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The impact of personal characteristics on engagement in nursing home residents with dementia

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SUMMARY

Objective—To examine the impact of personal attributes on engagement in persons with dementia.

Methods—Participants were 193 residents of seven Maryland nursing homes. All participants had a diagnosis of dementia. Cognitive functioning was assessed via the Mini-Mental State Examination, and engagement was assessed via the Observational Measure of Engagement. Data pertaining to activities of daily living were obtained from the Minimum Data Set.

Results—Women had longer mean engagement duration than men, and significant results were not seen with the other demographic variables. Significant, positive correlations were found between higher cognitive functioning and longer engagement duration, more attention, a more positive attitude, and a higher refusal rate. There was a positive and significant correlation between the comorbidity index and engagement duration, and between the number of medications and attention. All functional status variables yielded significance in a positive direction. Participants with poor hearing had a higher refusal rate. Cognitive status was the most consistent and potent predictor of engagement in this population.

Conclusion—Despite a higher refusal rate among those with higher cognitive levels, their overall engagement with stimuli is higher. Caregivers should anticipate higher refusal rates in those with poor hearing, and therefore compensatory methods should be used in presenting stimuli in this population. The potent role of cognitive and functional status on engagement of persons with dementia underscores the importance of tailoring activities to nursing home residents' needs, interests, and limitations.

Keywords

dementia; engagement; nursing home; personal attribute; characteristics; apathy

INTRODUCTION

Studies have shown that nursing home residents spend the majority of their time not engaged in any kind of activity (Cohen-Mansfield *et al*., 1992; Burgio *et al*., 1994; Kolanowski and Litaker, 2006). This is a cause for concern, as involvement in meaningful social activities has been found to raise the quality of life for persons in long-term care

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(LTC) facilities (Gonzalez-Salvador *et al*., 2000). Indeed, providing activities that are appropriate for persons with dementia not only engages these persons but also reduces negative behaviors (Cohen-Mansfield *et al*., 2007). Although it can be difficult to involve persons with dementia in activities, it is possible to do so when one has an understanding of the parameters that positively impact engagement.

Previously, we have described the Comprehensive Process Model of Engagement (Cohen-Mansfield *et al*., in press), in which we postulate that engagement with stimuli is affected by the characteristics of the person to whom a stimulus is presented, by the attributes of the stimulus, and by environmental characteristics. In this paper, we focus on how engagement may be affected by an individual's personal attributes, such as demographic variables, medical status, cognitive and physical functioning, and level of sensory functioning.

Demographic variables, such as age, gender, and education, have been examined relative to engagement in older persons by few researchers. Mendes de Leon *et al*. (2003) found that social engagement in older adults with dementia decreased with age and was higher among females, non-Blacks, and those with more years of schooling and higher income. As to gender differences, Zhang (2006) found that women tended to have greater cognitive impairment and participated less in leisure activities than did men. Ott *et al*. (2000) reported that men with Alzheimer's disease may have difficulties with social engagement as a result of behavior problems such as social impropriety.

Medical status (e.g. medical diagnoses and current medications) has been found to affect quality of life of persons with dementia as well as willingness to participate in activities. Kolanowski *et al*. (2006) reported that healthier and more cognitively intact older persons with dementia were able to participate longer in activities than were their less healthy counterparts. When administered acetaminophen for pain, nursing home residents with moderate-to-severe dementia spent more time in social interaction, engaged with media, talking to themselves, engaging in work-like activity, and less time alone in their rooms than they did when they received a placebo (Chibnall *et al*., 2005). Gonzalez-Salvador *et al*. (2000) examined quality of life in long-term care residents with dementia using the Alzheimer Disease Health-Related Quality of Life Scale (ADRQL) and found that nursing home residents who were treated with cholinesterase inhibitors had higher quality of life scores as compared to those who were not treated. The role of medication is not clear-cut, however, as these authors also found that quality of life was significantly worse in residents with a diagnosis of anxiety disorder who received anti-anxiety medication as compared to those with the same diagnosis who did not receive medication.

