

Supplementary material 1

Concept Categories and Search Strategies used in MEDLINE

Dementia	Behavioral and psychological symptoms	Caregiver	Information needs	mHealth application
<b>Key words</b>  Alzheimer* dement*  <b>Mesh terms</b> alzheimer disease dementia	<b>Key words</b>  “behavioral and psychological symptoms of dementia” “behavioral symptoms” “behavioral disturbance*” “neuropsychiatric problem*” “neuropsychiatric symptoms” BPSD	<b>Key words</b>  caregiver* carer* “personal assistant*” “informal caregiver*” “family caregiver*” famil* spouse* partner friend* relative*  <b>Mesh terms</b> caregivers spouses family	<b>Key words</b>  “information need*” “education* need*” “learning need*” “supportive need*” “unmet need*” knowledge* need*  <b>Mesh terms</b> Education	<b>Key words</b>  “electronic health app*” “eHealth app*” “smartphone app*” “mobile health app*” “mobile app*” “mHealth app*” “mobile phone app*” “iPhone app*” “Android app*” “phone app*” “handheld computer*” “internet based application*”  <b>Mesh terms</b>  Computers, Handheld Mobile applications Smartphone

Search strategy

1. Medline

- 1alzheimer disease (MeSH)
- 2dementia (MeSH)
- 3Alzheimer\* (ti/ab)
- 4dement\* (ti/ab)

- 5      1 OR 2 OR 3 OR 4
- 6      “behavioral and psychological symptoms of dementia” (ti/ab)
- 7      “behavioral symptoms” (ti/ab)
- 8      “behavioral disturbance\*” (ti/ab)
- 9      “neuropsychiatric problem\*” (ti/ab)
- 10     “neuropsychiatric symptoms” (ti/ab)
- 11     BPSD (ti/ab)
- 12     6 OR 7 OR 8 OR 9 OR 10 OR 11
- 13     caregivers (MeSH)
- 14     spouses (MeSH)
- 15     family (MeSH)
- 16     caregiver\* (ti/ab)
- 17     carer\* (ti/ab)
- 18     “personal assistant\*” (ti/ab)
- 19     “informal caregiver\*” (ti/ab)
- 20     “family caregiver\*” (ti/ab)
- 21     famil\* (ti/ab)
- 22     spouse\* (ti/ab)
- 23     partner (ti/ab)
- 24     friend\* (ti/ab)
- 25     relative\* (ti/ab)
- 26     13 OR 14 OR 15 OR 16 OR 17 OR 18 OR 19 OR 20 OR 21 OR 22 OR 23 OR 24 OR  
25
- 27     Education (MeSH)
- 28     “information need\*” (ti/ab)
- 29     “education\* need\*” (ti/ab)
- 30     “learning need\*” (ti/ab)
- 31     “supportive need\*” (ti/ab)

- 32 “unmet need\*” (ti/ab)
- 33 knowledge\* (ti/ab)
- 34 need\* (ti/ab)
- 35 27 OR 28 OR 29 OR 30 OR 31 OR 32 OR 33 OR 34
- 36 Computers, Handheld (MeSH)
- 37 Mobile applications (MeSH)
- 38 Smartphone (MeSH)
- 39 “electronic health app\*” (ti/ab)
- 40 “eHealth app\*” (ti/ab)
- 41 “smartphone app\*” (ti/ab)
- 42 “mobile health app\*” (ti/ab)
- 43 “mobile app\*” (ti/ab)
- 44 “mHealth app\*” (ti/ab)
- 45 “mobile phone app\*” (ti/ab)
- 46 “iPhone app\*” (ti/ab)
- 47 “Android app\*” (ti/ab)
- 48 “phone app\*” (ti/ab)
- 49 “handheld computer\*” (ti/ab)
- 50 “internet based application\*” (ti/ab)
- 51 36 OR 37 OR 38 OR 39 OR 40 OR 41 OR 42 OR 43 OR 44 OR 45 OR 46 OR 47 OR  
48 OR 49 OR 50 OR 50
- 52 5 AND 12 AND 26
- 53 35 OR 51
- 54 52 AND 53

