

Supplemental Table 1. Summary of Included Literature on Dementia Care, Fall Detection, and Ambient Assisted Living.

Author (Year)	Sample Size/Population	Age (mean)^{a,b}	Intervention Type (if applicable)	Main Results and Findings
Concept 1: Dementia Care				
Amjad et al. (2019)	44 older adults with MCI	NR	Xbox 360 Kinect cognitive games	Improved MMSE, MoCA, and trail making test after 6-week intervention on MCI subjects.
Appel et al. (2019)	66 older adults with varying cognitive abilities	81	VR using Samsung GearVR head-mounted-display	Feasible, safe, and with no side effects; 76% wanted to try VR again.
Asghar et al. (2018)	20 PWD	68	Semi-structured interviews on various assistive technologies (AT)	65% of participants felt comfortable using AT for their daily functioning (facilitate communication, timely medication/activities); 25% were unhappy with AT (social isolation, not tailored to needs).
Ben-Sadoun et al. (2016)	10 older adults with ND 8 HOA controls	ND: 82 Control: 71	Serious exergame played using the Microsoft Kinect	ND participants played less and had worse performance than controls.
Darragh et al. (2017)	9 older adults with MCI 8 caregivers 16 experts	54-78	Semi-structured interviews on homecare robots	Generally positive about potential use of robots for people with MCI, highlighting their assistance with home safety and security, monitoring of health and well-being, and therapeutic intervention.
Dethlefs et al. (2017)	13 HOAs 10 PWD	HOAs: 84 PWD: 78	Cognitive stimulation delivered via a spoken interactive computer system	Feasible to use spoken natural language to provide cognitive stimulation to HOAs and PWDs through computer-based assistive technology.
Djabelkhir et al. (2017)	Older adults with MCI - 9 CCS - 10 CCE	CCS: 75 CCE: 78	Computer-based cognitive exercises: - Computerized cognitive stimulation (CCS) - Computerized cognitive engagement (CCE)	Both interventions were highly feasible and acceptable to the participants and allowed improvement in different aspects of cognitive and psychosocial functioning.
Farina et al. (2019)	26 older adults with mild AD 26 caregivers	80	Wearable activity monitor	Feasible and acceptable. Major themes included routine, design, external influences, and perceived benefits.
Forsyth et al. (2019)	Older adults with AD and their caregivers - 247 control - 248 intervention	97% aged ≥65	Various assistive technology and telecare (ATT) practices, including reminder devices, devices to	Safety concerns were the most common reason for installation (38%), followed by reminder/prompting (18%). 53% of recommended technology was not installed.

			promote safety, safer walking technologies, and communication devices	
Gelonch et al. (2019)	9 older adults with MCI 9 caregivers	70	Wearable lifelogging camera	Participants found the wearable lifelogging camera to be acceptable and easy to use. Users highlighted privacy issues as a major concern of the technology.
Giovagnoli et al. (2018)	Older adults with AD -23 Active music therapy and memantine (M-AMT) -22 Memantine (M) only	M-AMT: 73 M: 72	Active music therapy	M-AMT group had significantly improved neuropsychiatric inventory (NPI) depression and appetite scores. Fewer patients in the M-AMT group than in the M group showed worsening of NPI scores. M-AMT has no further benefits for language compared to M alone.
Hattink et al. (2016)	42 with MCI or AD -20 experimental -22 control 32 caregivers	Experimental: 81 Control: 78	Integrated home-based monitoring system (Rosetta system)	Useful development, however concerns with user-friendliness and privacy. No differences noted on perceived autonomy, quality of life, caregiver competence, delay of NH admission, or care needs between groups.
Lazarou et al. (2016)	4 older adults with MCI and AD	69-80	Continuous remote monitoring system	All demonstrated improvements in neuropsychological assessment, physical condition, and sleep quality.
Liao et al. (2020)	Older adults with MCI -18 VR -16 combined physical and cognitive (CPC)	VR: 76 CPC: 73	VR-based physical and cognitive training using the HTC VIVE	Both groups had improved executive function and verbal memory. VR group showed significant improvements in global cognition, verbal memory, and instrumental activities of daily living.
Megges et al. (2017)	17 PWD 17 primary caregivers	72	App-based prototype location system	Usability ratings show that the prototype was rated fairly at baseline; however, the rating did decrease significantly at the 4-week evaluation. Potential users must (PWD) must be trained, suggesting possible training manuals.
Mitchell et al. (2020)	30 caregivers of PWD and their care recipients	Care recipients: 77	Remote activity monitoring (RAM) system consisting of door sensors, motion sensors, a toilet flush sensor, and bed mattress sensor	RAM provided caregivers with a sense of security. Caregivers found RAM to be easy to use and acceptable. Considerable customization was needed to make RAM appropriate for care recipients.

