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Research Article

# Television Viewing, Physical Activity, and Loneliness in Late Life

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## Abstract

**Background and Objectives:** Television viewing is the most common leisure activity in late life and may ease loneliness but encourage sedentary behavior. These associations may be particularly evident among older adults who live alone and who may lack other forms of companionship throughout the day.

**Research Design and Methods:** Adults aged 65+ ($N$ = 257) participated, of whom 34% lived alone. Participants completed an initial interview followed by a 5- to 6-day data collection involving multimethods: (a) Electronically Activated Recorders (30 s every 7 min) provided audio recordings of television viewing, (b) Actical accelerometers objectively measured physical activity, and (c) ecological momentary assessments every 3 hr assessed social interactions.

**Results:** On average, older adults spent approximately 37% of their waking time (6.4 hr a day) watching television. Multilevel models revealed that television viewing occurred when participants were alone or with a spouse and was associated with a greater proportion of time sedentary, lower activity, and higher ratings of loneliness compared to when not watching television. Older adults who lived alone reported greater loneliness during 3-hr intervals when viewing television, but older adults who lived with others spent a greater proportion of time sedentary when viewing television.

**Discussion and Implications:** Findings are discussed with regard to different rationales and ways of watching television—as compensation for social isolation or as a passive leisure activity with a social partner. We discuss ideas for research on additional aspects of television viewing and screen time in late life.

**Keywords:** Accelerometers, Sedentary, Social isolation, TV viewing

Leisure activity stems from choices individuals make about discretionary time. In late life, leisure activities may enhance or deter physical, cognitive, and emotional functioning. Television comprises the most frequent leisure activity in late life, pervasive during waking hours. On average, older adults watch television 7 hr a day (Harvey et al., 2015; Van Der Goot et al., 2006). Cross-sectional and longitudinal data suggest that television viewing increases with age into very late life (Gardner et al., 2014; Mares & Woodard, 2006). A vast literature has shown that individuals who are lonely or who experience social isolation bear greater risk of poor psychological and physical health (National Academies of Science, Engineering, and Medicine, 2020) and they may watch television more frequently because they have little else to do or because they use television to compensate for lack of social interaction (Cauwenberg et al., 2014; Tsao, 1996). Television viewing is associated with being sedentary

and health problems in late life (Katzmarzyk & Lee, 2012; Otten et al., 2009; Thorp et al., 2010). If individuals use television to compensate for a lack of social ties, given the sedentary aspect of TV viewing, it may serve a role in associations between loneliness and physical well-being in late life.

## The Social Context of Television Viewing

A compensation model of social engagement suggests that individuals seek different social partners or activities to substitute for the functions of an absent social partner, including companionship (Cornwell et al., 2020; Ferraro, 1984). By extension, individuals may use television as a pseudosocial partner to compensate for lack of companionship with other social partners. Studies from the Netherlands and Belgium find that widowed older adults are more likely to watch television than married older adults, and some report using television for companionship or to structure their day (Cauwenberg et al., 2014; Van Der Goot et al., 2012). A study of over 5,000 individuals aged 16 and older in the Netherlands suggested that television viewing may be both a cause and a consequence of social isolation (Toepoel, 2013). A U.S. study conducted in the 1990s found that television viewing was most commonly used to compensate for a deficit of social activity (Tsao, 1996). Notwithstanding, television does not completely parallel theoretical principles of substituting new social partners in late life. Indeed, more recent national studies in the United States (e.g., General Social Survey) found no significant associations between self-reported television viewing and demographic or social characteristics (Depp et al., 2010; Mares & Woodard, 2006). Likewise, a study of widowed older women found that those who described using TV to substitute for social partners reported *poorer* psychological health (Zettel & Rook, 2004).

Television viewing could also enhance relationships, particularly marriages. Television may serve as a shared activity contributing to relationship cohesion. Studies from the 1980s found that older adults watched television with a close social partner as a form of companionship, rather than as compensation for companionship when alone (Rubin, 1984; Rubin & Rubin, 1982). Another study found college students watched television to form a sense of connection in romantic ties (Gomillion et al., 2017). Television may serve to enhance cohesion in newer relationships or as passive leisure after many years of marriage.

In sum, we hypothesized that TV viewing may serve as a pseudosocial tie (in the absence of other social contact) or a shared leisure activity in close ties. To examine these issues, we considered the social context of television viewing for the same individual throughout the day. We asked whether the same individual is more likely to watch television when they are (a) alone or (b) in the company of a romantic partner, as well as (c) how television viewing is associated with loneliness throughout the day, and (d) whether these patterns are distinct for individuals who live alone compared to those who live with a spouse or other family members. We also assessed whether physical activity or sedentary behaviors co-occurred with television viewing throughout the day.

## Television Viewing and Loneliness

Television viewing may stem from loneliness. Research with undergraduate students in the 1980s linked television viewing to feelings of chronic loneliness (Perse & Rubin, 1990). As discussed previously, some studies have linked self-reports of television viewing to statuses characterized by possible social isolation in late life (e.g., widowhood, living alone), but these statuses might be associated with other factors (e.g., those who live alone are more lonely and also have more time for solitary activities).

