

# Pre- and Postoccupancy Evaluation of New Dementia Care Cottages

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## Abstract

Concerns about negative outcomes associated with relocating residents are common. Fifty-five residents of a traditional high-care nursing home moved to new, purpose-built, dementia-specific cottages; 35 additional residents moved into the cottages within the first 8 months of operation. Direct-care staff participated in workshops on engaging residents in life-skill activities. Resident behavior was observed using a time sampling and a de-identified behavior mapping procedure. Results showed increases in resident engagement following the move and further increases after staff training. Staff engagement in resident interactive tasks similarly increased both after the move and again after staff training. The newly built cottages scored higher across all domains of 3 different types of environmental assessment, and family satisfaction ratings also improved. These results suggest that relocation need not negatively affect residents with dementia and that this environment provides an attractive model of care for dementia facilities.

## Keywords

dementia, environment, engagement, distress, relocation

## Introduction

Populations worldwide are aging rapidly, resulting in an increasing number of older individuals who require care.<sup>1</sup> Over the last decade, the Australian Government has developed a policy framework that supports the care of older Australians in their own homes.<sup>2</sup> One outcome of this development of comprehensive community care programs is that the population accessing residential care is more cognitively disabled than ever before, with an average of 80% of all residents reported to have a diagnosis of dementia.<sup>3</sup> A survey of 11 nursing homes in Sydney reported that 90% of all residents with dementia engaged in problem behaviors.<sup>4</sup> There is increasing recognition that nursing homes with traditional multibed or ward designs do not meet the needs of this profile of residents<sup>5,6</sup> nor do traditional nursing home designs meet current community expectations of residential care accommodation. Australian legislation<sup>7</sup> governing the minimum standards of the built environment of residential care has addressed this situation.

As a result of these social and legislative changes, old, frail, and cognitively disabled residents are being relocated during renovations to new premises. Many within the aged care industry voiced concerns about negative outcomes for residents during relocation, including increased rates of death, falls, and confusion during such moves. Previous research on nursing home relocations often focused on mortality rates with contradictory results. Aldrich and Mendkoff<sup>8</sup> reported a 32% increase in mortality post relocation in a study of 182 residents (40% of which were described as having neurological conditions) moved from a closing nursing home to 56 similar nursing

homes. Borup et al<sup>9</sup> found a lower rate of mortality in 529 residents who relocated from a nursing home that was closing to existing or new nursing homes when compared to 453 residents in a control group that did not relocate. All residents were described as “interviewable,” suggesting an absence of dementia. Similar studies conducted in relocations from a ward being demolished to a newly constructed extended care unit<sup>10</sup> and from a deteriorating nursing home to a modern 4-story building with air conditioning<sup>11</sup> found no difference in mortality of relocated residents.

Nirenberg<sup>11</sup> also measured behavioral skills in low-functioning residents pre and post relocation. He found that a behavioral skills program resulted in significant post-relocation improvements in residents' proximity to others, talking, consuming, grooming and cleaning, interaction with other residents, and body position. Direct-care staff in the study reported having less available time for residents care post-relocation, due to special work requirements. Staff reported anecdotally that as a result, low-functioning residents engaged in more self-care such as grooming and cleaning.

More recent relocation research has focused on changes in residents' physical and mental functioning. Anthony et al<sup>12</sup>

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found no changes in continence or mobility after residents relocated from a large psychiatric hospital to smaller dementia wards within general hospitals in the United Kingdom; residents did, however, exhibit depressive signs such as withdrawal, crying, and loss of appetite. McAuslane and Sperlinger<sup>13</sup> found no changes in problem behaviors such as stripping, urinating in inappropriate places, and resisting basic care in 19 dementia residents relocating from a hospital ward to a community nursing home.

Schwarz, Chaundry, and Tofle<sup>14</sup> evaluated the impacts of renovations, to a dementia care facility, on residents' social and interactive behaviors. The renovations included replacing a large nurse's station with an aviary, replacing a large centralized dining room with several smaller dining rooms located throughout the facility, and creating several smaller activity areas as alternatives to one large area. Staff rated the renovated environment as more homelike. Residents were observed to spend more time in the smaller activity areas, were less likely to engage in negative behavior during dining such as yelling or agitating others, and were more likely to interact socially with staff.

In a review of 60 studies on nursing home relocations in the United States, Canada, and the United Kingdom, Smith and Crome<sup>15</sup> reported that only 58% of the studies included detailed information about the sample and of those that did include information, only 26% specified how many of the residents had dementia. Although there are anecdotal reports that the most confused and frail residents are most likely to have negative outcomes from relocation, 9 of the studies in the review of Smith and Crome excluded people with severe dementia and people with poorer general health. Research on the impact of relocation on residents has occurred in a wide variety of settings: home to a nursing home,<sup>16</sup> from one hospital to another hospital,<sup>17</sup> and from one room in a nursing home to a new room in the same facility.<sup>18</sup> Such wide variations in residents and types of relocation provide one possible explanation for contradictory results in previous research.

The current study analyzes the behavioral impacts of a move from a residential high-care facility to a new, purpose-built residential high-care facility on residents with moderate-to-severe dementia.

