. Gender was not associated with either autonomous or controlled motivation at the univariate level and is not shown.

Younger age was also found to be associated with higher autonomous motivation in the present study. Although the  $\beta$  score of  $-0.02$  indicated that age differences for participants with higher and lower autonomous motivation were small, the low standard error score of  $0.0079$  suggested the regression estimate was highly predictive. In a study that investigated relationships between autonomy and age in a cohort of undergraduate psychology students and their parents, Sheldon et al (2006) reported goal-related autonomous motivation increased with age through from early adulthood to middle age. By contrast, Edmunds et al (2007) studied people who were overweight or obese aged between 16 and 73 yr and found no effect of age on motivation for participation in a prescribed exercise program, although age was associated with reduced exercise. Custers et al (2012) found older people with higher cognitive function residing in aged-care facilities attributed greater importance to autonomy than those with lower cognitive function, with some participants preferring others to make decisions for them about everyday activities such as choice of mealtime or outfit. Studies of people who have either Type 1 and Type 2 diabetes (Williams et al, 1998) and coronary disease (Mildestvedt et al, 2007) found younger participants were more likely to make the decision to drop out of the research if they had fewer health complications. Varied associations between age and autonomy revealed in the earlier studies suggest that across the adult life span, changing personal circumstances, interests, and health status appear to impact upon autonomous motivation and the decisions people make (Kasser and Ryan, 1999). Rather than age itself, autonomous motivation of younger hearing help-seekers might, therefore, be affected by the presence or absence of other health conditions. However, as this study did not ask participants about their general health, it is not possible to determine whether this influenced their autonomous motivation for hearing rehabilitation decisions.

Surprisingly, there was a positive association between controlled motivation and desire for hearing aids as measured by the WANT. That is, people who felt guilt or shame about their hearing impairment, or who thought others would be upset or disappointed in them if they did not do something about their hearing, wanted hearing aids more than those who did not report these feelings. This finding appears to contradict the assertion that participants with higher controlled motivation scores (who have not internalized the need to act on their hearing loss) may not be motivated to act for a range of reasons. As discussed in Ridgway et al (2015), the present finding also suggests that the TSRQ autonomous and controlled motivation subscales may not precisely capture the spectrum of motivations of hearing help-seekers along the SDT internalization continuum (Ryan and Connell, 1989). For example, a person with higher controlled motivation scores may have re-

ported via the TSRQ a sense of guilt or shame if they did not do something about their hearing, and also report being motivated because they understand the personal benefits of wearing hearing aids. That is, they have sought hearing help for both autonomous and controlled reasons. Making changes to health behavior requires juggling multiple motives, within the behavior itself and across other life arenas (Deci and Ryan, 2008; Ryan et al, 2011). This helps explain our previous findings that autonomous and controlled motivation may separately exert influences on patients' decisions to seek help and consider hearing aids (Ridgway et al, 2015). Overall, the relationship between controlled motivation and desire for hearing aids suggests the need to explore elements of controlled motivation in more detail. Further analysis of the psychometric properties of the TSRQ and refinement of this questionnaire for hearing help-seekers would be of benefit.

Although there was an association between controlled motivation and desire for hearing aids, there was not a significant relationship between controlled motivation and self-reported hearing difficulty. The 20 participants who did not report any hearing difficulty (i.e., scored 1 on WANT question 2) had a mean controlled motivation score of  $3.31$ , which was proportionally higher than the mean controlled motivation scores of participants who reported slight and moderate difficulty ( $2.34$  and  $2.75$ , respectively). This result could suggest that a small number of participants who exhibited higher controlled motivation might not accept the possibility of their own hearing loss. Indeed, Helvik et al (2008), who sampled 173 first-time adult help-seekers, reported that participants who did not perceive or disclose hearing difficulties were less likely to adopt hearing aids after other variables such as age and degree of hearing impairment had been considered. This supports our previous results, which showed positive associations between self-reported difficulty and hearing aid adoption (Ridgway et al, 2015). Therefore, help-seekers who do not report hearing difficulties might come to recognize their own difficulties and decide to take action such as adopting hearing aids if practitioners explore underlying feelings of guilt, shame, or anxiety that accompany controlled motivation in patients.

Participants with higher controlled motivation were more likely to have sought help at the suggestion of others than to have personally made the decision to seek help. Some participants who sought hearing services at the behest of others might have done so because they had not fully internalized the value or need to act (Ryan and Deci, 2000). If participants attended to appease family members, they may have done so to maintain a sense of pride or self-worth, or to overcome feelings of guilt or shame associated with their hearing impairment. In these circumstances participants would be exhibiting introjected motivation, a controlled form of motivation that is not fully internalized (Ridgway et al, 2013). This finding calls for family members to be involved in rehabilitation decisions, so practitioners can recognize and

address underlying questions or concerns involving family that might shape patient choices. Family involvement is linked with self-care confidence and autonomous motivation in cardiovascular patients (Stamp et al, 2016), and in audiology, greater family member involvement in hearing rehabilitation is warranted (Ekberg et al, 2015).