It is important to consider whether television viewing and loneliness are linked when they occur throughout the day. For example, television is a primary source of sedentary behavior in late life (Katzmarzyk & Lee, 2012; Otten et al., 2009; Thorp et al., 2010). Likewise, loneliness is associated with a variety of poor health behaviors (Kobayashi & Steptoe, 2018). A concurrent association between television viewing, loneliness, and sedentary behavior suggests one potential mechanism in the processes linking loneliness and poor health.

Television viewing has been associated with mood more generally. A daily diary study with adults aged 33–83 found that higher positive emotion one day predicted reduced duration of television viewing the next day (Bayraktaroglu et al., 2019). In the 1980s, Kubey and Csikszentmihályi (1990) relied on ecological momentary assessments (EMAs; brief surveys) throughout the day among adults aged 18–63 (younger than participants in the current study). Participants reported feeling relaxed while viewing television but also reported diminished positive affect and wishing there were something else to do.

In sum, we speculated that television viewing may arise from diminished positive feelings (Bayraktaroglu et al., 2019) and also may be associated with loneliness (Depp et al., 2010). In other words, based on a compensation model, individuals may view television as a substitute for social contact, but feel frustrated that television viewing is not fulfilling. These principles may not hold true for television viewing with a spouse because television viewing may constitute shared leisure. Thus, we expected stronger associations between television viewing and loneliness for older adults who live alone (compared to those who live with a spouse or other family members) because television may play a greater role in their lives.

## The Current Study and Other Factors Associated With Television Viewing

Studies have relied on older adults' estimates of how many hours a day they watch TV rather than objective assessments of television viewing in everyday life (Gardner et al., 2014; Mares & Woodard, 2006). Responses may reflect the salience of television in memory rather than actual viewing. Some studies of television viewing have used the Day Reconstruction Method where individuals recount events the prior day (Depp et al., 2010) or EMAs (Kubey & Csikszentmihályi, 1990), but these studies rely on self-report. We used objective assessments of television viewing by recording ambient sound in the environment as older adults went about their day.

We considered other factors associated with television viewing and loneliness: gender, age, education, health, and ethnic or racial minority. Women have more social ties and engage in greater social activity, and report less loneliness (National Academies of Sciences, Engineering, and Medicine, 2020). Older adults with less education self-report more television viewing (Gardner et al., 2014). Likewise, older adults in poor health watch more television (Cauwenberg et al., 2014) and report greater loneliness (National Academies of Sciences, Engineering, and Medicine, 2020). Older adults from minoritized populations tend to report greater loneliness and poorer health (National Academies of Sciences, Engineering, and Medicine, 2020).

In sum, we predicted that (a) increased television viewing would occur more often when alone or with a spouse than with other social partners, (b) living alone would be associated with more television viewing than living with others, and (c) television viewing would be associated with diminished physical activity, prior and concurrent loneliness, and these associations would be stronger when individuals live alone due to the greater role of television in their lives.

## Method

In total, 333 adults older than 65 years in the greater Austin metropolitan area participated in the *Daily Experiences and Well-being Study* (DEWS) in 2016. The sample was recruited via listed phone numbers and random digital dialing using city area codes (most older adults still used landlines in 2016; Kennedy et al., 2016). Participants with listed addresses received a letter introducing the study. All participants received phone calls to screen for study criteria and for recruitment. Materials were available in Spanish and in English with bilingual interviewers conducting interviews in Spanish for those who preferred. The initial response rate was 79.5% of eligible participants. Of the 333 participants who participated, 257 provided data on all measures examined in this study.

Participants completed a baseline interview of 1–2 hr in their homes assessing family ties and broader social networks, demographic characteristics, and well-being. They then completed a 5- to 6-day intensive data collection across 3 weekdays and 2 weekend days. This included three ambulatory assessments: (a) Electronically Activated Recorder (EAR) capturing 30 s of sound every 7 min, (b) Actical accelerometer assessment of physical activity, and (c) EMAs with self-reports of their social interactions and mood. Participants received $50 for completing the baseline interview and $100 for the intensive data collection. We provided participants with a handheld Android device with the EAR app and the EMA survey software. We offered training for older adults not familiar with smart phones and daily phone calls to ensure the technology was working. Wrist-mounted Actical accelerometers used in this study have been validated for use with older populations to objectively measure physical activity and sedentary behavior during the 5- to 6-day period (Hooker et al., 2011).

This sample included 257 older adults ($M_{age}$ = 73.97, $SD$ = 6.54) who completed all three types of intensive data collections (Table 1). Older adults who did so were less likely to identify as ethnic or racial minority ($\chi^2$ = 20.13, $p$ < .001) than excluded participants ($n$ = 76) but did not differ regarding other demographic characteristics. Overall, participants were in good health ($M$ = 3.56, $SD$ = 1.01) on a 5-point scale. About 26% of older adults identified as racial or ethnic minority; the percentage of Hispanic older adults is representative of the population of Austin over the age of 65, (15%), but the subsample of African Americans is higher than the population of Austin (15% in the study, 8% in the population; U.S. Census Bureau, 2019). This is one of the largest and most diverse studies of older adults that utilizes ambulatory assessments (see Demiray et al., 2019 and Ram et al., 2014 for comparisons). Austin is a highly educated city, 45% of adults aged 65+ have a college degree (U.S. Census Bureau, 2019), 57% of this sample had a college degree, but 15% had high school education or less.