Several researchers found a relationship between functional status and participation in activities. Studies have shown decreased involvement with activities for those residents with lower cognitive functioning (Resnick *et al*., 1997; Dobbs *et al*., 2005; Kolanowski *et al*., 2006) and with greater ADL impairment (Voelkl *et al*., 1995; Resnick *et al*., 1997).

Sensory functions, such as hearing and vision, are often impaired in older persons with dementia (Marx *et al*., 1992; Cohen-Mansfield and Taylor, 2004). This impairment can be socially crippling, as sensory functions can play key roles in the development and maintenance of relationships among older persons (Marx *et al*., 1992; Horowitz, 1994) and in the ability to engage in social activities (Verbrugge and Patrick, 1995). Resnick *et al*. (1997) reported that increased visual impairment as well as moderate-to-severe hearing impairment in nursing home residents was associated with decreased levels of social engagement as well as time spent in nursing home activities. Sensory impairment has been found to correlate with not only reduced participation in leisure activities but also with

limitations in performing activities of daily living and instrumental activities of daily living (Branch *et al*., 1989; Marx *et al*., 1992; Horowitz, 1994).

Kitwood (1997) noted that although the need for occupation is still present in persons with dementia, the debilitating effects of the disease make it more difficult to meet this need. As such, he posited that knowing as much as possible about a person's interests, preferences and personal background increased the likelihood of this need being met. Kitwood defines the primary task of dementia care as 'the maintenance of personhood in the face of failing mental powers' (Kitwood, 1993). Indeed, the maintenance of personhood in dementia is important, as activities and stimuli relating to past preferences and self identity can reduce agitation and promote engagement in persons with dementia (Cohen-Mansfield *et al*., 2006, 2007).

The present study was conducted to examine the impact of personal attributes on engagement in persons with dementia. An understanding of specific personal attributes and how these relate to stimuli will ultimately guide us in the development of stimuli that will successfully engage persons with dementia. We hypothesized that persons with higher levels of cognitive functioning would manifest higher levels of stimulus engagement.

METHODS

Participants

Participants were 193 residents of seven Maryland nursing homes. All participants had a diagnosis of dementia. One hundred and fifty-one participants were female (78%), and age averaged 86 years, ranging from 60–101 years. The majority of participants were Caucasian (81%), followed by African-Americans (10%). Most participants were widowed (65%) or married (20%). In terms of education, 18% had less than high school education, 45% had high school education, and the rest had obtained either trade school or partial college education (12%), a bachelor's degree (13%) or graduate degree (12%). ADL performance, which was obtained through the Minimum Data Set (MDS; Morris *et al*., 1991), averaged 3.6 (SD = 1.0, range = 1–5; Scale: 1—'independent' to 5—'complete dependence'). Cognitive functioning, as assessed via the Mini-Mental State Examination (MMSE; Folstein *et al*., 1975), averaged 7.2 (SD = 6.3, range = 0–23). Participants had a mean comorbidity index of 4.7.

Assessments

Background data were collected through chart review and one-on-one interviews. Engagement was assessed through systematic observations via the Observational Measurement of Engagement Assessment (OME).

Background assessment—Data pertaining to background variables were retrieved from the residents' charts at the nursing homes by a trained research assistant and included the following demographic information: age, gender, marital status, level of education, and ethnicity, and the following medical information: a list of the resident's medical diagnoses and a list of medications taken by the resident (PRN and routine).

All participants had a diagnosis of a dementia, which we recorded as: Dementia—probable Alzheimer's disease; Dementia—possible Alzheimer's disease; Dementia—with the presence of vascular disorder (e.g. multi-infarct dementia); Dementia—with a diagnosis of Parkinson's disease; and Dementia—unknown etiology (i.e. cognitive impairment in an alert person that fits none of the categories above). The MMSE (Folstein *et al*., 1975) was

administered to each participant by a research assistant who was trained with regard to standardized administration and scoring procedures.

