Data Supplement for Brodaty and Arasaratnam, Meta-Analysis of Nonpharmacological Interventions for Neuropsychiatric Symptoms of Dementia, Am J Psychiatry (doi: 10.1176/appi.ajp.2012.11101529)

TABLE S1. Nonpharmacological family caregiver interventions with outcomes pertaining to behavioral and psychological symptoms of dementia (BPSD)

Study	Intervention vs. control[b]	Intervention Type[a]: administrator	NHMRC level of evidence[b]	Number and ethnicity	Outcomes relevant to BPSD: Instrument	Assessments and follow-ups	Significance of findings (mean rating scores, pretest – posttest/most recent follow-up)
Belle et al, 2006, USA (42)	Resources for Enhancing Alzheimer's Caregiver Health (REACH) II. In home and telephone sessions for Hispanic, Caucasian and African-American CGs: 12 sessions over 6 months vs. educational materials and brief "check-in" telephone calls	1, 2, 4, 5: certified interventionists with at least a bachelor's degree in psychology, social work, nursing, occupational therapy, or other related discipline.	Randomized controlled trial; level II	212 Hispanic/Latino, 219 white/ Caucasian, and 211 black/African-American dyads. 642 ITT analysis for primary outcomes; <642 IA for secondary outcomes	Change in frequency of 3 behaviors identified as problematic for each CR: RMBPC	Single post-test assessment at 6mth; no follow-up.	For Hispanic/Latino groups problem behaviors significantly improved in intervention group (10.6-9.2) but worsened for controls (10.6-10.7). *ns* diff in problem behaviors for white/Caucasian (intervention 10.7-10.1; control 11.1-11.1) or African-American groups (intervention 9.2-9.4; control 10-9.9).
Burns et al, 2003, USA (27)	Memphis REACH: behavior care (individualized educational program on BMT) + individualized CG stress–coping management training in 8 face-to-face sessions and 30 telephone calls over 24 months vs. behavior care only.	2, 5: master's-prepared health educator–interventionist.	Randomized controlled trial; level II	66 black/African American, 99 white/Caucasian, and 2 ''other race'' dyads. 167 ITT dyads; 76 IA	Change in CG bother associated with CR problem behavior: RMBPC.	Assessed every 6mths over the active intervention period; no follow-up.	Study wide significant improvement (i.e. regardless of treatment condition) in CG bother associated with CR behaviors; *ns* difference between groups (intervention 11.8-9.2; control 19.6-14.8).
Chang, 1999, USA (28)	Cognitive-behavioral intervention over 8 weeks: videos demonstrating assisted modeling behavior (eating and dressing) and telephone	1, 2, 4, 5: managed by research nurses.	Pseudo-randomized controlled trial; level III-1	87 ITT dyads; 65 IA (female CGs). 79.1% white/Caucasian and 16.3%	Severity of behavioral deterioration in CR: Functional Rating Scale for the Symptoms of	Assessed every 4 weeks over 3 months.	Compared to baseline, CR behavior worsened for treatment (13.57-15.2) and control (13.84-16.18); *ns* difference between groups.