### Baseline Interview

#### Background characteristics

Participants reported their age, gender (1 = male, 0 = female), educational attainment (from 1 = *no formal education* to 8 = *advanced degree*), and ethnicity and race (recoded as 1 = *ethnic or racial underrepresented group* and 0 = *non-Hispanic White*). Participants rated their health on a scale from 1 (*poor*) to 5 (*excellent*; Idler & Kasl, 1991; see Table 1).

Participants reported their marital status (married/remarried, cohabiting, widowed, divorced, never married; see Table 1). We recoded the variable as 1 = *married or cohabiting* and 0 = *not married or cohabiting*, but also estimated sensitivity tests comparing (a) married/cohabitating, (b) widowed, and (c) divorced older adults (dropping nine participants who were never married). Participants indicated with whom they lived: alone, spouse,

**Table 1.** Sample Description and Proportion of Experiences Throughout the Day

| | Participants ($N$ = 257) | | | |
|---|---|---|---|---|
| Variables | *M* | *SD* | Range | Proportion |
| Age | 73.97 | 6.54 | 65–90 | |
| Self-rated health[a] | 3.56 | 1.01 | 1–5 | |
| 3-hr assessments | | | | |
| Loneliness[b] | 1.16 | 0.48 | 1–5 | |
| Positive mood[c] | 3.49 | 0.78 | 1–5 | |
| Negative mood[d] | 1.22 | 0.37 | 1–5 | |
| Physical activity[e] | 10.78 | 10.01 | 0–146 | |
| Female | | | | .55 |
| Marital status | | | | |
| Married/cohabitating | | | | .58 |
| Divorced | | | | .18 |
| Widowed | | | | .20 |
| Never married or other | | | | .04 |
| Ethnic or racial minority | | | | .26 |
| Live alone | | | | .34 |
| Education | | | | |
| High school or less | | | | .15 |
| Some college | | | | .28 |
| College graduate or more | | | | .57 |
| Proportion of 3-hr assessments | | | | |
| Television viewing[f] | | | | .37 |
| Social encounters[g] | | | | |
| Spouse (married participants only) | | | | .81 |
| Intergenerational ties (child, grandchild) | | | | .22 |
| Friends | | | | .18 |
| Other family[h] | | | | .13 |
| Other social partners[i] | | | | .27 |
| Alone[j] | | | | .24 |
| Sedentary behavior[k] | | | | .48 |

*Notes*: Participants $N$ = 257. Assessments $N$ = 4,024.
[a]1 (*poor*) to 5 (*excellent*).
[b]1 (*not at all*) to 5 (*a great deal*).
[c]Average score of four items (proud, content, loved, and calm) from 1 (*not at all*) to 5 (*a great deal*).
[d]Average score of five items (nervous/worried, irritated, bored, lonely, and sad) from 1 (*not at all*) to 5 (*a great deal*).
[e]Measured via Acticals: Higher scores represent more physical activity.
[f]Measured via coding of the Electronically Activated Recordings (EAR) obtained 30 s out of every 7 min: Proportion of EAR assessments with television viewing.
[g]Proportion of ecological momentary assessments (EMAs) that participants encountered different categories of social partners.
[h]Siblings, cousins, and other extended family.
[i]Acquaintances, neighbors, and others.
[j]Proportion of EMAs lacking in-person contact.
[k]Measured via Acticals: Proportion of time that participants were sedentary.

child, grandchild, and other. We generated a dichotomous code 1 = *living alone* and 0 = *living with others*.

### Close social ties

Participants listed their closest social ties using the Social Convoy Measure (Antonucci et al., 2014) and provided information about their relationships to these social partners (e.g., spouse, child, friend). This measure is widely used with adults of all ages throughout the world; participants generate an assessment of their network of social partners who are close and important to them in three concentric circles (Antonucci et al., 2014).

## Intensive Data Collection

### Ecological momentary assessments

The EMA is a widely used approach to obtain self-reports throughout the day, proximate to when events occur and has been used successfully with older adults (Moskowitz & Young, 2006; Ram et al., 2014; Zhaoyang et al., 2018). DEWS participants used a study-provided handheld Android device to answer questions about their social encounters every 3 hr. In an innovation of this study, we transferred information regarding the 10 closest ties from the Convoy Measure to the Android device. At each EMA, participants reported whether they had contact

with each of these social partners and up to six other social partners. Thus, we asked whether television viewing occurs when alone, with spouse, or other social partners. Participants also indicated mode of contact—in person, by telephone, or electronic (e.g., text, social media). We classified absence of in-person contact as being alone, but also conducted sensitivity tests with regard to phone and text contact.

At each 3-hr assessment, participants rated their loneliness as well as four negative emotions (e.g., nervous, irritated, sad, and bored) and four positive emotions (e.g., content, loved, calm, and proud) from 1 = *not at all* to 5 = *a great deal* (Huo et al., 2019; Leger et al., 2019). Ratings of single emotions are used in EMA surveys due to respondent burden, and the emotions assessed here are consistent with other EMA studies (Chui et al., 2014; Ram et al., 2014).