## Method

### Setting

This study took place on the campus of The Hammond Village in Sydney, Australia. The Village was established as a charity in 1933, to provide low-cost housing for families evicted during the depression. Aged care services were first provided in the 1940s to veterans living on a pension. The relocation corresponded with the closure of Sinclair Home, a traditional 72-bed nursing home facility with multibed wards and a "racetrack" design with rooms arranged around a central courtyard. Sinclair Home had been remodeled in 1996/1997 to better serve the needs of residents with dementia by dividing it into 4 separated

units, catering to different resident profiles. One unit had already been closed prior to the start of the study. When the study began, 19 nonambulant confused residents lived in unit A, 20 ambulant confused residents lived in unit B, and 16 ambulant residents with moderate-to-severe behavior problems and psychological symptoms of dementia (BPSD) lived in unit C. The bedrooms in these units contained 1, 2, or 3 beds. Each unit had 4 direct-care staff during the day and 3 or 4 evening staff. Cleaning was carried out by additional staff and meals were prepared off-site in the campus's commercial kitchen. Staff ate their meals in a common staff room away from the residents. All residents shared access to communal bathrooms on each unit. Each unit had a dining room, an activity room containing a television, and access to large outdoor gardens with walking paths for the ambulant units and a small (20 m<sup>2</sup>) outdoor courtyard for the nonambulant residents. After assessment and approval by the resident's physician and family, lap belt restraints were used for residents who presented a falls risk. In the last month of operation, 38% of residents were restrained.

Southwood Cottages opened in October 2007 and is located directly across a residential street from Sinclair Home. Southwood was designed to create a home-like environment for high-care residents with dementia. It includes 5 cottages (Kalina, Ashton, Airlie, Wyn, and Forrest) each that house 15 residents. Primary entry into each cottage is through a residential-style front door. Each cottage has a home-style kitchen that is centrally located with clear visual access throughout the unit. Additional common areas include a television room and small quiet lounges at the end of each of 2 hallways that lead to each resident's private bedroom with an ensuite bathroom. Bedrooms are equipped with a passive infrared monitoring system that can be tailored to an individual resident's functional profile to alert staff by means of a vibrating pager. Each cottage has a large exterior garden courtyard (120 m<sup>2</sup>) with a pathway winding through outdoor seating areas. Pathways were designed to return walkers to the cottage. Each cottage is staffed by 3 direct-care staff that also prepare all meals in the cottage's kitchen and eat their meals with the residents in the cottage's dining room. Staff from Sinclair transitioned with the residents and were educated before the move on the new person-centered model of care. Staff-only corridors are located behind disguised doorways that can only be opened by magnetic strike pads. These corridors provide access between cottages and house utility areas for laundry, cleaning, and pantry goods. These architectural features obviate the need for trolleys. In lieu of a traditional nurse's station, each cottage has a small office located by the front door for private conferences.

Initial placement was based on the resident's mobility, nursing care needs, and severity of behavior problems; thus, non-ambulatory confused residents moved from unit A into Airlie and Wyn cottages; ambulatory confused residents moved from unit B into Kalina and Ashton cottages; residents with moderate-to-severe BPSD from unit C moved into Forrest cottage. Southwood has a restraint-free policy and restraints are only considered at the direct request of family, with approval by the resident's physician. Only 1 resident was restrained during the study.

## Participants

Ninety residents participated in this study. Most of the residents spoke English; however, 10% had French, Italian, Spanish, German, Macedonian, or Norwegian as their first language. Residents scored between 0 and 20 ( $M = 2$ ; Mode = 0) on the Mini-Mental State Examination (MMSE),<sup>19</sup> suggesting mostly severe impairment. Residents scored between 6e and 7f ( $M = 7c$ ) on the Functional Assessment Staging Test (FAST),<sup>20</sup> indicating that the average resident was incontinent, had very limited verbal capabilities, and had lost the ability to walk without assistance. The participants included a transition group that moved from Sinclair Home into Southwood and new residents group that moved into Southwood during the first 8 months of operation.

**Transition group.** Fifty-five residents (15 male, 40 female), ranging in age from 65 to 99 ( $M = 85$ ), moved from Sinclair Home into Southwood (12 of these residents moved or died during the 8-month study). These participants had resided in Sinclair Home for between 1 to 132 months ( $M = 30$ ).

**New residents.** Over the first 8 months of operation, 35 additional residents (11 male, 24 female), ranging in age from 68 to 100 ( $M = 85$ ), moved into Southwood cottages from either the community or other aged-care facilities (9 of these residents moved or died during the 8-month study). New resident admissions into Southwood were staggered across time, as beds became available. No baseline measurement was available for these residents.

## Observations and Measurements

**Environmental assessments.** Three environmental and building assessments were conducted to compare the physical environments of Sinclair Home and Southwood. The Sheffield Care Environment Assessment Matrix (SCEAM)<sup>21</sup> included 326 items from 11 domains (normalness, physical support, community, safety, privacy, cognitive support, staff, comfort, choice/control, personalization, and awareness). The Therapeutic Environment Screening Scale–Nursing Home (TESS-NH)<sup>22</sup> included 91 items from 6 environmental domains (lighting, noise, environment, homelike, cues, and signs). The Environmental Audit Tool (EAT)<sup>5</sup> was the final tool used to rate the physical environments. The EAT included 72 items that were associated with 10 basic principles of design for people with dementia (safety, size, visual access, stimulus reduction, stimulus enhancement, wandering and access outside, familiarity, privacy and community, community access, and domestic activities). Scores for each of these 3 scales were tallied and a percentage was calculated for each domain.