	support reinforcing video info and assist in CG support strategies vs. attention-only telephone calls.			black/African America.	Dementia.		
Gallagher-Thompson et al, 2003, USA (25)	REACH: Psychoeducational program vs. enhanced social support for Anglo and Latino female CGs over 10 weekly sessions	2, 5: trained interventionists who included psychologists, social workers and the like and pre- or postdoctoral psychology and social work graduate students.	Pseudo-randomized controlled trial with two active treatments; level III-1	ITT 213 female CGs (122 Anglo and 91 Latino); 213 IA	CG bother associated with CR behaviors: RMBPC + open-ended item for other behaviors	Assessed at 3, 6, 12 and 18mths but only reported 3mth post-test assessment.	Compared to baseline, CG bother from memory and behavior problems significantly decreased for both interventions across both ethnic groups (psychoeducational program Anglo 1.71-1.42, Latino 1.4-0.96; enhanced social support Anglo1.48-1.26, Latino 1.33-1.16). *ns* main effect for ethnicity or ethnicity by treatment interaction.
Gallagher-Thompson et al, 2007, USA (43)	Psychoeducative in-home cognitive-behavioral program including BMT over 4 months vs. telephone support	1, 2, 5	Pseudo-randomized controlled trial; level III-1	55 ITT female Chinese CGs; 45 IA	CG stress specific to troublesome CR behaviors: Conditional Bother Subscale of RMBPC.	Single post-test assessment at 4mth; no follow-up.	Significantly reduced bother associated with troublesome CR behaviors (intervention 1.57-0.99; control 1.49-1.48).
Gavrilova et al, 2009, Russia (26)	CG education and training via vignettes, role play and live interviews on specific problem behaviors + medical care as usual over 5 weekly, half hour sessions vs. medical care as usual	1, 2: newly qualified doctors with no previous experience working with patients with dementia and their families.	Randomized controlled trail; level II	60 ITT CGs; 53 IA	a) BPSD severity and b) associated CG distress: NPI	Single follow-up at 6mth; no post-test assessment.	*ns* difference in a) BPSD severity (post-pre difference score for intervention: -1.0 and control: -0.6) or b) associated CG distress (post-pre difference score for intervention -1.8 and control -0.2).
Gitlin et al, 2001, USA (44)	Occupational therapy over 5, 90-min home visits: education about dementia and impact of home environment on troublesome behaviors and activities of daily living deficits; instruction in problem solving and developing strategies, to manage caregiving concerns	1, 2, 3: occupational therapists.	Randomized controlled trial; level II	202 ITT CGs, 171 IA. Of the 171, 126 were white/Caucasian, 43 Black/African American, 1 Hispanic and 1 “other”.	a) Frequency of behavioral problems: MBPC + 4 other behaviors; b) CG upset associated with behavioral problems and c) caregiving self-efficacy assessed by CGs rating their	Single post-test assessment at 4mth; no follow-up.	a) *ns* effects on frequency of CR behavioral problems (intervention 20.25-17.2; control 18.74-14.43); b) *ns* differences for behavior upset (intervention 0.48-0.43; control 0.47-0.45) but post-hoc analysis revealed spouses benefited significantly from the intervention whilst nonspouses