Comorbidity index—A trained research assistant recorded whether or not the study participant had a diagnosis of any of the following categories: Cardiovascular disease, Respiratory disease, Neurological disease, Musculoskeletal disease, Digestive system disease, Genitourinary disease, Blood disease, Endocrine system disease, psychiatric disorder, other diseases (e.g. allergy, eye disorder, cancer, skin diseases), and Dementia. From this information, we derived a comorbidity index for each participant, i.e. the number of diagnostic categories (out of the possible 11).

Data pertaining to activities of daily living (ADL) were obtained from the MDS (Morris *et al*., 1991). The MDS ADL measure assesses nine activities (bed mobility, transferring, locomotion on the unit, dressing, eating, toilet use, personal hygiene, bathing, bladder incontinence, and bowel incontinence) utilizing a scale from 1–5, with 5 representing maximum independence, and a mean ADL score was calculated for each participant. Other measures of functional status assessed via the MDS include speech clarity (1 = no speech, 2 = unclear speech, 3 = clear speech) and making oneself understood (1 = rarely/never understood, 2 = sometimes understood, 3 = usually understood; 4 = understood).

Vision and hearing were also assessed through the MDS. Vision was recorded on a five-point scale where 1 = severely impaired and 5 = adequate. Hearing was assessed along a four-point scale where 1 = highly impaired and 4 = hears adequately.

In order to determine activities of past interest to the participant, we interviewed the resident whenever possible and also conducted a telephone interview with the closest living relative of the study participant. Both resident and relative were administered the Self-Identity Questionnaire (SIQ; Cohen-Mansfield *et al*., 2006). The SIQ examines four types of role-identity: professional, family-role, leisure activities, and personal attributes.

Observational Measurement of Engagement (OME)—The OME was developed specifically to assess the levels of engagement of persons with intellectual disabilities, and includes several dimensions of engagement, including attention, attitude, duration and refusal, which are described below. OME data were recorded through direct observations using specially designed software installed on a handheld computer, the Palm One Zire 31™. Following our introduction of the engagement stimulus, we recorded whenever the participant refused the engagement stimulus (through words or actions). Specific outcome variables on the OME included the following:

Attention to the stimulus during an engagement trial was measured on this four-point scale: not attentive, somewhat attentive, attentive, and very attentive. In addition, we recorded the highest rating of attention (using the same four-point scale) that had been seen during the trial. Based on high correlations suggesting these capture a single construct (Cohen-Mansfield *et al*., in press), these ratings were averaged to form an attention variable. Attention could be gauged in several ways, including the amount of attention the person was visibly paying to a stimulus during the session (e.g. eye movements, manipulating or holding the stimulus, talking about the stimulus), and whether the person was following instructions provided (e.g. how to build with the blocks). Attention could also include physical manifestations without visual contact (e.g. stroking a cat, even if looking away).

Attitude toward the stimulus during an engagement trial was measured on a seven-point scale: very negative, negative, somewhat negative, neutral, somewhat positive, positive, and very positive. We also recorded the highest rating of attitude (on the seven-point scale) that

had been seen during the trial. Based on high correlations suggesting these capture a single construct (Cohen-Mansfield *et al*., in press), these ratings were averaged to form an attitude variable. Attitude was typically determined by gauging the amount of excitement and/or expressiveness toward the stimulus (e.g. smiling, frowning, energy, excitement in voice).

Duration, measured in seconds, referred to the amount of the time that the participant was engaged with the stimulus. This measure started after presentation of the engagement stimulus and ended at 15 min, or whenever the study participant was no longer engaged with the stimulus.

Refusal rate, this was calculated for each study participant as the number of stimuli refused divided by the total number of stimuli presented.