**Individual resident social engagement observations.** A time sampling procedure was used in which each resident was observed and scored as engaged, inappropriately engaged, or not engaged. A resident was scored as engaged if he or she was involved in visible activity, including use of any aspect of his or

her environment. If scored as engaged, the resident's affect was scored as positive, neutral, or negative. A checklist with the name of each cottage resident and boxes for multiple observations of each resident was used for data collection. Before each observation session, the name of any new resident to the cottage was added to the list and the name of any transition resident who had moved or died was removed. The observer would watch the first resident listed on the checklist for 20 seconds and score that resident's social engagement, find the next resident on the list and conduct a 20-second observation, and repeat this process until all of the cottage's residents had been observed 3 to 5 times during an observation session. Observation sessions were conducted at different times of the day between 9:00 AM and 5:00 PM, and the order of living areas or cottages in which residents were observed was randomized each observation session. Observations were conducted at least 3 times per month ( $M = 4.25$ ).

Data were summarized for each observation session to reflect the percentage of 20-second intervals during which the resident was engaged (any engagement with a positive or neutral affect), distressed (inappropriate engagement or engagement with negative affect), and not engaged. Individual resident data were grouped by setting (unit or cottage), resident profile (ambulatory confused, nonambulatory confused, and moderate-to-severe BPSD), month, and whether the resident was in the transition group or a new resident.

**Behavior mapping.** Observations of resident engagement were also conducted using behavior maps. A simple architectural drawing identified all resident rooms and common areas for the residential units in Sinclair Home and each cottage in Southwood. Figure 1 is a blank copy of the behavior map for Kalina cottage. The observer marked the location and behavior of each resident, staff, and visitor on a map of the unit or cottage. Residents were designated by a circle to mark their location, and symbols inside the circle were used to indicate whether the resident was engaged (positive or neutral affect), not engaged, or distressed (negative affect or inappropriately engaged). Staff were designated by a triangle to mark their location, and symbols inside the triangle were used to indicate whether the staff member was interacting with a resident (using a positive or neutral tone), doing a work-related task that was not interactive, or acting inappropriately (any off task behavior or interacting with a resident in a harsh or negative tone). Behavior maps were collected in each living unit in Sinclair Home once and 21 times in Southwood cottages. The identity of the resident or staff member being observed was not recorded on the behavior maps. Thus, Southwood behavior maps included all residents living in the cottage (both transition group and new residents) on the day of the observation.

## Other Measurements

Data on resident mortality and falls in the 8 months before and first 8 months after the transition were also collected from the facility's records. Falls data are reported per 100 bed days to

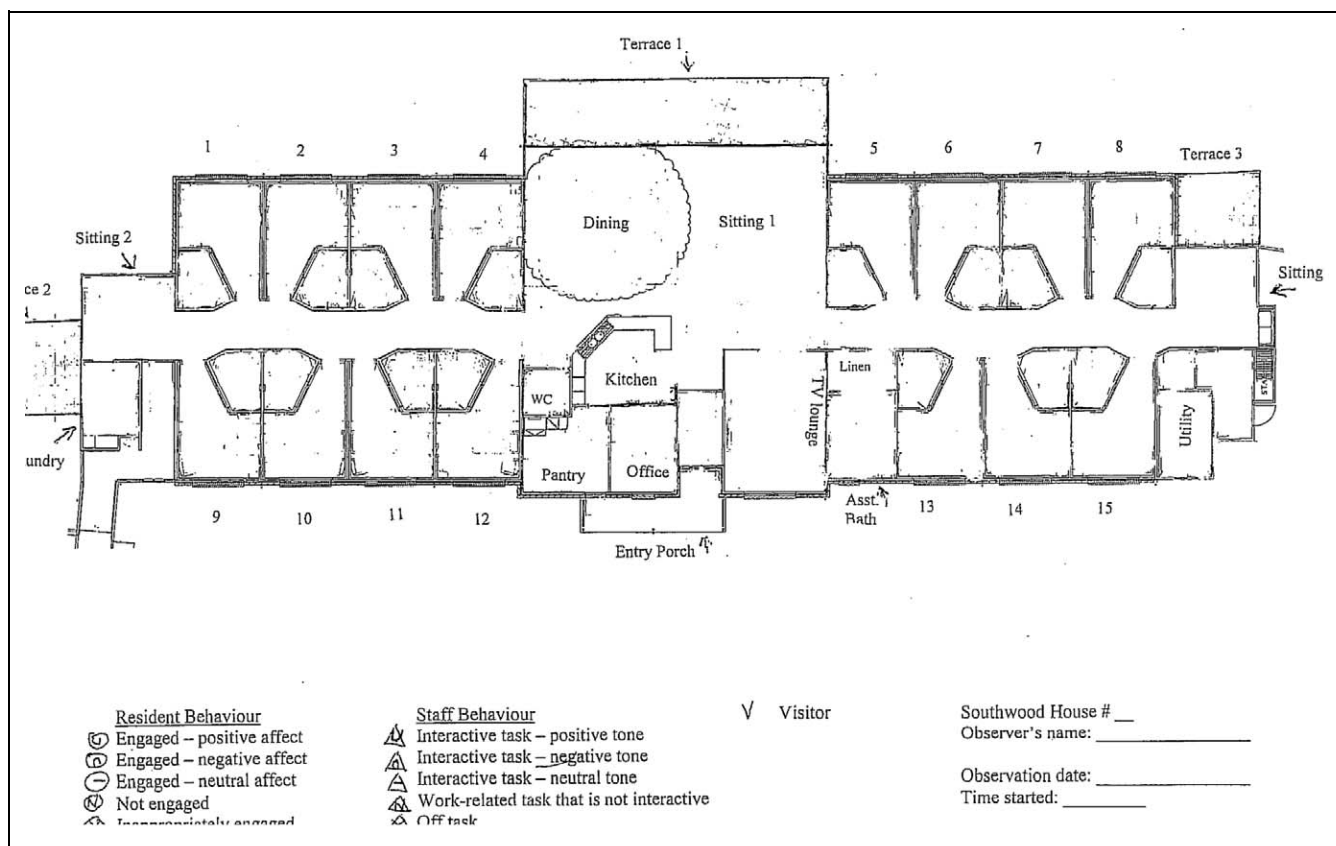


Figure 1. Behavior map of Kalina cottage.

equalize for differences in the number of residents over time and across settings.