	vs. usual care				confidence in managing each reported behavioral disturbance.		did not; c) *ns* differences for self-efficacy for managing behavior (intervention 0.77-0.84; control 0.74-0.8), however post-hoc analysis found significant improvement for female CG but not for males.
Gitlin et al, 2003, USA (45)	Home environmental skill-building program over 5, 90-min home visits and 1, 30-min telephone contact: education, and physical and social environment modifications; similar to (44) (Philadelphia REACH) vs. usual care (information only)	1, 2, 3: occupational therapist.	Randomized controlled trial; level II	255 ITT CGs; 190 IA at 6mth; of the 190, 44.7% were white/Caucasian, 52.6% Black/African American and 2.6% "other".	a) Number of disruption-related behaviors: modified RMBPC presence or absence of behaviors rather than frequency; b) CG upset with disruptive behaviors: RMBPC	Single post-test assessment at 6mth; findings from follow-ups at 12 and 18mths not available for these outcomes.	a) *ns* change in disruptive behaviors for CRs (intervention 2.14-1.88; control 2.16-1.96); b) *ns* diff in CG upset with disruptive CR behaviors (intervention 0.53-0.43; control 0.56-0.5); but post-hoc analysis found spousal CGs reported significantly less upset with disruptive CR behaviors.
Gitlin et al, 2008, USA (46)	Tailored Activity Program for CR developed by occupational therapist who instructs CG to implement activities + stress management techniques for CG over 6, 90-minute home visits and 2 15-min telephone contacts over 4 months vs. wait-list	1, 3, 5: occupational therapist.	Randomized controlled trial; level II	60 ITT dyads: 76.7% White/Caucasian, 21.7% Black/African American and 1.6% "other"; 56 IA	a) Frequency of occurrence of 24 behaviors; b) proportion of CGs reporting occurrence (yes or no) of each behavior: Agitated Behaviors in Dementia Scale and RMBPC c) Depressive symptoms in CR: CSDD d) CG upset with CR behavior: RMBPC.	Single post-test assessment at 4mth; no follow-up.	a) Significantly reduced frequency of problem behaviors (intervention 30.5-18.8; control 41.5-60.8); post-hoc analysis revealed this was more so for shadowing and repetitive questioning; b) *ns* difference between groups in overall number of behaviors occurring (intervention 8-7.2; control 7.5-7.7); c) *ns* effects on CR depressed mood (intervention 9.2-9; control 8.1-8.7); d) *ns* effects on CG upset with CR behavior (intervention 4.5-4.5; control 4.6-4.8).
Gitlin et al, 2010, USA (47)	Tailored treatment plan for managing problem behaviors and self-care including CG skill-building exercises and education vs. no treatment.	1, 2, 3, 5; occupational therapist + advanced practice nurse	Randomized controlled trial; level II	272 CGs: 69.9% White/Caucasian and 30.1% other; ITT	Change in a) frequency of most distressing behavior: agitated behavior in dementia scale,	Assessed at 16 and 24 weeks post-test; no follow-up.	Significantly a) improved target behavior; b) reduced upset and c) enhanced confidence managing target behavior (intervention 2.1-2.5; control 2-

	Intervention involved up to 11 home and telephone contacts over 16 weeks; and between 16 and 24 weeks, 3 telephone contacts	provided education and collected serum and urine samples from CR for possible undiagnosed illnesses.		analysis	RMBPC; b) caregiver upset with (RMBPC) and c) confidence in managing most distressing problem behavior (5-point Likert scale (24)) and d) overall caregiver upset with all occurring problem behaviors: RMBPC		2.2) and d) less overall upset with all occurring problem behaviors (intervention 5.8-4.6; control 5.6-5.3)
Gormley et al, 2001, Ireland (50)	Education and aggressive behavior management training program for CG in 4 in-home sessions over 8 weeks vs. discussions with CG and CR on a variety of nonspecific care-related issues and advice on services.	1, 2: study co-author, Neil Gormley.	Pseudo-randomized controlled design; level III-1	62 ITT dyads; 62 IA	a) Overall symptomatology and severity of behavioral problems: BEHAVE-AD; b) CR aggressive behavior: Rating Scale for Aggressive Behavior in the Elderly	Assessed 2 weeks after treatment completion; no follow-up.	a) *ns* difference in overall behavioral problems (intervention 8-6.5; control 8-7.8); b) *ns* diff in CR aggressive behavior (intervention 9.4-6.9; control 8.8-8.6); however when controlling for baseline diff in aggressive behavior scores post-hoc, there was a significant reduction in aggressive behavior scores for the behavior management group but not for the control group.
Graff et al, 2007, The Netherlands (37)	Occupational therapy in 10 sessions over 5 weeks: therapist taught CR to use compensatory and environmental strategies to improve their performance of daily activities and CG trained by means of cognitive-behavioral treatment vs. wait-list	1, 2, 3: occupational therapists.	Randomized controlled trial; level II	135 ITT dyads; 132 IA	CR mood: CSDD.	Post-test assessment at 6 weeks and follow-up at 12 weeks.	Significantly improved CRs' mood (intervention 8.3 -6.2; control 8.1-9.2).
Hébert et al, 2003, Canada (38)	Psychoeducative group program for CGs over 15, 2-hour weekly sessions vs. traditional support group.	1, 2, 5	Randomized controlled trial; level II	158 ITT CGs; 142 IA for desire to institutionalize; 114-116 IA for all other	a) Frequency of behavior problems and b) associated CG reactions (upset with behavior); and c) frequency of	Single post-test assessment at 16 weeks; no follow-up.	a) *ns* improvement in frequency of behavior problems (intervention 1.64-1.57; control 1.55-1.63); b) significantly reduced CG reactions to/upset with CRs behavioral-problems