Inter-rater reliability, inter-rater reliability of the OME was assessed by six dyads of research assistants' ratings of the engagement measures during 48 engagement sessions with nursing home residents. Intraclass correlation (alpha values) averaged 0.78 for the engagement outcome variables.

Procedure

Informed consent was obtained for all study participants from their relatives or other responsible parties. Additional information on the informed consent process is available elsewhere (Cohen-Mansfield *et al*., 1988). Our main inclusion criterion was a diagnosis of dementia (derived from either the medical chart or the attending physician) based on DSM-IV criteria and the Report of the NINCDS-ADRDA. The criteria for exclusion were:

- The resident had an accompanying diagnosis of bipolar disorder or schizophrenia.
- The resident had no dexterity movement in either hand.
- The resident could not be seated in a chair or wheelchair.
- The resident was younger than 60 years of age.

Once consent was obtained for eligible participants, background information was retrieved from each participant's chart in the nursing home. In addition, the MMSE was administered to each participant. Those who received MMSE scores greater than 23 were dropped from the study, as persons with a comparatively higher level of cognitive functioning are usually able to articulate their interests and needs.

Systematic observations of engagement—A baseline observation was completed each day before presentation of the stimuli to measure participants' level of engagement in normal activities. Each study participant was then presented with 22 different predetermined engagement stimuli over a period of three weeks (approximately four stimuli per day). The stimuli were: a life-like doll, a plush animal, a childish doll, an expanding sphere, music, a tetherball, a squeeze ball, a large print magazine, a fabric book, a respite video, a wallet/purse, an activity pillow, envelops to stamp, markers and coloring pages with which to color, towels to fold, flower arrangement, building blocks, a robotic animal, a sorting task, a puzzle, and two stimuli personalized for each resident on the basis of past and present interests. The personalized stimuli were designed after identifying the most important role identity (e.g. family, occupation) or preference in the participant's life, both past and present through the Self-Identity Questionnaire (Cohen-Mansfield *et al*., 2000). All personalized stimuli were designed so that they: (1) were directly related to the detailed content and/or context of the role identity; (2) were considered appropriate for the cognitive, physical, and sensory abilities of the participant, and (3) took into account the demographics of the participant (e.g. gender, highest level of education). All stimuli were presented to each

participant. Presenters asked if the participant would like to engage in the activity and then left the room. If a study participant asked questions or needed more modeling of the engagement stimulus, the research assistant provided these before leaving, and this was recorded on the OME. If the participant refused the engagement stimulus, the research assistant removed it and left the room, and this information was recorded on the OME. Engagement trials took place between 9.30 am and 12.30 pm and between 2 pm and 5.30 pm, as these are the times that residents are not usually occupied with care activities at the nursing home (e.g. meals in the dining room, bathing). Individual engagement trials were separated by a washout period of at least 5 min. The order of stimulus presentation was randomized for each participant.

A second research assistant, who remained unobtrusive, observed the participant's reaction and engagement with the stimulus via the OME, entering the data directly onto a Palm Pilot Zire31™. As described earlier, the OME included items measuring the participant's attention to the stimulus during engagement, attitude toward the stimulus, and duration of engagement. Each trial lasted a minimum of 3 min. If the participant showed no interest in the stimulus after 3 min, the trial was terminated and the first research assistant retrieved the engagement stimulus. If the participant became engaged with the stimulus, the trial lasted throughout the extent of the participant's engagement—up to a cutoff time of 15 minutes. When it appeared to the research assistant that the study participant was no longer engaged (for those trials that lasted more than 3 min), the research assistant continued to observe the study participant, ending the trial after 30 sec if the study participant showed no further engagement. Disengagement was determined by the resident no longer looking at, touching, responding or reacting to or showing visible interest in the stimulus.