Surveys were sent to residents' families asking them to rate their satisfaction with staff, cleanliness of facility, resident activities, food, and environment in Sinclair Home. Five months after residents had transitioned to Southwood, the same survey was sent to family members to assess their satisfaction with the new facility.

### Staff Training

A 1-week staff-training workshop was conducted in each cottage 3 to 4 months after opening. Two workplace trainers employed in the Learning and Development section of the same organization reviewed prior didactic training and modeled techniques for staff to engage residents in life-skill activities that the new environment allowed. For example, residents could participate in meal preparation, laundry, sweeping, dusting, or helping themselves to a drink in the kitchen. Data from individual observations and behavior maps were collected pre and postworkshop and analyzed to discover what effects the training had on resident engagement and distress levels.

### Statistical Analysis

Individual resident social engagement data were grouped by resident profile (ambulatory confused, nonambulatory

confused, and moderate-to-severe BPSD) and analyzed with 2 repeated measures planned orthogonal contrasts. The first contrast compared baseline means from Sinclair with means from the first 3 to 4 months in Southwood. The second contrast compared means from the first 3 to 4 months in Southwood to means from the next 3 to 4 months in Southwood after the staff-training workshop. Only residents with data collected in all 3 conditions were included in this analysis. Because new residents had no baseline scores from Sinclair, a repeated measures test was done comparing their means from the first 3 to 4 months in Southwood to the means from after the staff-training workshop. Only residents with data collected in both conditions were included in this analysis.

### Human Ethics Approval

This study received approval (Reference # 10-2007/10407) from the University of Sydney ethics committee, and consent was obtained from residents' families.

## Results

### Environmental Assessments

Table 1 shows that Southwood's cottages had better scores than Sinclair on every domain included in the 3 environmental assessments. Therapeutic Environment Screening Scale

**Table 1.** Environmental Design Features

	Sinclair	Southwood	Difference
<b>Therapeutic Environment Screening Scale (TESS)</b>			
Clean	20	100	80
Maintenance	25	100	75
Lighting	29	100	71
Global rating—environment	25	85	60
Cues and signs	15	65	50
Homelike	33	67	34
Noise	92	100	8
Mn TESS	34	88	54
<b>Sheffield Care Environment Assessment Matrix (SCEAM)</b>			
Comfort	50	100	50
Personalization	16	63	47
Choice/control	40	82	42
Awareness	59	100	41
Privacy	32	66	34
Cognitive support	29	55	26
Normalness	52	70	18
Safety/health	65	82	17
Staff	86	100	14
Physical support	54	63	9
Community	80	83	3
Mn SCEAM	51	79	27
<b>Environmental Audit Tool (EAT)</b>			
Community links	0	100	100
Wandering	0	89	89
Safety	23	100	77
Stimulus reduction	25	100	75
Visual access	26	95	69
Privacy and community	33	100	67
Stimulus enhancement	44	100	56
Domestic activities	25	63	38
Size	33	67	34
Familiarity	58	92	34
Mn EAT	27	91	64

(TESS) scores improved by an average of 54 points with 6 of its 7 domains increasing by 100% or more. Sheffield Care Environment Assessment Matrix scores improved in every domain with an average increase of 27 points with 4 of the 11 domains increasing by 100% or more. Environmental Audit Tool (EAT) scores similarly improved by an average of 64 points with increases of 100% or more in 9 of its 10 domains.

### Resident Engagement

Figure 2 shows the average resident engagement rates by month for each cottage. This figure includes de-identified data collected using behavior maps (open squares), resident-specific data collected on the transition group (closed circles), and resident-specific data on all new residents that moved into 1 of the 5 cottages during the first 7 months of operation (open triangles).

Behavior map data (open squares in Figure 2) showed that residents were engaged during 20% of baseline observations conducted in Sinclair. This increased to 33% during the 3 to 4 transition months before the staff-training workshops and then increased to 58% in observations conducted after training.

Baseline averages ranged from 13% (residents moving to Airlie and Wyn) to 27% (residents moving to Forrest). The behavior maps showed increased engagement in all 5 cottages during the first 3 to 4 transition months after the move (from a 6% increase in Kalina, 8% in Airlie and Wyn, 15% in Forrest, and 23% in Ashton). After the staff-training workshops, even larger increases in engagement were observed in all 5 cottages (23% increase over baseline in Wyn, 30% in Airlie, 41% in Forrest, 45% in Ashton, and 50% in Kalina).

Individual observations showed residents in the transition group that (closed circles in Figure 2) were engaged during 35% of baseline observations; percentage of observations engaged increased to 42% in the initial 3 or 4 transition months and increased to 54% in observations conducted after the staff-training workshops. Baseline averages ranged from 22% (residents that moved to Wyn) to 55% (residents that moved to Kalina). Engagement increased during the 3 to 4 transition months after the move in 4 of the 5 cottages (from a 1% increase in Airlie and Wyn, a 2% in Kalina, and 15% in Forrest; Ashton decreased by 3%). After the staff-training workshops, increases in engagement were observed in all 5 cottages (13% increase over baseline in Ashton and Wyn, 14% in Airlie, 16% in Kalina, and 31% in Forrest).