Moyle et al. (2019)	5 PWD 5 caregivers 12 health professionals	78	Telepresence robot	Participants reported a sense of authenticity and positive social connection when using the telepresence robot. Users indicated significantly higher positive than negative affect.
Nishiura et al. (2019)	18 older adults with AD 9 HOAs	82	Electric calendar	Electric calendar users showed significant increases in total MMSE scores and improved ability to perform activities of daily living. Most participants mentioned that electric calendars were useful but unnecessary.
Pino et al. (2015)	10 people with MCI 7 caregivers 8 HOAs	MCI: 72 HOA: 78	Self-administered questionnaires and focus groups on socially assistive robots (SAR)	People with MCI and their caregivers had a higher perceived usefulness and intention to presently use SARs than healthy older adults did. Barriers to SARs adoption include mismatch between needs and solutions offered by the robot, usability factors, and lack of experience with technology.
Robert et al. (2020)	Older adults with CI -21 control group -25 Memory Motivation (MeMo) group	Control: 79 MeMo: 80	Web app	No significant differences in cognitive and behavioral scores between control group and MeMo group.
Rohrbach et al. (2019)	10 older adults with mild or moderate AD	72	Augmented reality headset (Microsoft HoloLens)	Use of the headset increased the time it took to complete a tea-making task. Participants found the headset to be acceptable and comfortable, but complained about its bulkiness.
Sejunaite et al. (2017)	Older adults with MCI	63-89	Augmented reality head-up display	Participants followed the correct path in 113 out of 120 intersections using the AR head-up display. Users were willing to use the device in everyday life if needed and were willing to pay for it.
Serino et al. (2017)	20 older adults with AD - 10 VR - 10 control 8 HOAs with VR	AD VR: 87 AD control: 89 Healthy VR: 87	VR-based training	Users with AD had significant improvement in long-term spatial memory after VR-based training. Healthy older adults had significant improvement in executive functioning after VR-based training.
Silva et al. (2017)	Older adults with mild AD - 17 Memo+ group - 17 SenseCam group - 17 written diary group	Memo+: 72 SenseCam: 75 Diary: 74	Memo+: paper and pencil memory training program SenseCam: wearable camera used as a passive external memory aid	SenseCam and Memo+ groups had significantly reduced depressive symptoms and improved perceived functional capacity compared to the diary control group; however, both interventions had no effects on quality of life measures. Immediate effects of the interventions were not maintained at follow-up.
Wolters et al. (2016)	7 PWD 1 caregiver	NR	Focus groups on the design of an intelligent	Voice and interaction style of the ICA should be chosen based on the preferences of the user, not those of the caregiver. For PWD,

	5 HOAs		cognitive assistant (ICA)	the ICA should act like a patient, encouraging guide, whereas for health older adults, the ICA should be to the point and not patronizing. The ICA should also be able to adapt to cognitive decline.
Wu et al. (2016)	20 older adults with MCI -5 focus group -15 semi-structured interviews	Focus group: 73 Interviews: 76	Focus groups and semi-structured interviews on assistive robots	Participants did not see themselves as needing assistance; as such, they believed that they did not need or want a robot at the present time but considered it potentially useful in the future. Concerns about assistive robots included lack of human presence and contact, lack of authenticity, difficulties learning how to use it, and timing of adoption.
Zajac-Lamparska et al. (2019)	72 HOAs 27 older adults with mild AD	HOA: 68 AD: 72	VR-based cognitive training	Both groups had improved cognitive performance, but this effect was greater in the healthy older adults. Additionally, only the healthy older adults exhibited improvements in cognitive functioning.
Concept 2: Fall Detection				
Chaudhuri et al. (2017)	27 older adults	NR	Focus groups on wearable and environmental fall detection devices	Influential considerations for acceptance include perceived need; balance between independence, autonomy, and stigma; and affordable cost. Recommendations include automatic calling; audible, short messages indicating activity; usable buttons; acceptable battery life; inclusion of alternative functionality; customizability; and a fall prevention design instead of a fall detection one. Participants preferred wearable devices over environmental devices.
Demiris et al. (2016)	18 older adults living in a residential retirement community	86	Wearable fall detection device	Participants enjoyed the GPS and automatic detection features but disliked the high number of false alarms and the device's obtrusiveness. Many participants did not see a need for the device or were embarrassed by it.
Di Rosa et al. (2017)	29 older adults with ≥1 fall in last year	71	Electronic insoles	The fall risk index calculated from data collected by the electronic insoles determined the risk of falls with an accuracy that is similar to that of conventional performance-based tests of fall risk.
Ejupi et al. (2017)	CD older adults -25 free-living study -94 laboratory study	Free-living: 83 Laboratory: 80	Wearable pendant fall detection device	Algorithm detected 93.1% of sit-to-stand movements and incurred a 2.9% false positive rate. Differences existed between those with and without past falls.
Saadeh et al. (2019)	20 older adults	65-70	Wearable accelerometer worn on thigh	Fast mode for fall prediction achieved a sensitivity of 97.8% and specificity of 99.1%, whereas slow mode for fall detection achieved a sensitivity of 98.6% and a specificity of 99.3%.