### Clinical Implications

The findings from this study have important implications for practitioners seeking to better understand autonomous and controlled motivation on hearing help-seekers' behaviors. The WANT was originally developed for use in the Australian Government Hearing Services Program as a tool for measuring motivation of hearing help-seekers with minimal hearing loss. However, significant correlation between the WANT and TSRQ in this study suggests both measures could be applied in the clinic to assist practitioners' discussions about rehabilitation intervention options, irrespective of hearing level. Together with the TSRQ, which measured autonomous and controlled motivation, the WANT could provide practitioners with a detailed motivation profile of hearing help-seekers, from which rehabilitation could be planned. For example, help-seekers with higher controlled motivation scores who do not report any hearing difficulties may require counseling about awareness or acceptance of hearing loss, and exploration of the reasons behind their scores. On the other hand, help-seekers with higher autonomous motivation scores who report hearing difficulties and who want hearing aids are likely to have given careful consideration to wearing hearing aids and are ready to act. Therefore, practitioners who explore results of the TSRQ and WANT can potentially engage help-seekers in discussion about the psychosocial factors that may underlie patients' actions. This form of counseling could be regarded as autonomy supportive because it helps reveal rationales for health behavior and encourages discussion from patients' perspectives (Markland et al, 2005). However, as autonomy support was not associated with hearing aid adoption, and was associated with increased perceived competence, increased satisfaction, and reduced activity limitation (Ridgway et al, 2016), further work is needed to understand how characteristics of autonomy support relate to discussions about interventions such as hearing aid adoption.

Autonomous motivation was positively associated with younger age in this study. Although not directly researched in this study, age-related decline in health, cognitive and physical capacity, and participation in life (Rowe and Kahn, 1997; Meyer et al, 2014) may have contributed to this association. There is evidence that links autonomous motivation to vitality in an older population (Kasser and Ryan, 1999), which supports this assertion. Furthermore, the psychosocial and functional effects of chronic health conditions associated with aging may

reduce communicative competence and autonomous motivation (Ferrand et al, 2012). Although Meyer et al (2014) did not study autonomous motivation, they found adults with hearing impairment consulted practitioners and adopted hearing aids more often if they were younger, reported better general health, and perceived greater benefits of hearing aids. Exploring associations between autonomous motivation, attitudinal beliefs, and health and well-being with hearing help-seekers would therefore be of interest. Although this study did not question participants about their health status, practitioners who explore the physical, cognitive, and sociocultural features of healthy aging with hearing help-seekers might gain insight to how autonomy can be promoted with potential hearing aid candidates.

### Future Research Implications

It should be noted that the current study did not explore relationships among autonomy support and sociodemographic or audiometric characteristics, as the purpose of this article was to investigate associations among these characteristics and autonomous and controlled motivation. Identifying whether factors such as age or self-reported difficulty affect autonomy support might inform what practitioners look for to help motivate healthy behavior and well-being with patients, because in hearing aid adopters, autonomy support was positively associated with increased satisfaction, reduced activity limitation, and greater perceived competence (Ridgway et al, 2016). Practitioners recognize sociodemographic and audiometric factors during clinical consultation when decisions such as hearing aid adoption are being considered (Knudsen et al, 2010; Hickson et al, 2014; Meyer et al, 2014), yet the ingredients of autonomy support influential to motivating decisions and maintenance of healthy behavior in hearing rehabilitation are not yet fully understood (Ridgway et al, 2016). Further exploration of autonomy support in audiology consultations is warranted.

Our study was not the first to challenge the structure of the SDT internalization continuum (e.g., Pelletier et al, 2013). Recognizing these potential structural issues, Sheldon et al (2015) performed a detailed psychometric evaluation of the continuum by analyzing the items of multiple autonomy scales. Their analyses confirmed a sequential model structure of six subscales of relative autonomy, which supported the SDT continuum proposed by Ryan and Connell (1989). However, their study found both positive and negative dimensions of introjected motivation, a relatively controlled, partially internalized form of motivation. This suggests that items that characterize introjection, such as acting from guilt or shame (Cohen et al, 2011), to boost self-esteem (Crocker et al, 2003) and for hubristic, or overly arrogant, pride (Tracy



et al, 2009) should be differentiated in the model because they may have both positive and negative effects on internalization. Sheldon et al (2015) acknowledged the need for further psychometric evaluation of items across multiple life domains to confirm the universal validity of the continuum. Therefore, further evaluation of concepts such as introjected motivation in audiology research would be of interest, to determine if this form of motivation is influential to rehabilitation help-seeking and decision-making.

In the current study, all participants but one were eligible for subsidized hearing services through the Australian Government Hearing Services Program. Receiving subsidized hearing services may increase help-seeking behavior (Meyer et al, 2014) and hearing aid adoption (Laplante-Lévesque et al, 2012) when compared with those ineligible for the Government subsidy. Cost of hearing services is known to delay help-seeking (Kochkin, 2009). Consequently, WANT and TSRQ scores might differ in adults who do and do not receive subsidized services. Further investigation of associations between subsidized versus unsubsidized hearing services and motivation would therefore be of interest.

Given the range of cognitive, behavioral, and affective processes that appear to be involved in the decision whether to adopt hearing aids, further work to explore how hearing help-seekers develop “agency” (Bandura, 2006) would be of benefit. According to Bandura (2006), agency refers to the human capacity to influence one’s own functioning in everyday life. In doing so, people develop personal goals and anticipate possible outcomes to motivate their courses of action. They develop strategies to attain an outcome, and reflect on the rationale and adequacy of their thoughts and actions. Within SDT, “agency” is interpreted as competence to accomplish behaviors necessary to achieve an outcome (Deci and Ryan, 2000), and a positive association between perceived hearing aid competence and autonomy support found by Ridgway et al (2016) suggests that practitioners can help people develop agency in the hearing rehabilitation setting, to facilitate autonomous motivation. However, further research that explores how people engage in hearing rehabilitation and make meaningful choices would be of benefit.

## CONCLUSION

In conclusion, complex interrelations among motivation and sociodemographic factors underscore the utility of practitioners’ attention to the personal factors that may characterize autonomous and controlled motivation in first-time hearing help-seekers. Practitioners’ focus on cognitive, emotional, and motivational processes underlying patient behaviors and actions may help facilitate clinical decision-making such as hearing aid adoption.

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