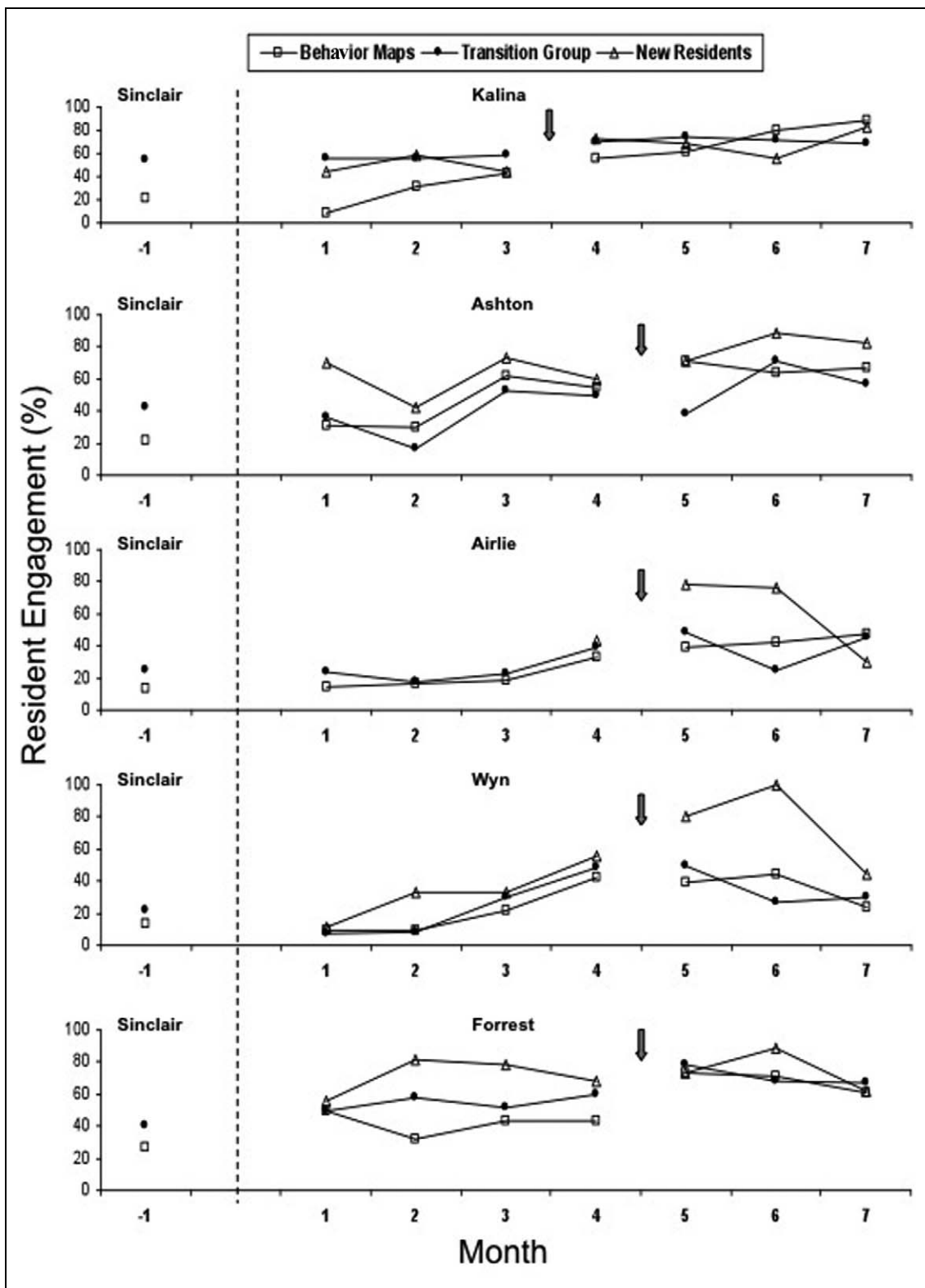
Table 2 summarizes engagement data by resident profile (ambulatory confused, nonambulatory confused, and confused BPSD) for the 43 transition group residents for whom data were collected in each experimental condition (12 residents from the transition group were excluded from this analysis). The transition group showed a statistically significant increase in engagement over time; mean engagement scores were lower premove compared to postmove ( $F_{1, 40} = 18.754, P < .001$ ) and improved further after the staff training ( $F_{1, 40} = 16.558, P < .001$ ). There was no interaction between time and group, but there were significant differences between the groups ( $F_{2, 40} = 6.087, P < .05$ ).

Observations of new residents (open triangles in Figure 2) showed that they were engaged during 54% of observations in 3 to 4 months before the staff-training workshops and during 72% of the observations conducted after training. There were no baseline scores for these residents. After the staff-training workshops, increases in engagement were observed in all 5 cottages (4% increase over pretraining rates in Forrest, 18% in Airlie, 20% in Ashton, 22% in Kalina, and 42% in Wyn).

Data from 27 new residents were analyzed (8 residents did not have complete data and were excluded from the analysis). There was no significant change in engagement over time. There was a significant interaction between time and group ( $F_{2, 23} = 5.583, P < .01$ ), but there were no significant differences between the groups as seen in Table 2.

### Resident Distress

Figure 3 shows average resident distress rates by month for each cottage. This figure includes de-identified data collected using behavior maps, resident-specific data collected on the transition group, and resident-specific data on all new residents.