Thilo et al. (2019)	15 CD older adults	81	Wearable sensor worn on torso	Participants found the sensor to be comfortable but wished that the sensor had a longer battery life and did not require the use of a smartphone.
Concept 3: Ambient Assisted Living				
Adcock et al. (2020)	IL older adults - 15 training group - 16 control group	Training: 77 Control: 71	Home-based exergame sessions	Training group had improved inhibition and working memory. Both groups exhibited a significant decrease in gray matter volume of frontal areas and hippocampus over time. No improvements in physical functions or brain volume were found.
Baric et al. (2019)	20 CD older adults	74	Interactive digital calendar (RemindMe)	RemindMe was easy to use but was not easily incorporated into everyday routines. Receiving active reminders via text messages followed by actively acknowledging the reminder helped participants perform more everyday life activities.
Batsis et al. (2018)	29 obese older adults 4 community leaders 7 rural clinicians	73	Wearable device (Amulet)	User-centered design and aesthetics are critically important. All participants desired having a centralized dashboard. Concerns about the device include accuracy as well as intrusiveness in daily life and privacy.
Berridge et al. (2019)	20 IL older adults 11 emergency contacts 10 social work, housing and technology staff	NR	Sensor-based passive monitoring system installed in the home (QuietCare)	QuietCare was often mismatched with older adults' values, needs, and expectations. Asian older adults accepted the intervention offered by social workers largely to appease them, discontinuing its use at the highest rate.
Cohen et al. (2016)	23 CD older adults 15 informal caregivers	83	Intelligent wireless sensor system	Performance and usefulness of the system were low to moderate. The majority of participants were unsatisfied with its ease of use and found multiple obstacles in use. Caregivers provided higher scores for usefulness, ease of use, and intention to use.
Costa et al. (2015)	11 IL older adults	~70	Wearable monitoring system	Participants were satisfied with the wearable monitoring system and found it to be usable and relatively easy to learn.
Croff et al. (2019)	19 African Americans aged ≥55	69	Walking application combining an oral history archive with cognitive health education	Participants were open to learning new technology not only for the sake of participating in the study but also to mitigate other modifiable risk factors for cognitive decline. Participants noted that technology introduction should be gradual with in-person assistance initially and an uncomplicated interface.
Dupuy et al. (2017)	Cognitively healthy, CD older adults - 16 intervention - 16 control	Intervention: 80 Control: 83	Set of wireless sensors and two touchscreen tablets: HomeAssist	Caregivers' estimates of everyday functioning of participants who received HomeAssist were unchanged over time, whereas these decreased for control participants. Reduction of self-reported caregiver burden was noted after 6 months in the intervention group.