Analytic approach—Dependent measures were duration, attention, attitude, and refusal rate. When a study participant refused a stimulus, we coded duration as 0 sec and scored both the attention and attitude variables as missing for that trial for the purpose of analysis. We calculated an average rating for each study participant across all the stimuli in order to examine the impact of personal characteristics. Independent *t*-tests were used when comparing two levels of a personal attribute (e.g. gender), analysis of variance was used when comparing more than two levels, and Pearson correlations were used for continuous data (i.e. age or MMSE score). Multiple regression using stepwise selection was also undertaken. All statistical analyses were performed using SPSS software.

RESULTS

Examination of analyses with demographic variables revealed a trend for gender. Women had a longer mean engagement duration (154.9 sec) than men (mean = 119.2 sec) ($t_{(191)}$ = 1.820, p = 0.07, see Table 1). Significant results were not seen with the other demographic variables, namely age, marital status, ethnicity, or education.

As to the variables pertaining to medical status, significant findings emerged for comorbidity index and number of medications (see Table 1). There was a positive and significant correlation between comorbidity index and engagement duration. In addition, there was a positive and significant correlation between the number of medications and attention, and a trend toward a positive relationship between engagement duration and number of medications. Analyses with number of psychotropic medications were not significant.

Correlations of MMSE scores with the engagement outcome measures were all positive and significant (see Table 1), suggesting a link between higher cognitive functioning and longer engagement duration, more attention, a more positive attitude, and a higher refusal rate.

As for the four variables included in the category of functional status, all analyses yielded significant test statistics (see Table 1). Greater ADL independence was linked with longer engagement times, greater attention, more positive attitudes, and a higher refusal rate. The better an individual's clarity of speech and ability to make his or herself understood, the longer the engagement time and attentiveness, as well as a more positive attitude and higher refusal rate.

As to the two variables concerned with sensory function, vision did not yield significant correlations with any of the four outcome measures, whereas one analysis with hearing was significant. A significant correlation emerged between hearing and refusal rate, where study participants with poor hearing had a higher refusal rate ($r = -0.244$, $p \leq 0.001$, see Table 1). None of the other analyses with hearing were statistically significant.

Engagement duration, attention, attitude and refusal rate served as separate dependent variables for the next analyses. The independent variables were those found to be related to the engagement outcome measures in the bivariate analyses (see Table 1). Multiple regression equations were estimated for each of the dependent variables using stepwise selection (see Table 2). MMSE was a potent predictor for the four engagement outcome measures. As to the individual response measures, longer engagement duration was predicted by a positive MMSE score (i.e. higher cognitive functioning) and by a comparatively higher comorbidity index. Attention was positively related to higher cognitive functioning as well as to being female, greater speech clarity, and more ADL independence. Residents with a positive attitude tended to be those with higher cognitive functioning, greater speech clarity, and more ADL independence. Finally, refusal rate was predicted by comparatively higher cognitive functioning and ability to make oneself understood as well as by poor hearing. Number of medications did not enter any regression equation.

Additional stepwise multiple regressions were undertaken using different dependent variables. Rather than using a mean score across all observations for each study participant for engagement duration, attitude, and attention, we used the maximum score for each of the three response measures for each study participant. On the basis of bivariate analyses with the maximum engagement outcome measures, we excluded two of the independent variables from Table 2 (comorbidity index, number of medications) and included one independent variable, the number of activities of past interest to the participant, in these regression analyses. The results are presented in Table 3. Study participants with longer engagement durations tended to be female, with greater speech clarity, more ADL independence, and a greater number of activities of past interest. Maximum attention was positively related to greater speech clarity and more ADL independence. Residents with a positive attitude tended to be female with higher cognitive functioning and more ADL independence. The independent variable of making oneself understood did not enter any regression equation.

DISCUSSION

Our analysis revealed that cognitive and functional status were significantly related to the engagement outcome measures, a result consistent with previous researchers (Voelkl *et al*., 1995; Resnick *et al*., 1997; Dobbs *et al*., 2005). Moreover, we found that hearing loss and being female played a role in engagement across our group of stimuli. Caregivers should anticipate higher refusal rates in those with poor hearing, and therefore compensatory methods should be used in presenting stimuli in this population.