### Electronically Activated Recorders

The Android device included the EAR app which recorded ambient sound 30 s out of every 7 min during waking hours in the 5- to 6-day data collection. The EAR provides an ecologically valid assessment of acoustic exposures and language production throughout the day (Mehl, 2007, 2017; Mehl & Robbins, 2012; Robbins et al., 2011). Participants wore the Android device on a study-provided belt fit to their waist to assure consistency in the body location of the microphone. This is the first study to use the EAR to capture television viewing. We obtained 135,078 audio files, the largest known sample of naturalistic sounds files from an older adult population. Coders rated each file containing sound ($N$ = 110,407) for the presence of television. Coders were able to differentiate television from other background noise (including radio) with over 99% reliability; the few disagreements reflected coder inattention.

### Physical activity and sedentary behavior

We assessed physical activity using Actical accelerometers (Phillips Respironics Actical Z). These devices are unobtrusive, waterproof, and comfortable to wear, much like a wristwatch, and are validated for use with adults of all ages (Huisingh-Scheetz et al., 2016; Troiano, 2006). The Actical assessed physical activity and sedentary behavior continuously, every minute 24 hr a day during the 5- to 6-day period (Healy et al., 2011). We used activity energy expenditure counts (the standard unit) per minute. We also used the predetermined cutoff for sedentary (0.00–0.30) and averaged proportion of time sedentary for each 3-hr interval.

## Analytic Strategy

We aggregated the data using time stamps from each device with the 3-hr responses in the EMA. That is, we used (a) proportion of time television viewing every 3 hr, (b) proportion of time sedentary every 3 hr, and (c) mean activity level every 3 hr within each participant.

To test hypotheses, we estimated two-level multilevel models with measurement interval nested within participant. We considered three-level models (intervals nested within days and days nested within individuals), but television viewing did not vary at the day level. The outcome was the proportion of TV viewing at each 3-hr interval. In all models, we adjusted for participant age, gender, education, minority status, and health. When relevant, we also controlled for person-specific mean of each time-varying predictor (e.g., social encounters) to distinguish within-person changes (e.g., intervals with social encounters are compared to the intervals without; Level 1) from between-person differences (e.g., individuals with more social encounters on average are compared to their counterparts with fewer social encounters on average; Level 2) across the study period. This method accounts for different associations between the predictors and the outcomes at different levels in multilevel data (Hamaker & Muthén, 2020).

Our first hypotheses pertained to the social context of television viewing. We estimated a multilevel model treating being alone during a 3-hr interval (1 = *alone* and 0 = *had in-person contact with at least one social partner*) as the predictor. In a second model, we investigated whether participants were more likely to watch television with their spouse compared to other familial (e.g., grown child) and nonfamilial (e.g., friend, acquaintance) social partners. Participants could be with more than one social partner at each 3-hr interval (e.g., with spouse and grown child, friend and acquaintances). We entered dichotomous variables for the presence of each type of tie: spouse, intergenerational ties (child, grandchild), other family (sibling), friend, or other social partners (e.g., acquaintance, community group member) coded as 1 = *with that type of partner* and 0 = *not with that partner*.

Hypothesis 2 asked whether individuals who live alone are more prone to watching television overall. We addressed the participant's living situation and their average television viewing (mathematically equivalent to total TV viewing) in a linear regression model. In Hypotheses 1 and 2, we adjusted for variables associated with TV viewing or social context, including age, gender, education, minority status, and self-rated health. Living alone was strongly negatively correlated with being married ($r$ = –.71), and due to potential multicollinearity, we did not consider marital status in these analyses.

We anticipated that television viewing would predict proportion of time sedentary, physical activity, and loneliness at each 3-hr interval. We controlled for the variables listed above. In these analyses, we also controlled for the presence of different social partners by entering the relationship types treated as predictor variables in hypothesis 1. This allowed us to examine effects from television viewing above and beyond the presence of social partners (e.g., does television decrease loneliness beyond being with a spouse?).

We estimated multilevel moderation models with the between-participant level residential status (i.e., lives alone vs lives with others) crossed with proportion of time spent viewing television to predict sedentary behavior, physical activity, and loneliness as the outcomes. We also estimated an interaction between television viewing and being alone (regardless of residential status) to ask whether associations with outcomes were stronger when watching television alone (regardless of residential status).

Sensitivity tests considered positive and negative mood overall (rather than just loneliness). We also examined lagged effects of television viewing at one time and loneliness at the next interval and vice versa.

## Results

We examined the proportion of the day that individuals were engaged (a) in television viewing, (b) with each type of social partner or alone, and (c) in being sedentary and physically active (see Table 1). On average, participants spent 37% of waking hours watching television. Participants spent time with a social partner during three quarters of assessments (76%). Married individuals were with their spouse at 81% of assessments. Participants reported spending time with grown children or grandchildren or with friends at approximately a fifth of assessments.