## 2. CINAHL

- S1 (MH "Alzheimer's Disease")
- S2 (MH "Dementia+")
- S3 Alzheimer\*
- S4 dement\*
- S5 1 OR 2 OR 3 OR 4
- 
- S6 "behavioral and psychological symptoms of dementia"
- S7 "behavioral symptoms"
- S8 "behavioral disturbance\*"
- S9 "neuropsychiatric problem\*"
- S10 "neuropsychiatric symptoms"
- S11 BPSD
- S12 6 OR 7 OR 8 OR 9 OR 10 OR 11
- 
- S13 (MH "Caregivers")
- S14 (MH "Spouses")
- S15 (MH "Family+")
- S16 caregiver\*
- S17 carer\*
- S18 "personal assistant\*"
- S19 "informal caregiver\*"
- S20 "family caregiver\*"
- S21 famil\*
- S22 spouse\*
- S23 partner\*
- S24 friend\*
- S25 relative\*
- S26 13 OR 14 OR 15 OR 16 OR 17 OR 18 OR 19 OR 20 OR 21 OR 22 OR 23 OR 24 OR 25

- S27 (MH “Education+”)
- S28 “information need\*”
- S29 “education\* need\*”
- S30 “learning need\*”
- S31 “supportive need\*”
- S32 “unmet need\*”
- S33 knowledge\*
- S34 need\*
- S35 27 OR 28 OR 29 OR 30 OR 31 OR 32 OR 33 OR 34
- 
- S36 (MH “Computers, Handheld+”)
- S37 (MH “Mobile Applications”)
- S38 (MH “Smartphone”)
- S39 “electronic health app\*”
- S40 “eHealth app\*”
- S41 “smartphone app\*”
- S42 “mobile health app\*”
- S43 “mobile app\*”
- S44 “mhealth app\*”
- S45 “mobile phone app\*”
- S46 “iPhone app\*”
- S47 “Android app\*”
- S48 “phone app\*”
- S49 “handheld computer”
- S50 “internet based application\*”
- S51 36 OR 37 OR 38 OR 39 OR 40 OR 41 OR 42 OR 43 OR 44 OR 45 OR 46 OR 47 OR 48  
OR 49 OR 50 OR 50
- 
- S52 S35 OR S51
- 
- S53 S5 AND S12 AND S26 AND S52

### 3. PsycInfo

- 1 Alzheimer disease.mp. or exp Alzheimer's Disease
- 2 exp Dementia/ or dementia.mp.
- 3 Alzheimer\*.mp. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests & measures, mesh word]
- 4 dement\*.mp. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests & measures, mesh word]
- 5 1 or 2 or 3 or 4
- 6 "behavioral and psychological symptoms of dementia".mp. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests & measures, mesh word]
- 7 "behavioral symptoms".mp. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests & measures, mesh word]
- 8 "behavioral disturbance\*".mp. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests & measures, mesh word]
- 9 "neuropsychiatric problem\*".mp. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests & measures, mesh word]
- 10 "neuropsychiatric symptoms\*".mp. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests & measures, mesh word]
- 11 BPSD.mp. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests & measures, mesh word]
- 12 6 or 7 or 8 or 9 or 10 or 11
- 13 caregiver.mp. or exp Caregivers
- 14 spouse.mp. or exp Spouses
- 15 exp Family
- 16 caregiver\*.mp. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests & measures, mesh word]
- 17 carer.mp. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests & measures, mesh word]
- 18 "personal assistant\*".mp. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests & measures, mesh word]
- 19 "informal caregiver\*".mp. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests & measures, mesh word]