An additional finding of note was the positive and significant relationship between comorbidity index and engagement duration. This can be compared with Kolanowski *et al*. (2006) who reported that healthier and more cognitively intact persons were able to

participate longer in activities than their less healthy counterparts. The result concerning cognitive function is consistent with the results of the present study, as cognitive function had the highest correlation with the engagement variables. The result concerning health status may appear contradictory. It may, however, be a byproduct of the selection process into the nursing home. That is, persons may enter a nursing home either because they have severe cognitive problems or because of other advanced disease states. Therefore, the sicker population may be the more cognitively intact. This is supported by a positive trend seen in the correlation of MMSE with comorbidity index in our sample(r = 0.129, n = 188, p = 0.079 two-tailed).

An intriguing finding is the result that better cognitive function is associated with higher rates of refusal as well as higher levels of engagement. Upon reflection, it makes sense that persons with higher levels of cognitive function are more selective in the stimuli with which they are willing to engage, especially with respect to the current selection that included stimuli that would not be socially acceptable to most adults. However, with the higher rate of refusal, their higher level of cognition allowed them to pay more attention to the stimuli that they had not refused. This focus on desired stimuli was so much more effective in those with higher cognitive functioning as compared to lower that even in the measure of engagement duration that controls for refusal (since refusal is coded as 0 sec for duration and as missing for attention), engagement duration is still higher in those with higher levels of cognitive function. Therefore, despite a higher refusal rate among those with higher cognitive levels, their engagement with stimuli is overall higher.

A limitation of this study is the reliance on the MDS for information concerning vision and hearing. Future research needs to complete direct clinical assessments to provide more objective and accurate measures of sensory processing as well as of dexterity. Another limitation pertains to the fact that all participants were from the Washington Metropolitan Area, and a single county in Maryland may not be generalizable to other cultures and ethnic backgrounds. However, the literature has shown that even results obtained from a Caucasian population in one nursing home (Cohen-Mansfield *et al.*, 1989) showed remarkable generalization to many other populations including French (Micas *et al*., 1997), Dutch (De Jonghe and Kat, 1996), Japanese (Schreiner *et al*., 2000), Chinese (Choy *et al*., 2001), and worldwide (Rabinowitz *et al*., 2005). Furthermore, the participants were similar in their demographic characteristics to the nursing home population based on the National Nursing Home Survey (NNHS; Jones, 2002). For example, 78% of our participants were female as compared to 72% of the NNHS participants; 83.2% of our sample was Caucasian (non-Hispanic) and 11.5% African-American as compared to 85.8% and 11.4%, respectively, for the NNHS; 65.9% of our sample was widowed and 18.1% married as compared to 57.8% and 17.7%, respectively, for the NNHS.

The portion of variance explained by the regression is modest. That is partially due to the fact that in this paper we focus on only one factor that affects level of engagement, namely personal attributes. As stipulated in the Comprehensive Process Model of Engagement (Cohen-Mansfield *et al*., in press), other factors affect engagement, including stimuli attributes, environmental conditions, method of presentation, and the match between stimuli and personal preferences and characteristics. We are currently analyzing data to clarify some of those mechanisms, including the differential impact of different stimuli and stimuli attributes. It may behoove future researchers to study the personal characteristics of persons with dementia in a holistic way, as their life histories, preferences, values, and attitudes may have an impact on engagement globally or in reference to particular stimuli. Future research should also examine whether hearing augmentation reduces refusal rates.

Although more research is clearly needed, we are encouraged by the findings of the present study, as knowledge about how personal characteristics impact engagement gives caregivers insight by which to tailor activities to nursing home residents' needs, interests, and limitations.