### Social Context of Television Viewing Throughout the Day

We examined within-person associations between social encounters at the 3-hr interval and TV viewing. Using each respondent as his/her own control, we first assessed whether the presence of other people would be associated with television viewing. As expected, individuals spent more time watching television during a 3-hr interval when they were alone than with other people. A second model examined the associations between television viewing and each type of relationship. Being with a spouse/partner was associated with more television watching at a given 3-hr interval, compared to a different 3-hr interval without the spouse/partner. In contrast, being with friends, other family members (e.g., sibling, in-laws), or acquaintances was associated with less television watching, compared to a different 3-hr interval without the respective social encounters. There was no within-person association between presence of intergenerational partners (i.e., a child or grandchild) and television viewing (see Table 2).

We expected older adults who reside alone to watch more television. Regression analysis did not reveal a significant main effect between residential status and television viewing (findings not shown).

### Television Viewing, Sedentary Behavior, Physical Activity, and Loneliness

We examined the associations of television viewing with activity, sedentary behavior, and loneliness. In these analyses, we controlled for the presence of different types of social partners to assess effects of watching television beyond presence of those social partners. Television viewing was associated with greater proportion of time sedentary and diminished physical activity and showed a positive association with loneliness (Table 3).

Multilevel models including moderation effects indicated that older adults' residential status moderated the association of television viewing on sedentary behavior, physical activity, and loneliness (Table 4). As expected, positive associations between television viewing and loneliness were stronger for older adults who live alone ($B = 0.10$, $p < .001$), and television viewing was not associated with loneliness for older adults who live with others ($B = 0.01$, $p = .628$; see Figure 1). The association of television viewing with diminished physical activity was more pronounced among those who reside with others ($B = -6.19$, $p < .001$) than it was for those who live alone ($B = -2.93$, $p < .001$). The interaction between residential status and television viewing had a parallel pattern with sedentary behaviors. Positive associations between television viewing and a greater proportion of time sedentary were stronger for older adults who reside with others ($B = 0.18$, $p < .001$) than for those who live alone ($B = 0.11$, $p < .001$). Interactions between television viewing and being alone showed similar pattern of findings on the level of physical activity and time sedentary (Supplementary Figure 1). We estimated sensitivity tests and considered the four-item positive and negative mood scales. Television viewing was not associated with positive or negative mood, suggesting the association is specific to loneliness. We estimated sensitivity tests to compare television viewing and its associations with loneliness and physical activity for different categories of marital status (i.e., married/cohabiting, divorced, widowed); findings revealed no differences between the participants who were divorced and those who were widowed.

We also estimated lagged analyses to ascertain whether loneliness at one time predicted television viewing, and whether television viewing predicted loneliness at the next time period. The lagged effects were not significant.

## Discussion

Consistent with other research, older adults in this study spent over a third of their waking hours with the television on. Implications of television viewing for physical and psychological health in late life are of considerable interest, and this study examined those associations as they occur naturally in daily life.

**Table 2.** Multilevel Model Predicting Television Viewing From Time Alone and Social Encounters

| Parameter | Television Viewing[a] | | Television Viewing[a] | |
|---|---|---|---|---|
| | *B* | *SE* | *B* | *SE* |
| Fixed effects | | | | |
| Intercept | 0.54*** | 0.05 | 0.67*** | 0.07 |
| Alone[b] | 0.14*** | 0.01 | — | — |
| Social encounters[c] | | | | |
| Spouse | — | — | 0.09*** | 0.02 |
| Intergenerational (child, grandchild) | — | — | −0.02 | 0.01 |
| Other family[d] | — | — | −0.05** | 0.02 |
| Friends | — | — | −0.11*** | 0.01 |
| Other social partners[e] | — | — | −0.17*** | 0.01 |
| Covariates | | | | |
| Female | −0.04 | 0.02 | −0.03 | 0.03 |
| Live alone | −0.08* | 0.04 | −0.05 | 0.04 |
| Age | −0.00 | 0.00 | −0.00 | 0.00 |
| Education | | | | |
| High school or less | (Ref.) | | (Ref.) | |
| Some college | −0.05 | 0.04 | −0.04 | 0.04 |
| College graduate or more | −0.13** | 0.04 | −0.13** | 0.04 |
| Minority status[f] | 0.12*** | 0.03 | 0.13*** | 0.03 |
| Self-rated health[g] | −0.04** | 0.01 | −0.04** | 0.01 |
| Random effects | | | | |
| Intercept VAR (Level 2: participant) | 0.03*** | 0.00 | 0.03*** | 0.00 |
| Residual VAR | 0.09*** | 0.00 | 0.08*** | 0.00 |
| −2 log likelihood | 2151.44 | | 1758.18 | |

*Notes*: Participants $N = 257$. Assessments $N = 4{,}024$. All time-varying variables adjusted for person-specific means. VAR = variance.
[a]Proportion of time television viewing evident every 3 hr.
[b]Having no in-person contact with any social partners during the 3-hr interval. Reference category: Had social encounters.
[c]Having in-person contact with different categories of social partners during the 3-hr interval.
[d]Siblings, cousins, and other extended family.
[e]Acquaintances, neighbors, and others.
[f]1 (*racial or ethnic minority*) and 0 (*not a minority*).
[g]1 (*poor*) to 5 (*excellent*).
*$p < .05$. **$p < .01$. ***$p < .001$.