**Figure 2.** Resident engagement summarized by month for each Sinclair unit and Southwood cottage.

Behavior map observations (open squares in Figure 3) showed that none of the residents were observed to be distressed during the baseline observations conducted in Sinclair,

residents were distressed during only 1% of the behavior mapping observations conducted in 3 to 4 transition months before the staff-training workshops, and 1% in observations conducted

**Table 2.** Statistical Analysis of Mean Resident Engagement (SD)<sup>a</sup>

Resident Profile	N	Baseline	Pretraining Workshop	Posttraining Workshop
<b>Transition group</b>				
Ambulatory confused	14	48.43 (25.488)	48.93 (17.104)	61.14 (25.319)
Nonambulatory confused	21	23.00 (23.535)	31.71 (19.173)	40.62 (28.586)
Confused, BPSD	8	34.75 (34.408)	57.50 (19.183)	71.25 (23.463)
<b>New residents</b>				
Ambulatory confused	17	NA	59.71 (22.124)	76.00 (18.214)
Nonambulatory confused	4	NA	51.50 (7.047)	53.50 (5.000)
Confused, BPSD	5	NA	80.40 (24.048)	54.80 (37.131)

Abbreviations: BPSD, behavior problems and psychological symptoms of dementia; NA, not applicable.

<sup>a</sup> Where significant, values given in text.

after training. Observations of distress were rare in any of the cottages using the behavior mapping procedure.

Resident-specific observations of the transition group (closed circles in Figure 3) showed that they were distressed during 4% of baseline observations (ranging from none for residents moving to Kalina to 8% for residents moving to Wyn), 2% in 3 to 4 transition months before the staff-training workshops (with 5% decreases in Ashton and Wyn), and in 3% of observations conducted after training (with decreases from baseline of 4% in Wyn and 7% in Ashton).

Table 3 summarizes statistical analyses done on the resident-specific distress data. Distress data from 43 residents from the transition group were analyzed (12 residents did not have complete data and were excluded from the analysis). There were no significant differences in distress over time. There was also no significant difference between groups and no interaction between time and group, as seen in Table 3.

Resident-specific observations of new residents (open triangles in Figure 3) showed that they were distressed during 2% of observations in first 3 to 4 months that Southwood was opened before the staff-training workshops (ranging from none in Ashton and Airlie to 3% in Wyn) and only 1% in observations conducted after training (a 1% decrease in Kalina, a 5% decrease in Wyn, and a 2% increase in Forrest).

Resident-specific distress data for 27 new residents were analyzed (8 residents did not have complete data and were excluded from the analysis). There was no significant change in distress over time. There was also no significant difference between groups and no interaction between time and group, as seen in Table 3.

### Other Measures

Figure 4 shows staff work patterns monthly for each cottage. This de-identified data collected using behavior maps shows staff engagement rates in resident interactive tasks and other work-related tasks. Staff members were observed to be engaged in resident interactive tasks in Sinclair Home in 16% of observations. After the move to Southwood, this increased to 33% in 3 to 4 months before the staff-training workshops and increased to 41% after training. Observations

of staff in Sinclair Home showed that they were engaged in other work-related tasks in 73% of baseline observations. After the move to Southwood, this decreased to 67% in 3 to 4 months before the staff-training workshops and further decreased to 59% following the staff-training workshops.

In the 10 months before the move, Sinclair Home reported an average of 0.5 falls per 100 bed days. Southwood reported an average of 1.0 falls per 100 bed days in the 10 months following the move. In the 8 months before the transition, 22 deaths (35%) occurred in Sinclair Home. In the first 8 months in Southwood, 12 residents from the transition group (22%) died, and 3 of the new residents (9%) died.

Results from family surveys showed that families were more satisfied with the environment, the cleanliness, the food, and the way the staff worked in Southwood. Family opinion about a lack of planned activities did not change.

### Discussion

Three different environmental assessments found Southwood to be a structural and therapeutic improvement over Sinclair Home. The new features of design allowed residents to be more engaged and less distressed in all 5 cottages at Southwood. There was provision for wandering with a garden path that ran the full length of the cottage and provided multiple opportunities for activity (such as bird bath, garden pergola, outside broom, etc), and eventually returned the walker to the cottage. Distracting institutional stimuli, such as trolleys, public address systems, and fire extinguishers, were eliminated by creating hidden service corridors between cottages for staff to handle food deliveries, laundry, and so on. Lighting was improved by floor to ceiling windows in the common area in the center of each cottage. Individual bedrooms with ensuite allowed for greater comfort, privacy, and personalization. The homestyle kitchen created a more home-like environment, while amenities such as the gardens, kitchen, and laundry allowed residents to engage in more domestic activities.

The no-restraint policy likely contributed to an increase in resident engagement and decrease in resident distress. Several residents who had been restrained in Sinclair Home and had not