- 20 "family caregiver\*".mp. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests & measures, mesh word]
- 21 famil\*.mp. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests & measures, mesh word]
- 22 spouse\*.mp. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests & measures, mesh word]
- 23 partner\*.mp. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests & measures, mesh word]
- 24 friend\*.mp. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests & measures, mesh word]
- 25 relative\*.mp. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests & measures, mesh word]
- 26 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25
- 27 exp Education
- 28 "information need\*".mp. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests & measures, mesh word]
- 29 "education\* need\*".mp. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests & measures, mesh word]
- 30 "learning need\*".mp. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests & measures, mesh word]
- 31 "supportive need\*".mp. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests & measures, mesh word]
- 32 "unmet need\*".mp. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests & measures, mesh word]
- 33 knowledge\*.mp. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests & measures, mesh word]
- 34 need\*.mp. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests & measures, mesh word]
- 35 27 or 28 or 29 or 30 or 31 or 32 or 33 or 34
- 36 exp Computers/ or Computers, Handheld.mp.
- 37 exp Mobile Applications/ or Mobile applications.mp.
- 38 exp Smartphones/ or Smartphone.mp.

- 39 "electronic health app\*".mp. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests & measures, mesh word]
- 40 "eHealth app\*".mp. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests & measures, mesh word]
- 41 "smartphone app\*".mp. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests & measures, mesh word]
- 42 "mobile health app\*".mp. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests & measures, mesh word]
- 43 "mobile app\*".mp. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests & measures, mesh word]
- 44 "mHealth app\*".mp. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests & measures, mesh word]
- 45 "mobile phone app\*".mp. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests & measures, mesh word]
- 46 "iPhone app\*".mp. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests & measures, mesh word]
- 47 "Android app\*".mp. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests & measures, mesh word]
- 48 "phone app\*".mp. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests & measures, mesh word]
- 49 "handheld computer\*".mp. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests & measures, mesh word]
- 50 "internet based application\*".mp. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests & measures, mesh word]
- 51 36 or 37 or 38 or 39 or 40 or 41 or 42 or 43 or 44 or 45 or 46 or 47 or 48 or 49 or 50
- 52 35 or 51
- 53 5 and 12 and 26 and 52

#### 4. EMBASE

- #1 'dementia'/exp
- #2 'alzheimer disease'/exp
- #3 alzheimer\*
- #4 dement\*



- #5 #1 OR #2 OR #3 OR #4
- #6 'behavioral and psychological symptoms of dementia'
- #7 'behavioral symptoms'
- #8 'behavioral disturbance\*'
- #9 'neuropsychiatric problem\*'
- #10 'neuropsychiatric symptoms'
- #11 bpsd
- #12 #6 OR #7 OR #8 OR #9 OR #10 OR #11
- #13 'caregivers'/exp
- #14 'spouse'/exp
- #15 'family'/exp
- #16 caregiver\*
- #17 carer\*
- #18 'personal assistant\*'
- #19 'informal caregiver\*'
- #20 'family caregiver\*'
- #21 famil\*
- #22 spouse\*
- #23 partner\*
- #24 friend\*
- #25 relative\*
- #26 #13 OR #14 OR #15 OR #16 OR #17 OR #18 OR #19 OR #20 OR #21 OR #22 OR #23 OR #24 OR #25
- #27 'education'/exp
- #28 'information need\*'
- #29 'education\* need\*'
- #30 'learning need\*'
- #31 'supportive need\*'

- #32 'unmet need\*
- #33 knowledge\*
- #34 need\*
- #35 #27 OR #28 OR #29 OR #30 OR #31 OR #32 OR #33 OR #34
  
- #36 'personal digital assistant'/exp
- #37 'mobile applications'/exp
- #38 'smartphone'/exp
- #39 'electronic health app\*'
- #40 'ehealth app\*'
- #41 'smartphone app\*'
- #42 'mobile health app\*'
- #43 'mobile app\*'
- #44 'mhealth app\*'
- #45 'mobile phone app\*'
- #46 'iphone app\*'
- #47 'android app\*'
- #48 'phone app\*'
- #49 'handheld computer\*'
- #50 'internet based application\*'
  