## Television Viewing in a Social Context

Older adults watched more television when alone than with other people. Individuals may engage in television as a leisure activity to buffer deleterious effects of being alone. Our prior work found that older adults sometimes benefit emotionally from time spent alone (Birditt et al., 2019). As part of this solitude, individuals may watch television to decompress and relax (Kubey & Csikszentmihályi, 1990). Yet, television viewing also may enhance loneliness for some people or may occur concurrently with the experience of loneliness. Concurrent associations suggest that television viewing does not evoke loneliness that endures throughout the day, however, and thus the findings also may be spurious and attributed to a third factor. Additional research is warranted to untangle this issue.

We predicted that living alone would be associated with viewing television. We did not find these associations. The lack of findings is consistent with contradictions in the literature. Some studies have found that unmarried older adults watch more television (Cauwenberg et al., 2014; Van der Goot et al., 2012), but other studies have not found this (Depp et al., 2010; Mares & Woodard, 2006). Married older adults typically spend much of their day with their spouse. When the television is on, both partners may be watching. Thus, the daily social context of television viewing may differ for individuals who live with others versus those who live alone.

When older adults were with more distant family, friends, and acquaintances, they were *less* likely to watch television. These findings are consistent with social integration theory which predicts that individuals benefit from engagement with a wide array of social partners (Berkman et al., 2000).

Television viewing was not associated with the presence of grown children and grandchildren, perhaps due to the diverse situations in which older adults visit with these family members. When children and grandchildren come to the older adult's home, they may watch television. But older adults also may meet the child and grandchild outside the home, where they do not watch television together.

**Table 3.** Multilevel Model Predicting Sedentary Behavior, Activity Level, and Loneliness From Television Viewing

| Parameter | Sedentary Behavior[a] | | Activity Level[b] | | Loneliness[c] | |
|---|---|---|---|---|---|---|
| | *B* | *SE* | *B* | *SE* | *B* | *SE* |
| Fixed effects | | | | | | |
| Intercept | 0.55*** | 0.06 | 8.59*** | 2.39 | 1.54*** | 0.16 |
| Television viewing[d] | 0.12*** | 0.01 | −4.22*** | 0.44 | 0.04* | 0.02 |
| Covariates | | | | | | |
| Social encounters[e] | | | | | | |
| Spouse | 0.01 | 0.01 | 0.18 | 0.51 | −0.02 | 0.02 |
| Intergenerational (child, grandchild) | −0.05*** | 0.01 | 0.24 | 0.40 | −0.04* | 0.02 |
| Other family[f] | −0.04*** | 0.01 | 0.69 | 0.48 | −0.04* | 0.02 |
| Friends | −0.07*** | 0.01 | 1.41*** | 0.36 | 0.00 | 0.02 |
| Other social partners[g] | −0.09*** | 0.01 | 2.68*** | 0.31 | −0.02 | 0.01 |
| Female | −0.03 | 0.02 | 0.71 | 0.82 | −0.10** | 0.05 |
| Living alone | −0.02 | 0.03 | −0.85 | 1.14 | 0.12 | 0.07 |
| Age | 0.01*** | 0.00 | −0.33*** | 0.06 | 0.00 | 0.00 |
| Education | | | | | | |
| High school or less | (Ref.) | | (Ref.) | | (Ref.) | |
| Some college | 0.00 | 0.03 | −0.10 | 1.21 | −0.06 | 0.08 |
| College graduate or more | 0.00 | 0.03 | 0.48 | 1.22 | −0.08 | 0.08 |
| Minority status[h] | −0.03 | 0.02 | 0.44 | 1.00 | −0.03 | 0.07 |
| Self-rated health[i] | −0.02 | 0.01 | 0.78* | 0.39 | −0.05* | 0.03 |
| Random effects | | | | | | |
| Intercept VAR (Level 2: participant) | 0.02*** | 0.00 | 27.24*** | 2.78 | 0.13*** | 0.01 |
| Residual VAR | 0.03*** | 0.00 | 57.97*** | 1.33 | 0.11*** | 0.00 |
| −2 log likelihood | 1877.01 | | 28284.66 | | 3134.18 | |

*Notes*: Participants $N = 257$. Assessments $N = 4{,}024$. All time-varying variables adjusted for person-specific means. VAR = variance.
[a]The proportion of time sedentary every 3 hr.
[b]Mean activity level across every 3 hr.
[c]1 (*not at all*) to 5 (*a great deal*).
[d]Proportion of time television viewing evident every 3 hr.
[e]Having in-person contact with different categories of social partners during the 3-hr interval.
[f]Siblings, cousins, and other extended family.
[g]Acquaintances, neighbors, and others.
[h]1(*racial or ethnic minority*) and 0 (*not a minority*).
[i]1 (*poor*) to 5 (*excellent*).
*$p < .05$. **$p < .01$. ***$p < .001$.

## Television, Sedentary Behavior, Physical Activity, and Loneliness

In prior studies, individuals who self-reported more television viewing also reported less physical activity (Clark et al., 2011). It was unclear whether sedentary people are inactive most of the day (including when they watch television), or whether television viewing itself is associated with that sedentary behavior. Methodological innovation in this study provided objective assessments of television viewing and physical activity. We tracked television viewing throughout the day using audio recordings (e.g., Mares & Woodard, 2006; Van der Goot et al., 2012). Objective assessments of using accelerometers provided validity of the synchronous occurrence of television viewing and sedentary behavior in real time.