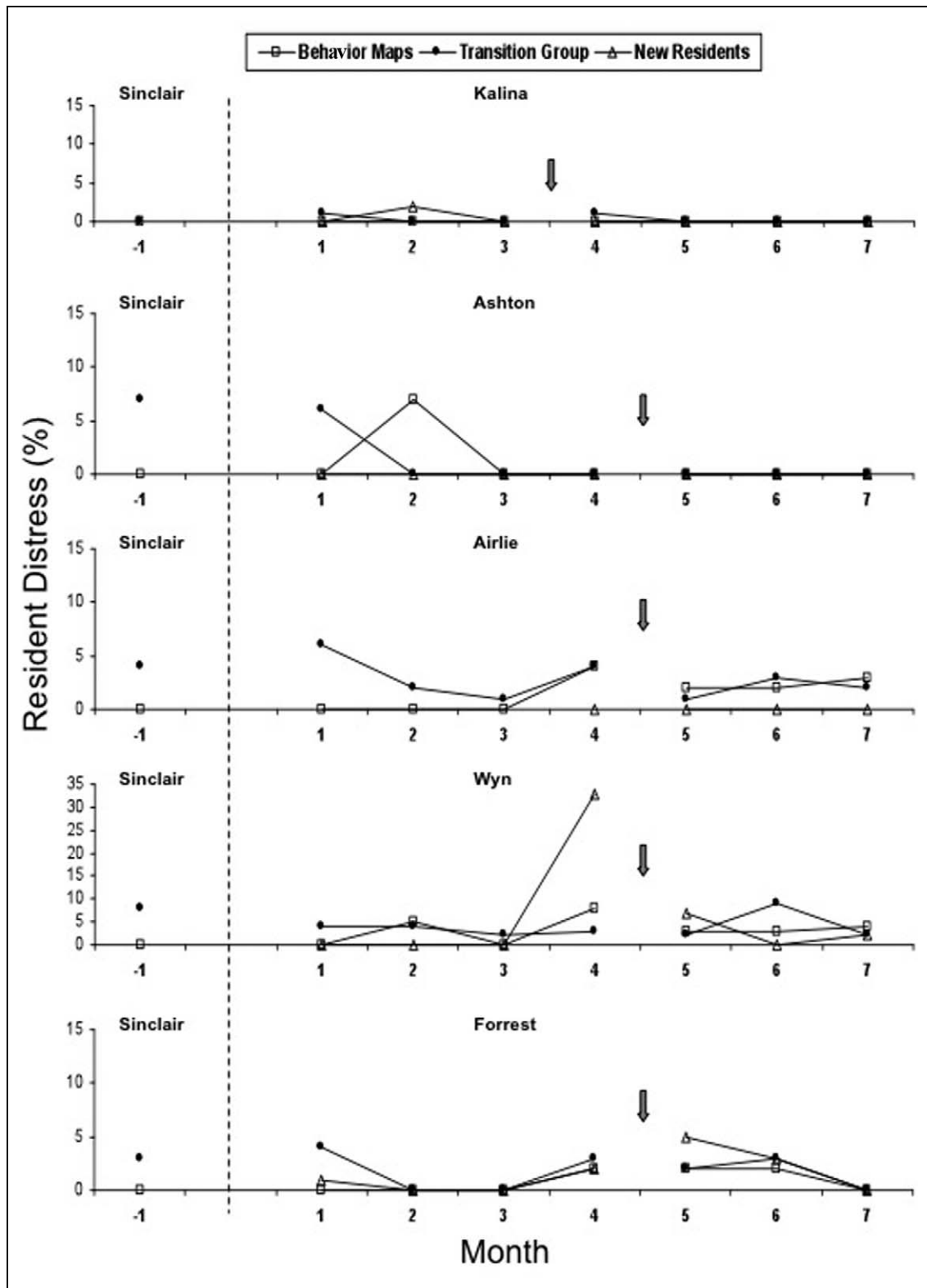


Figure 3. Resident distress summarized by month for each Sinclair unit and Southwood cottage.

walked in months became mobile once again. This lack of restraints also may have contributed to the increased number of resident falls. Mortality rates decreased after the transition.

After relocation, residents were highly engaged in exploring their new environment. Some physical features of the environment that may have contributed to the increase in engagement



**Table 3.** Statistical Analysis of Mean Resident Distress (SD)<sup>a</sup>

Resident Profile	N	Baseline	Pretraining Workshop	Posttraining Workshop
<b>Transition group</b>				
Ambulatory confused	14	1.36 (2.735)	0.93 (2.056)	0.14 (0.535)
Nonambulatory confused	21	7.24 (13.386)	3.43 (8.060)	2.67 (6.843)
Confused, BPSD	8	7.24 (13.386)	2.25 (3.240)	1.5 (4.243)
<b>New residents</b>				
Ambulatory confused	17	NA	0.12 (0.485)	0.00 (0.000)
Nonambulatory confused	4	NA	3.50 (7.000)	1.25 (2.500)
Confused, BPSD	5	NA	1.00 (2.236)	4.20 (9.391)

Abbreviations: BPSD, behavior problems and psychological symptoms of dementia; NA, not applicable.

<sup>a</sup> Where significant, values given in text.

were visual access from an open-plan layout, a garden path that took residents around to the other side of the cottage, and a homestyle kitchen that allowed residents to participate in mealtime. Engagement was lower in cottages accommodating non-ambulant residents (Airlie and Wyn), but these residents seemed to benefit from the move to Southwood and from the staff-training workshop, as their engagement increased over time. The residents in the BPSD group benefited the most from the move to Southwood and from the staff-training workshop, with large average increases in engagement at each measure. The ambulatory group benefited from the staff-training workshop more than from the initial move to Southwood. These increases in engagement contradict the trajectories of deteriorating function and activity normally found in people with severe dementia. In the new resident group, the ambulatory confused and nonambulatory confused groups showed increased engagement while the BPSD showed a large decrease. This explains the significant difference in the interaction between time and group.

After the move, there was no large increase in distress that may be expected with a confused population changing environments. A higher level of distress occurred in nonambulant cottages and was only observed in 1 or 2 residents per cottage. Distress in these residents seemed to be more of a feature of their dementia than a result of events or external environment. Low levels of distress for all resident profiles across all measurement times resulted in nonsignificant findings in the statistical analyses. Features of the new environment that may have contributed to lower distress levels were a private bedroom and ensuite, good highlighting of relevant items throughout the cottage, and provision for wandering. The new dining arrangements also may have created a less irritating environment. Seating fewer residents per table appeared to increase resident-to-resident interaction during mealtimes, and the smell of food being cooked may have stimulated appetites.