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KEY POINTS

- Engagement in meaningful activities raises the quality of life for these persons and reduces caregiver burden, yet nursing home residents spend the majority of their time not engaged in any kind of activity, which can increase problem behaviors.
- Attention and attitude towards stimuli were related to personal attributes indicating improved function: cognitive functioning, ability to perform activities of daily living, and speech clarity. While those parameters of engagement increase with higher cognitive and functional status, refusal also increases with higher cognitive function and with hearing impairment.
- Despite the higher refusal rate among those with higher cognitive functioning, the measure of duration of engagement, which incorporates both refusal and attention, still increases with higher levels of cognitive function.
- To achieve a more complete understanding of the engagement of persons with dementia, there is a need to understand, in addition to the impact of personal attributes described above, the impact of stimulus attributes, environmental effects and their interactions with personal preferences and attributes. Future research should also examine whether hearing augmentation reduces refusal rates.

Table 1

Correlation coefficients and *t*-values describing the relationship between residents' personal attributes on mean engagement outcome measures

Personal attribute	Engagement duration (sec)	Attention	Attitude	Refusal rate
Gender (Female, Male)	$t_{(191)} = 1.820$, $p = 0.070$	NS	NS	NS
Comorbidity index[a]	r =.186**	NS	NS	NS
Number of medications	$r = 0.122$, $p = 0.090$	$r = 0.145$*	NS	NS
MMSE	$r = 0.264$***	$r = 0.483$***	$r = 0.401$***	$r = 0.425$***
ADL	$r = 0.142$*	$r = 0.415$***	$r = 0.373$***	$r = 0.283$***
Speech clarity	$r = 0.214$**	$r = 0.362$***	$r = 0.328$***	$r = 0.251$***
Making self understood	$r = 0.143$*	$r = 0.378$***	$r = 0.325$***	$r = 0.375$***
Hearing[b]	NS	NS	NS	$r = -0.244$***

* $p \leq 0.05$;

** $p \leq 0.01$;

*** $p \leq 0.001$ (two-tailed).

NS =not significant.

[a] Comorbidity index =the number of diagnostic categories (out of these possible 11: Cardiovascular disease, Respiratory disease, Neurological disease, Musculoskeletal disease, Digestive system disease, Genitourinary disease, Blood disease, Endocrine system disease, psychiatric disorder, other diseases (e.g. allergy, eye disorder, cancer, skin diseases), and Dementia).

[b] Hearing was assessed along a four-point scale where 1 = highly impaired and 4 =hears adequately.

Note: age, marital status, ethnicity, education, type of dementia, vision, and number of psychotropic medications were not significantly related to the engagement variables.

Table 2

Beta and Total R^2 associated with the four engagement outcome measures

Independent variables	Engagement duration (seconds)	Attention	Attitude	Refusal rate
Gender (female, male)		−0.130*		†
Comorbidity index	0.154*			†
Number of medications				†
MMSE	0.244***	0.329***	0.246***	0.300***
Speech clarity		0.172**	0.178**	
ADL		0.247***	0.229***	
Making oneself understood				0.219**
Hearing[a]	+	+	+	−0.175**
Total R^2	0.093	0.337	0.242	0.252

* p <0.05;

** p <0.01;

*** p <0.001.

[a] Hearing was assessed along a four-point scale where 1 = highly impaired and 4 =hears adequately.

+ Variables were not included within analysis.

Table 3

Beta and Total R^2 associated with maximum duration, maximum attention, and maximum attitude

Independent variables	Maximum engagement duration (seconds)	Maximum attention	Maximum attitude
MMSE			0.165*
Speech clarity	0.163*	0.182*	
ADL	0.201**	0.304***	0.244**
Making oneself understood			
Number of activities of past interest to the participant	0.171*		
Gender (female, male)	−0.142*		−0.175*
Total R^2	0.131	0.155	0.141

* $p < 0.05$;

** $p < .01$;

*** $p < 0.001$.