Surprisingly, the association between television viewing and being sedentary was stronger when older adults were viewing television with a social partner compared to when they were alone. The opposite is more typically true: in general, being with other people is associated with *fewer* sedentary behaviors and more activities than being alone (Fingerman, Huo, et al., 2020). As such, television viewing appears to reduce the usual physical activity benefits of social encounters throughout the day.

The moderating effect of living alone showed a similar pattern. The association between television viewing and a decreased activity level was more pronounced for older adults residing with others than for those living alone. People who live alone may have a television on while they go about their day and are active, whereas people who live with others sit down to watch television in shared leisure. Alternately, individuals who live alone may need to get up and fetch things or otherwise be active while watching television, whereas those who live with others can do these tasks for one another (e.g., get a glass of water).

We examined self-reports of concurrent loneliness to address whether individuals use television to compensate for lack of a social partner as well as whether

**Table 4.** Multilevel Model Predicting Sedentary Behavior, Activity Level, and Loneliness From Television Viewing Moderated by Living Alone and Time Alone

| | Living Alone Interaction Models | | | | | | Time Alone Interaction Models | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Sedentary Behavior[a] | | Activity Level[b] | | Loneliness[c] | | Sedentary Behavior[a] | | Activity Level[b] | |
| Parameter | *B* | *SE* | *B* | *SE* | *B* | *SE* | *B* | *SE* | *B* | *SE* |
| Fixed effects | | | | | | | | | | |
| Intercept | 0.50*** | 0.05 | 9.70*** | 1.90 | 1.39*** | 0.12 | 0.48*** | 0.05 | 10.42*** | 1.91 |
| Television viewing[d] | 0.18*** | 0.01 | −6.19*** | 0.52 | 0.01 | 0.02 | 0.20*** | 0.01 | −6.09*** | 0.48 |
| Live alone | −0.02 | 0.04 | −0.17 | 1.71 | 0.19 | 0.11 | −0.02 | 0.03 | −0.77 | 1.10 |
| Alone[e] | 0.12*** | 0.01 | −2.96*** | 0.37 | 0.06*** | 0.02 | 0.18*** | 0.01 | −4.39*** | 0.51 |
| Television viewing × Live alone | −0.07*** | 0.02 | 3.26*** | 0.88 | 0.09* | 0.04 | | | | |
| Television viewing × Being alone[e] | | | | | | | −0.15*** | 0.02 | 3.93*** | 0.85 |
| Covariates | | | | | | | | | | |
| Female | −0.02 | 0.02 | 0.42 | 0.79 | −0.16** | 0.05 | −0.02 | 0.02 | 0.47 | 0.78 |
| Age | 0.01*** | 0.00 | −0.34*** | 0.06 | −0.00 | 0.00 | 0.01*** | 0.00 | −0.35*** | 0.06 |
| Education | | | | | | | | | | |
| High school or less | | | | | | | | | | |
| Some college | −0.00 | 0.03 | −0.04 | 1.23 | −0.05 | 0.08 | −0.00 | 0.03 | 0.02 | 1.22 |
| College grad or more | −0.00 | 0.03 | 0.86 | 1.23 | −0.08 | 0.08 | −0.01 | 0.03 | 1.04 | 1.24 |
| Minority status[f] | −0.02 | 0.02 | −0.15 | 0.98 | −0.01 | 0.06 | −0.02 | 0.02 | −0.12 | 0.98 |
| Self-rated health[g] | −0.02* | 0.01 | 0.92* | 0.40 | −0.06* | 0.03 | −0.02 | 0.01 | 0.88* | 0.40 |
| Random effects | | | | | | | | | | |
| Intercept VAR (Level 2: participant) | 0.02*** | 0.00 | 29.08*** | 2.96 | 0.13*** | 0.01 | 0.02*** | 0.00 | 28.90*** | 2.94 |
| Residual VAR | 0.03*** | 0.00 | 58.52*** | 1.35 | 0.11*** | 0.00 | 0.03*** | 0.00 | 58.41*** | 1.35 |
| −2 log likelihood | 1727.8 | | 28335.2 | | 3130.2 | | 1772.2 | | 28326.5 | |

*Notes*: Participants *N* = 257. Assessments *N* = 4,024. All time-varying variables adjusted for person-specific means. VAR = variance.
[a]The proportion of time sedentary every 3 hr.
[b]Mean activity level across every 3 hr.
[c]1 (*not at all*) to 5 (*a great deal*).
[d]Proportion of time television viewing evident every 3 hr.
[e]Having no in-person contact with any social partners during the 3-hr interval. Reference category: Had social encounters.
[f]1 (*racial or ethnic minority*) and 0 (*not a minority*).
[g]0 (*poor*) to 4 (*excellent*).
*$p < .05$. **$p < .01$. ***$p < .001$.

television viewing mitigates loneliness throughout the day (Depp et al., 2010; Van Der Goot et al., 2006, 2012). Individuals reported more loneliness during periods when they watched television, but television viewing did not alleviate or increase loneliness subsequently. The elevated loneliness did not represent trait loneliness; the comparisons accounted for fluctuations in each individual's own loneliness throughout the day. It seems that television might be a lonely activity during the day without clear causal direction.