The lower number of residents per cottage seemed to make life easier on the residents. Rather than having to interact with 18 or 23 others, the maximum was now 15. Each resident now had a private room with ensuite, and

there was a wider variety of community spaces. Increased visual access also allowed residents to sit and observe their surroundings without being disturbed. The elimination of linen trolleys, pill trolleys, nursing stations, and the public address system with buzzers and flashing lights probably helped to keep distress low and make the environment appear more homelike and less institutional.

Staff who transitioned from Sinclair Home with residents changed roles from a traditional “assistant in nursing” or “personal care worker” to a multiskilled “Specialist Dementia Carer.” The new role significantly broadened the scope of work activities to include cleaning, cooking, and personal care, but emphasized doing these activities with residents rather than for residents, while encouraging social interaction and activity.

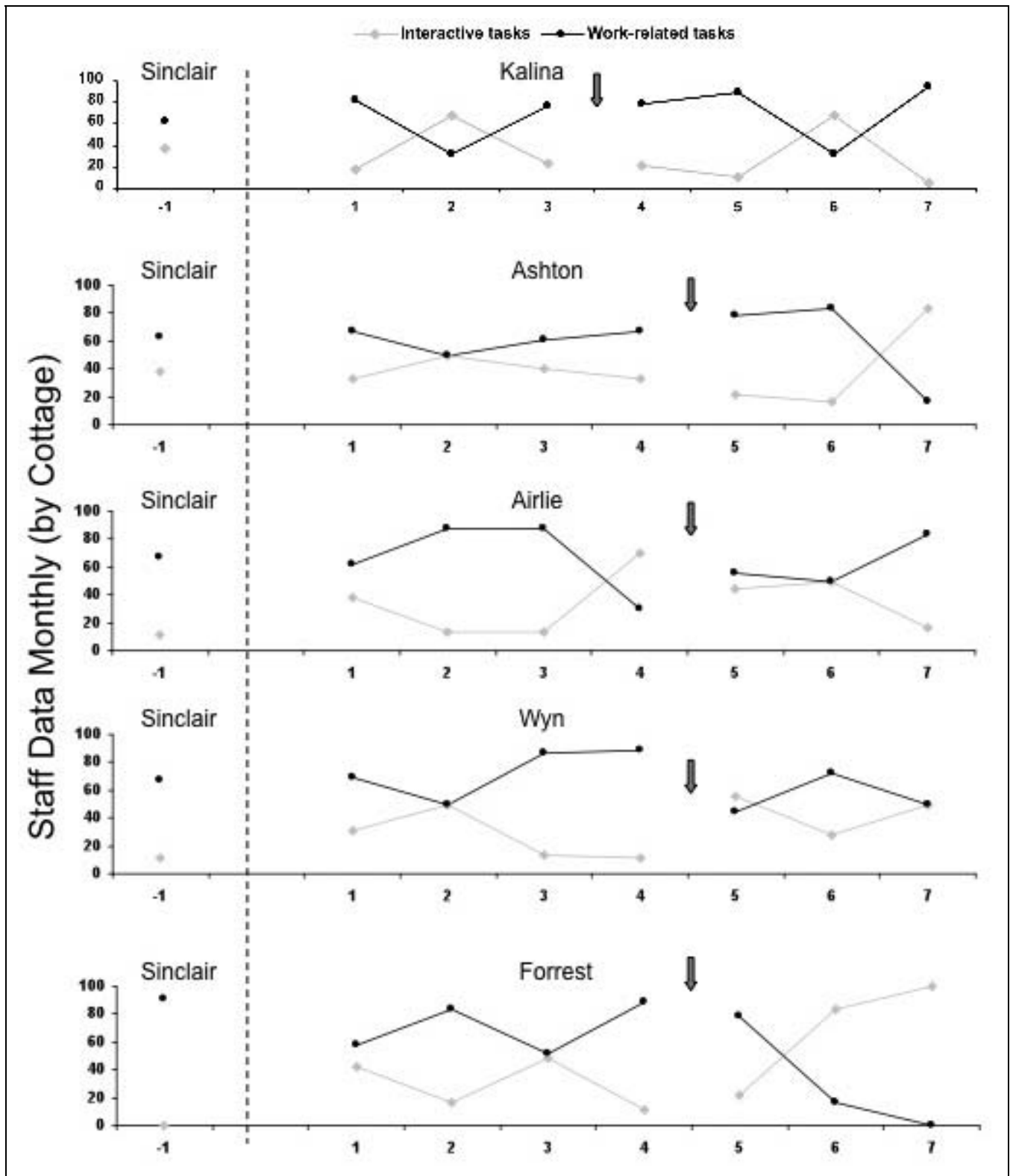
Many aged care providers have expressed concern that resident mortality and behavior problems will increase with relocation. This research provides evidence that this does not have to be the case and that the relocation to a carefully planned environment with specifically selected and trained staff can also increase engagement and interaction and keep distress low, even in a population with severe dementia. This study observed a relocation in which a new environment, a reduction in numbers of residents per unit, a new model of care, and staff training all contributed to increasing engagement and lowering distress in residents. Future research can be done to determine which of these aspects of the transition had the greatest impact on resident social behaviors.

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### Declaration of Conflicting Interests

The authors declared no conflicts of interest with respect to the authorship and/or publication of this article.



**Figure 4.** Staff engagement in resident-interactive tasks and other work-related tasks summarized by month for each Sinclair unit and Southwood cottage.

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