- #51 36 OR 37 OR 38 OR 39 OR 40 OR 41 OR 42 OR 43 OR 44 OR 45 OR 46 OR 47 OR 48  
OR 49 OR 50 OR 50
- #52 #35 OR # 55
- #53 5 AND 12 AND 26 AND 52

## 5. Cochrane

#1 (dementia OR alzheimer disease):ti,ab,kw AND ("behavioral and psychological symptoms of dementia" OR "behavioral symptoms" OR "behavioral disturbance\*" OR "neuropsychiatric problem\*" OR "neuropsychiatric symptoms" OR BPSD):ti,ab,kw AND (caregiver\* OR carer\* OR "personal assistant\*" OR "informal caregiver\*" OR "family caregiver\*" OR famil\* OR spouse\* OR partner\* OR friend\* OR relative\*):ti,ab,kw AND (("information need\*" OR "education\* OR need\*" OR "learning need\*" OR "supportive need\*" OR "unmet need\*" OR knowledge\* OR need\*) OR ("electronic health app\*" OR

“eHealth app\*” OR “smartphone app\*” OR “mobile health app\*” OR “mobile app\*” OR “mHealth app\*” OR “mobile phone app\*” OR “iPhone app\*” OR “Android app\*” OR “phone app\*” OR “handheld computer\*” OR “internet based application\*”):ti,ab,kw, in Trials  
(Word variations have been searched)

## 6. ProQuest

- S1    mainsubject(alzheimer s disease)
- S2    mainsubject(dementia)
- S3    ab(alzheimer\*)
- S4    ab(dement\*)
- S5    ab("behavioral and psychological symptoms of dementia")
- S6    ab("behavioral symptoms
- S7    ab("behavioral disturbance\*")
- S8    ab("neuropsychiatric problem\*")
- S9    ab("neuropsychiatric symptoms")
- S10   ab(BPSD)
  
- S11   mainsubject(caregivers)
- S12   mainsubject(spouses)
- S13   mainsubject(family)
- S14   ab(caregiver\*)
- S15   ab(carer\*)
- S16   ab("personal assistant\*")
- S17   ab("informal caregiver\*")
- S18   ab("family caregiver\*")
- S19   ab(famil\*)
- S20   ab(spouse\*)
- S21   ab(partner\*)
- S22   ab(friend\*)
- S23   ab(relative\*)

- S24 mainsubject(education)
- S25 ab("information need\*")
- S26 ab("education\* need\*")
- S27 ab("learning need\*")
- S28 ab("supportive need\*")
- S29 ab("unmet need\*")
- S30 ab(knowledge\*)
- S31 ab(need\*)
- 
- S32 mainsubject(Computers, Handheld)
- S33 mainsubject(Mobile applications)
- S34 mainsubject(Smartphone)
- S35 ab("electronic health app\*")
- S36 ab("eHealth app\*")
- S37 ab("smartphone app\*")
- S38 ab("mobile health app\*")
- S39 ab("mobile app\*")
- S40 ab("mHealth app\*")
- S41 ab("mobile phone app\*")
- S42 ab("iPhone app\*")
- S43 ab("Android app\*")
- S44 ab("phone app\*")
- S45 ab("handheld computer\*")
- S46 ab("internet based application\*")
- 
- S47 (mainsubject(alzheimer s disease)) OR (mainsubject(dementia)) OR (ab(alzheimer\*))  
OR (ab(dement\*))
- S48 (ab("behavioral and psychological symptoms of dementia")) OR (ab("behavioral  
symptoms")) OR (ab("behavioral disturbance\*")) OR (ab("neuropsychiatric  
problem\*")) OR (ab("neuropsychiatric symptoms")) OR (ab(BPSD))
- S49 (mainsubject(caregivers)) OR ((mainsubject(spouses)) OR (mainsubject(family)) OR  
(ab(caregiver\*)) OR (ab(carer\*)) OR (ab("personal assistant\*")) ) OR (ab("informal

