Title: Cluster randomised controlled trial of an aged care specific leadership and management program to improve work environment, staff turnover and care quality

Running Head: Effectiveness of a leadership and management program in aged care

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Abstract

Objective To evaluate the effectiveness of a leadership and management program in aged care.

Design Double-blind cluster randomized controlled trial.

Setting Twelve residential and 12 community aged care sites in Australia.

Participants All care staff employed for 6 months or longer at the aged care sites were invited to participate in the surveys at three time points – baseline (Time 1), nine months from baseline (Time 2), and nine months after completion of Time 2 (Time 3) from 2011 to 2013. At each time point, at least 500 care staff completed a survey. At baseline (N=503) the largest age group was 45 to 54 years (37%), and the majority of care staff were born in Australia (70%), spoke English (94%), and had at least completed secondary education (57%).

Intervention A 12-month Clinical Leadership in Aged Care (CLiAC) program for middle managers which aimed to further develop their leadership and management skills in creating positive workplace relationships and in enabling person-centered, evidence-based care.

Main outcome measures The primary outcomes were care staff ratings of the work environment, care quality and safety, and staff turnover rates. Secondary outcomes were care staff's intention to leave their employer and profession, workplace stress, job satisfaction, and cost-effectiveness of implementing the program. Absenteeism was excluded due to difficulty in obtaining reliable data. Managers' self-rated knowledge and skills in leadership and management are not included in this paper, which focuses on care staff perceptions only.

Results At six months after its completion, the CLiAC program was effective in improving care staff's perception of management support (mean difference 0.61, 95% confidence interval: 0.04 to 1.18; P=0.04). Compared to the control sites, care staff at the intervention sites perceived their managers' leadership styles as more transformational (mean difference 0.30, 95% confidence interval: 0.09 to 0.51; P=0.005), transactional (mean difference 0.22, 95% confidence interval: 0.05 to 0.39; P=0.01), and less passive avoidant (mean difference 0.30, 95% confidence interval: 0.07 to 0.52; P=0.01); and were rated higher on the overall leadership outcomes (mean difference

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0.35, 95% confidence interval: 0.13 to 0.56; P=0.001) as well as individual manager outcomes – extra effort (P=0.004), effectiveness (P=0.001), and satisfaction (P=0.01). There was no evidence that CLiAC was effective in reducing staff turnover, or improving patient care quality and safety.

Conclusions While the CLiAC leadership program had direct impact on the primary process outcomes (management support, leadership actions, behaviors and effects), this was insufficient to change the systems required to support care service quality and client safety. Nevertheless, the findings send a strong message that leadership and management skills in aged care managers can be nurtured and used to change leadership behaviors at a reasonable cost.

Trial registration Australian New Zealand Clinical Trials Registry (ACTRN12611001070921).

INTRODUCTION

With an ageing population, accompanied by the rising prevalence of long-term conditions and multi-morbidity among older people, there is a growing concern for the effectiveness and sustainability of the skilled nursing and care workforce to ensure care quality for frail older people.[1-4] Recent reviews of aged care[5] have highlighted the need for a skilled workforce to meet the chronic and complex care needs of older aged care recipients. The quality of aged care provision in Australia has been described as being far from optimal;[5] a global issue causing concern for many governments in developed countries. This concern has prompted recent changes to health, aged and social care policies worldwide.[1-4] Most policy changes aiming to improve service quality have tended to focus on funding mechanisms, directions and re-distributions in health services, new models of care, or extra education and training of existing care staff. Yet, these strategies can become a 'band-aid solution', since the problem of poor care quality is often deeply embedded in the system and culture of aged care services.[6]

Improving aged care quality requires policymakers to pay greater attention to several aspects of the organizations, such as the resource model used, facility ownership, size and occupancy rates, management structure, total licensed staff hours, wages and client case-mix,[7-9] Higher registered nursing staff ratios have been associated with better health outcomes for aged care clients,[10,11] while a poor skill-mix has been linked to higher staff error rates and iatrogenic client deaths.[12] Other staff characteristics such as low worker and managerial stability and high agency staff use have also been shown to be significantly associated with lower care quality in nursing homes.[8,13,14] Work environment and leadership (separately, and as part of, the work environment) are two of the most common factors associated with improvements in job satisfaction, job stability (turnover/retention and intention to stay/leave) and client care quality.[6,15,16] Two recent randomized controlled trials (RCTs) that examined the effectiveness of person-centered care and

psychosocial interventions in Australian nursing homes further highlight the importance of managerial support and leadership in ensuring positive staff and resident outcomes.[17,18]