				outcome variables	disruptive behaviors and d) associated CG reactions: RMBPC		(intervention 2.01-1.77; control 2.18-2.07); c) *ns* improvement in frequency of disruptive behaviors (post-pre difference score for intervention -0.06 and control 0.15); d) even greater significant improvement in CG reactions for disruptive behaviors (post-pre difference score for intervention -0.41 and control -0.03).
Mahoney et al, 2003, USA (29)	REACH over 12months: Automated interactive voice response telephone support system with information and advice on BMT, anonymous telephone support group (between caregivers) and communication with clinical nurse specialist and CR telephone distraction to provide CG a break vs. usual care (given reference booklet)	2, 4	Randomized controlled trial; level II	100 ITT CGs: 79 white/Caucasian, 16 Black/African American, 2 Hispanic, 2 "other" and 1 unaccounted. 78-93 IA at 6mth; 60-86 IA at 12mth; 45-82 IA at 18mth.	CG bother associated with CR problem behavior: RMBPC.	Assessed every 6mths; follow-up at 18mth.	*ns* effect on overall bother associated with CR disruptive behaviors (intervention 14.9-12.2; control 11.1-12.3). Post-hoc analysis revealed the treatment significantly reduced bother associated with CR behavioral disturbances for wives and CGs with low-mid caregiving mastery at baseline significantly demonstrated most reduction in CG stress-related outcomes of bothersome behaviors.
Marriott et al, 2000, UK (35)	CG education, stress management and skills training for managing CR behavior and coping with change over 14 sessions, delivered every 2 weeks vs. a control receiving one type of short family (CG + CR) interview also used in treatment group and a control not receiving any interview.	1, 2, 5: Experienced consultant clinical psychologist and study coauthor, Alison Marriott.	Pseudo-randomized controlled trial with 2 control groups; level III-1	42 ITT dyads; 41 IA	Change in BPSD: a) depressive symptoms: CSDD; b) behavioral disturbances and c) psychotic symptoms: MOUSEPAD	Post-test assessment at 9mth and follow-up at 12mth	*ns* differences between control groups (control means are the average of the 2 control groups): a) *ns* effects on depression (intervention 7.3-7.3; control 6.25-10.35); b) significantly reduced CR behavioral disturbances at post-treatment but *ns* at follow up (intervention 5.4-5.3; control 5.15-5.35); c) *ns* effects on psychotic symptoms (intervention 1.6-1.7; control 2.05-2.1).
McCurry et	Nighttime Insomnia Treatment	1, 2:	Randomized	36 ITT dyads:	a) CRs	Post-test	a) Significantly reduced number