	32 professional caregivers			
Epstein et al. (2016)	37 older adults and their caregivers	55-84	In-home monitoring system consisting of motion sensors, contact sensors, smart light bulbs, and remote controls	Most caregivers believed the system gave them a sense of control, whereas many older adults did not appreciate being monitored, felt threatened, and did not believe the monitoring system could replace their caregivers. Suggestions for improvement included not using it, improving its accuracy and ease-of-use, individualizing the system, and allowing it to intervene when necessary.
Finch et al. (2017)	268 enrollees dually eligible for Medicare and Medicaid - 74 intervention - 129 not enrolled - 65 historical control	Intervention: 79 Not enrolled: 79 Historical: 82	Passive remote patient monitoring systems installed in homes	Intervention group had fewer acute hospitalizations, ED visits, long-term care admissions and days, and SNF admissions than either of the control groups. Costs for inpatient services, ED visits, long-term care, SNFs, and ambulance care were all at least 10% lower in the intervention group than in either of the control groups.
Fischinger et al. (2016)	49 CD adults aged ≥70	NR	Care robot (Hobbit)	Usability and acceptance of Hobbit were high. Participants were initially skeptical or insecure but became more confident in their interactions with Hobbit over time.
Halcomb et al. (2016)	24 CD older adults	81	Telehealth monitor consisting of a central monitor and Bluetooth-enabled peripherals	Significant difference between pre and post ratings on survey items regarding ease of use and telemonitoring being standard of care in the future. Telemonitoring allowed a sense of security and peace of mind, assisted participants in managing their health, and improved their confidence in managing their health.
Jang et al. (2018)	Rural CD older adults - 11 robust older adults - 11 prefrail older adults	Robust: 69 Prefrail: 73	Wearable device: Xiao Mi band 2	After 6 months of the “Smart Walk” coaching program, the prefrail group showed significant improvement in usual gait speed, International Physical Activity Questionnaire scores, and European Quality of Life score; no significant improvement was found in the robust group. Participants who used the wearable device for the longest time showed increased body weight and BMI.
Joe et al. (2018)	43 IL older adults	77	Focus groups on various design concepts	Majority of participants found the wellness tools useful. Participants favored features, such as use of voice navigation, but were concerned over cost and the need for technology skills and access.
Lach et al. (2019)	5 CD older female adults	85	Passive in-home sensor monitoring system	Participants were generally positive about the monitoring system, but they varied in their awareness levels of the presence of the equipment. Use of the sensor system was feasible and acceptable to participants.

Lie et al. (2016)	21 CD older adults	60-90	Home monitoring system	Participants emphasized the importance of relationships between them and their “monitors” based on trust as well as institutional providers who need to instill or earn trust.
Macis et al. (2020)	59 CD older adults - 28 short-term TV - 12 short-term tablet - 19 4-month TV	Short-term TV: 79 Short-term tablet: 75 4-month TV: 73	Android-based telemonitoring system: the HEREiAM system	Participants found the system to be easy to use regardless of user interface (TV vs. tablet). Many participants did not feel the need to constantly monitor their health status. Usability scores did not significantly change over a period of four months.
Pigini et al. (2017)	15 healthy adults 13 older adults with cardiac diseases 4 clinicians	53-81	Home monitoring system with wearable and environmental sensors	The majority of the older adults found the system useful, especially for monitoring their health, improving their security at home, and reducing the stress of repeated outpatient visits. None of the participants were concerned about loss of privacy.
Pol et al. (2016)	11 CD older adults	68-94	Home sensor monitoring system with motion, contact and toilet flush sensors	Participants positively valued sensor monitoring and indicated that the technology served as a strategy to enable independent living. Participants noted that the system contributed to their sense of safety and helped them remain active. Participants believed that health care professionals’ continuous access to their sensor data and use of the data for their safety outweighed any privacy concerns.
Rantz et al. (2015)	IL older adults - 52 with sensors - 81 without sensors	Sensor: 83 No sensor: 84	Bed and motion sensor system	Residents living with sensors had an average length of stay in independent housing that was significantly longer than that of those living without sensors (1,557 days vs. 936 days). An estimated \$51,280 could be saved annually if older adults are able to stay in their own homes with sensor systems instead of relocating to nursing home.
Son & Kim (2019)	8 CD older adults	80	Home mobility monitoring system with activity/door sensors and flame detector	Participants thought the system was useful and were generally satisfied with it. Participants suggested that the system would be most helpful for those who have more serious medical conditions or live alone. Some participants were concerned about the cost of the system.

Abbreviations: AD, Alzheimer’s disease; CD, community-dwelling; CI, cognitive impairment; HOA, healthy older adults; IL, independent living; MCI, mild cognitive impairment; MMSE, Mini-Mental Status Examination; MoCA, Montreal Cognitive Assessment; ND, neurodegenerative disease; NR, not reported; PWD, person with dementia; VR, virtual reality

^a Age reported solely of older adults when multiple groups (i.e. caregivers, professionals) included in analysis

^b Range reported when mean not available