The work environment is a multi-dimensional construct inclusive of the interpersonal, organizational, structural, and professional characteristics of the workplace.[19] A work environment is considered supportive when the organization operates with a strong service mission and staff have "adequate supervision, access to professional and emotional support, the establishment of systems that provide feedback to staff (such as regular staff appraisal), and the presence of strong professional leadership".[20, p.55] Contrary to common belief, remuneration and personal characteristics of staff alone may not necessarily be associated with job satisfaction and staff retention; instead, greater opportunities for involvement in care decision-making, personal growth in the workplace, and management style have important roles to play in determining these individual behaviors.

Aspects of the work environment that have been shown to be associated with job satisfaction include good relationships with co-workers and supervisors,[21] general work climate and organizational support,[22] role clarity and stress,[23] perceived personal autonomy, opportunities for personal growth and development within the organization, perceived task orientation and efficiency of the workplace.[24] Researchers in the USA have also demonstrated that low turnover of staff has a positive impact on the work environment as indicated by manageable work pressure, peer cohesion, supervisor support, autonomy, and innovation.[25]

Leadership capacity of managers and supervisors in aged care is important. They can influence care staff's job satisfaction, perceptions of their work environment, perceptions of their main roles and responsibilities, their perceived level of control, their perceived value in the workplace, retention and intentions to leave (or stay).[16,26,27] Managers play a pivotal role in setting and

improving the standards of care and the health and well-being of aged care clients, which has the potential to achieve improvements in cost-effectiveness.[28,29] While empirical research has yet to confirm direct links between leadership capacity and health outcomes of aged care clients, two recent studies have showed a significant positive relationship between leadership practices and increased client satisfaction and reduced adverse events, such as behavioral symptoms, restraint use, pressure ulcers, complications of immobility, fractures and falls, and medication errors.[28,29]

Middle managers in aged care are mostly RNs, and they play a pivotal role in responding effectively to the high expectations placed on the aged care sector.[30] Despite emerging evidence that effective leadership is critical to improving the care quality and health outcomes of older people, as well as job satisfaction and retention of staff, no RCT to date has been conducted to build reliable and high-quality evidence for the effectiveness of an aged care specific leadership and management program.[31,32]

The aim of the present study was to apply a rigorous research design to determine the effectiveness of an aged care specific leadership and management program (the CLiAC) in Australian aged care services. The primary hypotheses were that, compared to the control sites, the intervention sites would have an improved work environment (H1), improved care quality and safety (H2), and reduced staff turnover rates (H3). Secondary hypotheses included reduced staff absenteeism (H4), decreased 'intention to leave' (H5), reduced stress levels amongst staff (H6), increased job satisfaction (H7), and reduced costs of retaining and recruiting staff (H8) at intervention sites. A 9th hypothesis about managers' self-rated knowledge and skills in leadership and management is excluded from this paper, which focuses on care staff perceptions.

METHODS

A double-blind cluster randomized controlled trial design was used for the CLiAC study, which complied with the CONSORT guidelines.[33] Because people with managerial/supervisorial responsibility (hereafter 'managers') work with their staff at each site in the delivery of care and services, the care site was deemed the appropriate unit of randomization. Details of the study protocol have been reported elsewhere.[34] Ethical approval for the study was granted by the collaborating organization's ethics committee (HREC Code: EC00432), which was subsequently ratified by the Human Research Ethics Committee at the University of Sydney (HREC Database No. 13405).

Setting

The study was conducted at both residential and community aged care services of a collaborating aged care organization, located in urban and rural areas in New South Wales (NSW) and the Australia Capital Territory (ACT) in Australia, between February 2011 and August 2013. The collaborating organization is one of the largest aged care service providers on the eastern seaboard of Australia, employing over 4,000 staff across NSW and the ACT.