al, 2005, USA (30)	and Education for Alzheimer's Disease over 6 1-hour in-home sessions within 2-months: training CGs to implement treatment vs. general dementia education and CG support	geropsychologist experienced in behavioral interventions with dementia patients	controlled trial; level II	94.1% in intervention were white/Caucasian and 5.9% Native American or Alaska Native; in the control, 89.5% were white Caucasian and 10.5% Asian/Pacific Islander. 36 IA at 2mth; 23 IA at 6mth.	nighttime/sleep behavior: Actillume wrist-movement recorder and CGs rated CR daytime sleepiness with Epworth Sleepiness Scale; b) CR depression: RMBPC.	assessment at 2mth and follow-up at 6mth	of night time awakenings and total time awake at night. At 6mth follow up, additional significant improvements in duration of night awakenings, treatment CRs had significantly lower longitudinal ratings of daytime sleepiness while controls tended to spend significantly more time in bed; b) significantly lower levels of CR depression at 2mth (intervention 1.12-0.79; control 0.75-0.74) but *ns* at 6mth (intervention 0.91; control 0.85).
Moniz-Cook et al, 2008, UK (48)	Community mental health nurses helped CGs manage behavior problems in CR and cope with stress during 4 weekly in-home visits + further contact when necessary over 18 months vs. usual care	1, 5, 6: community mental health nurses.	Pseudo-randomized controlled trial; level III-1	113 ITT dyads. 61 IA at 6mth; 43 IA at 12mth; 35 IA at 18mth.	a) Frequency of problem behavior in CR and b) CG problem behavior management difficulty: adapted-Gilleard Problem Checklist	Assessed every 6mths; no follow-up.	a) Significantly reduced problem behaviors over 18mth (intervention 25.8-28.16); however post-hoc analysis revealed this effect was dependent on care manager. Control CGs reported significant increases in problem behavior (25.63-31.87). b) Significant positive effects for CG management associated with problem behavior over 18mth (intervention 29.98-30.89; control 24.37-29.4). Findings a) and b) not present at 6mth.
Nobili et al, 2004, Italy (31)	Information and advice for CG in a 60-min visit by a psychologist and a 90-min visit by an occupational therapist vs. helpline and information on community services and legal and economic aspects of caregiving	2: psychologist and occupational therapist.	Randomized controlled trial; level II	69 dyads; ITT analysis	Frequency of problem behaviors in CR: Spontaneous Behavior Interview – Section C.	Assessed at 6mth and 12mth; results provided for 12mth follow-up only.	Significantly reduced CR problem behaviors on average (post-pre difference score for intervention -3.6; control -0.9) and frequency of delusions.

Teri et al, 1997, USA (34)	2 behavioral therapy interventions over 9, 60-min weekly sessions: education, discussing and planning strategies with CG on: managing problem behavior and maximizing CRs cognitive function with a focus on increasing pleasant events for CR + self-care strategies are encouraged and discussed with CG (BT-PE) vs. same elements as the previous intervention with a focus on problem solving, not pleasant events (BT-PS) vs. typical care control and wait-list control.	1, 2, 5: experienced geriatricians.	2 treatment conditions compared with 2 control groups. Total of 4 groups. Randomized controlled trial; level II	72 ITT dyads; <72 IA	Depression in CR: a) Hamilton Depression Rating Scale; b) CSDD and c) Beck Depression Inventory	Post-test assessment at 9/10 weeks and follow-up at 6mth.	Relative to both controls, there was a significant improvement in CR depressive symptoms (reduced level of depression) in both behavioral treatment conditions across all depression scales (pre-post difference score for BT-PE -4.2 and BT-PS -3.7; post-pre difference score for controls 0.07). Post-hoc analysis revealed *ns* diff between the active treatments or between the controls.
Teri et al, 2003, USA (32)	Exercise for CRs + CGs taught BMT and education on dementia over 2 weekly 12-hour sessions for the first 3 weeks, followed by 4 weekly sessions and then 4 biweekly sessions vs. routine medical care	1, 2, 6: home health professionals experienced in dementia care.	Randomized controlled trial; level II	153 dyads; ITT analysis. 269 participants (i.e. CGs and CRs) were white/Caucasian, 25 black/African American, 10 Asian/Pacific Islander, 1 Hispanic and 1 Native American/Alaska Native	a) Depressive symptoms in CR: Hamilton Depression Rating Scale and CSDD; b) delays in institutionalization related to problem behavior and associated CG distress: RMBPC	Post-test assessment at 3mth and follow-up at 6, 12, 18 and 24mths.	a) Significantly decreased rates of depression for CRs at 3mths (intervention 5.7-5.2) while control patients had significantly worse scores (5.8-6.2). There were *ns* at 24mth (intervention 6.4; control 7.4); however, improvements at 3mth were maintained for CRs with higher baseline depression; ; b) At 24mth, treatment CRs showed a trend for significantly less institutionalization due to behavioral disturbance.
Teri et al, 2005, USA (33)	Community consultants interactively taught CGs BMT and strategies for communication, increasing pleasant events for CR and enhancing CG support over 8-weekly in-home sessions, followed by 4-monthly	1, 2, 4, 6: community health care professionals with master's degrees or equivalents in counseling,	Pseudo-randomized controlled trial; level III-1	95 ITT dyads: 86%CG and 85% CR were white/Caucasian. 83 IA at 3mth; 66 IA at 6mth.	a) Severity (NPI) and b) frequency of problem behaviors: NPI and RMBPC; c) associated CG reactions: RMBPC.	Post-test assessment at 2mth and follow-up at 6mth.	a) Significantly reduced frequency (intervention 3.1 - 2.3) and b) severity (intervention 2.8-2.2) of CR behavior problems from pre- to post-test within the intervention group; c) Significantly improved CG reactivity to CR behavior