## Limitations and Implications

Several limitations warrant future research. Selective attrition or refusal to participate in the study may limit the implications of the study. Compared to the sample included in this study, individuals who did not complete all measures were less educated and thus may be even more likely to watch television (Gardner et al., 2014).

Likewise, we did not assess content of the television shows. Older adults may watch different types of programs when alone, with a spouse, or with other social partners (e.g., game shows, soap operas, news and documentaries, sports, or shows with violence or sex; Kremar & Greene, 1999).

Furthermore, questions regarding cohort differences remain. Younger adults today spend more time using devices for social media, games, or streaming videos to their preferences than viewing television (Anderson & Jiang, 2018). Nevertheless, television viewing increased among younger adults during the coronavirus disease 2019 outbreak (Nielsen Corporation, 2020), with new screening apps for shared viewing of shows and movies across households (e.g., Netflix Party, Hulu Watch Party). Thus, television viewing also may serve as a forum for companionship in future cohorts.

A key contribution of this study involves distinctions between television viewing among older adults who live alone versus those who live with others. If findings from this study replicate, clinicians who work with married older adults might encourage them to develop joint spousal activities that are less sedentary. Likewise, efforts to combat

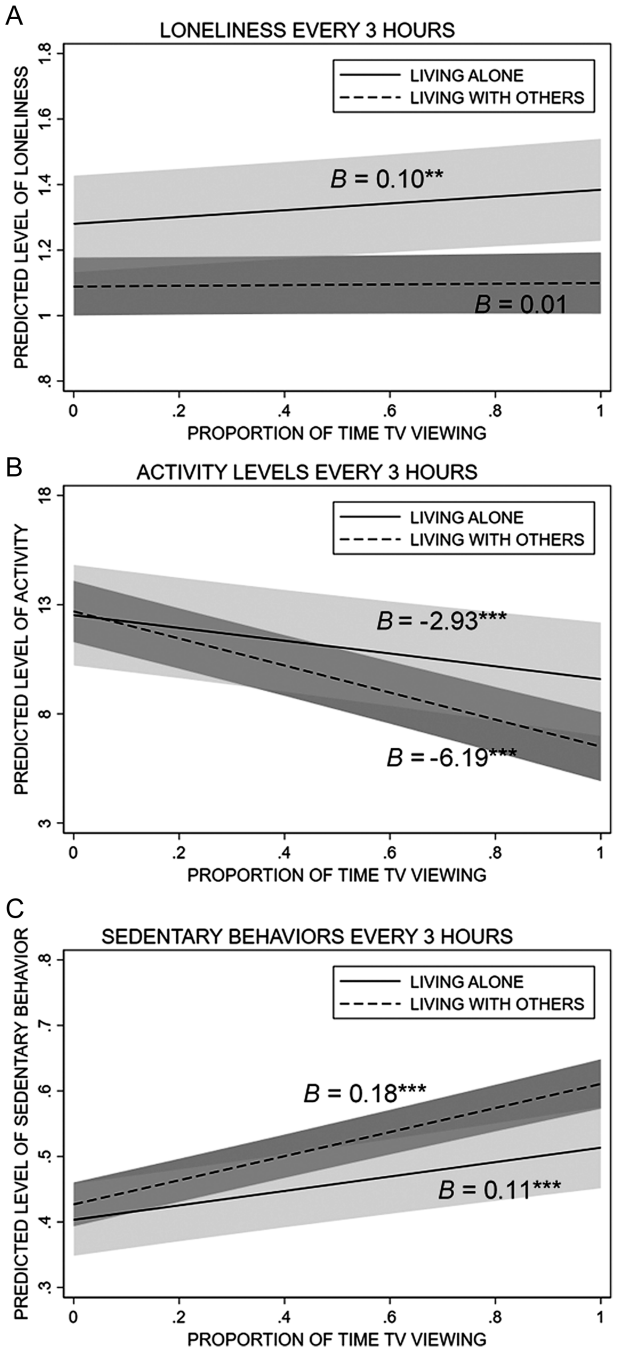


**Figure 1.** Predicted level of loneliness (A), activity (B), and sedentary behaviors (C) across 3-hr assessments varies by individuals' residential status and proportion of television viewing.

loneliness need to address effective efforts and coping strategies among older adults who live alone.

In sum, television viewing remains a central activity in older adults' lives, with use occurring much more frequently than other forms of technological media (e.g., video games, social media; Fingerman, Birditt, et al., 2020). TV viewing is associated with greater sedentary behavior, decreased physical activity, and increased loneliness (Clark et al., 2011). This study suggests older adults may watch television for many reasons including social bonding with a spouse, as well as for purposes of companionship and entertainment when alone, but unfortunately this may lead to health problems due to its negative associations with physical and emotional well-being.

## Supplementary Material

Supplementary data are available at *The Gerontologist* online.

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## Conflict of Interest

None declared.

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