- caregiver\*")) OR (ab("family caregiver\*")) OR (ab(famil\*)) OR (ab(spouse\*)) OR (ab(partner\*)) OR (ab(friend\*)) OR (ab(relative\*))
- S50 (mainsubject(education)) OR (ab("information need\*")) OR (ab("education\* need\*")) OR (ab("learning need\*")) OR (ab("supportive need\*")) OR (ab("unmet need\*")) OR (ab(knowledge\*)) OR (ab(need\*))
- S51 (mainsubject(Computers, Handheld)) OR (mainsubject(Mobile applications) AND PEER(yes)) OR (mainsubject(Smartphone)) OR (ab("electronic health app\*")) OR (ab("eHealth app\*")) OR (ab("smartphone app\*")) OR (ab("mobile health app\*")) OR (ab("mobile app\*")) OR (ab("mHealth app\*")) OR (ab("mobile phone app\*")) OR (ab("iPhone app\*")) OR (ab("Android app\*")) OR (ab("phone app\*")) OR (ab("handheld computer\*")) OR (ab("internet based application\*"))
- S52 ((mainsubject(education)) OR (ab("information need\*")) OR (ab("education\* need\*")) OR (ab("learning need\*")) OR (ab("supportive need\*")) OR (ab("unmet need\*")) OR (ab(knowledge\*)) OR (ab(need\*))) OR ((mainsubject(Computers, Handheld)) OR (mainsubject(Mobile applications)) OR (mainsubject(Smartphone)) OR (ab("electronic health app\*")) OR (ab("eHealth app\*")) OR (ab("smartphone app\*")) OR (ab("mobile health app\*")) OR (ab("mobile app\*")) OR (ab("mHealth app\*")) OR (ab("mobile phone app\*")) OR (ab("iPhone app\*")) OR (ab("Android app\*")) OR (ab("phone app\*")) OR (ab("handheld computer\*")) OR (ab("internet based application\*"))))
- S53 ((mainsubject(alzheimer s disease)) OR (mainsubject(dementia)) OR (ab(alzheimer\*)) OR (ab(dement\*))) AND ((ab("behavioral and psychological symptoms of dementia")) OR (ab("behavioral symptoms")) OR (ab("behavioral disturbance\*")) OR (ab("neuropsychiatric problem\*")) OR (ab("neuropsychiatric symptoms")) OR (ab(BPSD))) AND (((mainsubject(caregivers)) OR ((mainsubject(spouses)) AND (mainsubject(family)))) OR (ab(caregiver\*)) OR (ab(carer\*)) OR (ab("personal assistant\*")) OR (ab("informal caregiver\*")) OR (ab("family caregiver\*")) OR (ab(famil\*)) OR (ab(spouse\*)) OR (ab(partner\*)) OR (ab(friend\*)) OR (ab(relative\*))) AND (((mainsubject(education)) OR (ab("information need\*")) OR (ab("education\* need\*")) OR (ab("learning need\*")) OR (ab("supportive need\*")) OR (ab("unmet need\*")) OR (ab(knowledge\*)) OR (ab(need\*))) OR ((mainsubject(Computers, Handheld)) OR (mainsubject(Mobile applications)) OR (mainsubject(Smartphone)) OR (ab("electronic health app\*")) OR (ab("eHealth app\*")) OR (ab("smartphone app\*")) OR (ab("mobile health app\*")) OR (ab("mobile app\*")) OR (ab("mHealth app\*")) OR (ab("mobile phone app\*")) OR (ab("iPhone app\*")) OR (ab("Android app\*")) OR (ab("phone app\*")) OR (ab("handheld computer\*")) OR (ab("internet based application\*")))))