	telephone calls vs. routine medical care	psychology and social work + at least 1 year of clinical experience with older adults.					problems (intervention 28.1-21.9; control 25-23.4).
Tremont et al, 2008, USA (39)	Telephone-based intervention delivered in 23 telephone contacts over 12 months involving psychoeducation, enhancing CG support, self-care techniques and strategies for coping with CR problems vs. standard care	2, 4, 5; two qualified master's level therapists	Randomized controlled trial; level II	60 ITT caregivers; 33 IA	Caregiver reactions to behaviour problems: RMBPC	Single post-test assessment at 12 months; no follow-up.	Intervention CGs reported significantly less severe reactions to behavior problems (16.06-8.56) compared to controls (22.41-20.12).
Ulstein et al, 2007, Norway (36)	Psychosocial/educative group program over four and a half months: CGs taught problem-solving and communication techniques + usual care vs. usual care	1, 2: educational program run by geriatricians and psychiatrists; meetings for problem-solving and communication led by trained geriatric or psychiatric nurses.	Randomized controlled trial; level II	171 dyads; ITT analysis	Frequency and severity of behavioral symptoms in CR: NPI	Post-test assessment at 4.5mths; follow-up at 12mths.	*ns* diff in CR behavioral symptoms (intervention 22.1-22.13; control 23.2-25.42), however post-hoc analysis showed significant improvement in behavioral symptoms among female CRs (pre-post difference score for intervention 1.8) whilst behavior in control group females significantly worsened (pre-post difference score for control -5.6).

Notes.
BEHAVE-AD = Behavioral Pathology in Alzheimer's Disease Rating Scale; BMT = behavioral management techniques; BPSD = behavioral and psychological symptoms of dementia; CG = caregiver; CR = care recipient; CSDD = Cornell Scale for Depression in Dementia; IA = in analysis; ITT = intention to treat analysis; MBPC = Memory and Behavior Problems Checklist; mth = month; MOUSEPAD = Manchester and Oxford Universities Scale for the Psychopathological Assessment of Dementia; NHMRC = National Health and Medical Research Council; NPI = Neuropsychiatry Inventory; *ns* = no/not significant; RMBPC = Revised Memory and Behavior Problem Checklist.
[a] From Table 1: 1=Skills training for caregivers, 2=Education for caregivers, 3=Activity planning and environmental redesign, 4=Enhancing support for caregivers, 5=Self-care techniques for caregivers and 6=Miscellaneous

[b] Levels of evidence rated according to NHMRC guidelines with lower numerals indicating higher quality. Level I evidence, the highest level, is a systematic review of level II studies; level II studies are randomized controlled trials; level III–1 is a pseudo-randomized controlled trial, III-2 a comparative study with concurrent controls and III-3 a comparative study without concurrent controls; and level IV, the lowest level, is a case series with either post-test or pre-test/post-test outcomes. Only higher quality level II and level III-1 studies were included.