Recruitment

Recruitment and follow-up of targeted aged care sites occurred between February 2011 and August 2013. We divided the 45 eligible services belonging to the aged care organization into two lists of 20 residential care and 25 community care sites. We excluded sites that were currently (or in the near future) undergoing major management/structural changes. Each eligibility list was randomly sorted and sites were approached in order until 12 residential and 12 community care sites had agreed to participate. The recruitment process consisted of: 1) engaging targeted aged care services to participate and agree to random allocation to intervention or control group, 2) recruiting managers at the intervention sites to take part in the CLiAC program, and 3)

recruiting staff at both the intervention and the control sites to complete the evaluation surveys at three time points. Return of their survey was considered as consent (implied consent). All staff employed at each site were invited to complete the evaluation survey at each time point, except for those who had been 1) recently employed by the collaborating organization (less than six months), or 2) involved in non-direct care roles such as administration and domestic duties. In order to be able to link all three surveys without diverging staff identity, we implemented an identification method where staff were asked to write their maternal grandparents' first names next to a unique site character on the front page of each survey.

Intervention

The CLiAC is a structured education and support program developed specifically for aged care middle managers, and is designed to promote safe, high-quality person-centered and evidence-based care by assisting middle managers to develop effective team relationships and person/client-centered leadership strategies that enable them to deal with the day-to-day realities of care service. This 12-month CLiAC program is based on a comprehensive literature review[6,32] and a clinical leadership framework for aged care middle managers[35] and utilizes action learning techniques, 360-degree feedback, case scenarios, one-on-one interactions with a program facilitator, and individual practice improvement projects, all of which is facilitated in the program participant's workplace. The CLiAC program was designed to be congruent with, and incorporated into, the governing organization's philosophy, policies, leadership and strategic directions. The program's delivery requires the organization's support, with the understanding that the full potential of effective leadership of managers is realized when those organizational elements align with the individual's leadership efforts.

A facilitator with extensive nurse manager experience delivered the CLiAC program. She was employed by the collaborating organization to ensure continuity of the program beyond the

lifetime of the trial. In addition to the workshop provision, the facilitator's role was to support CLiAC participants throughout the life of the program via individual meetings and/or teleconferences every four to six weeks, provide mentorship and coaching, and participate in peer support meetings. Program participants received a set of learning resources that included templates for team building activities, developing team-based action plans, providing education sessions, and undertaking the clinical care improvement project.

An expert education consultant who was directly involved in the development of the CLiAC program was responsible for mentoring and supporting the CLiAC facilitator through weekly contacts for the life of the trial. The facilitator kept a diary of the activities she undertook during the program, which was shared with the research team and the consultant on a monthly basis to ensure fidelity of program delivery.

Fifty managers (supervisors, acting/deputy managers, managers) in the 12 intervention sites participated in the CLiAC program (divided into three groups based on their geographical closeness). Forty-six of them completed the entire program (3 resigned and 1 retired during the program).

Control group

Managers in the control group received no alternative intervention. No restriction about participating in their usual education and training was imposed on them.

Randomization and blinding

After the collection of baseline data from all 24 sites, a biostatistician (JMS) who was not involved in recruitment, data collection, or contact with the sites randomly allocated the sites stratified by type of aged care (residential vs. community). Within each stratum, restricted randomization was used to balance the groups by: size of the service (number of clients), span of

control (care staff to middle management ratio), provision of dementia specific services and geographical location (major cities vs. regions). Allocation was fully concealed. Participating managers signed forms agreeing that they would not discuss any group-specific activities or training that occurred with their work teams and care staff, and agreed to maintain blinding until the end of data collection. Members of the research team who were responsible for data entry and analysis remained blinded until completion of the analysis.

Outcome measures

The primary outcomes of the study were care staff perceptions of the work environment, and assessment of care quality and safety, and staff turnover rates. Secondary outcomes included aged care staff intentions to leave their employer and profession, staff stress levels and job satisfaction, and various costs including direct costs of recruiting and retaining aged care staff, and the cost of resources used in care delivery covered by the aged care service provider.

Work environment was measured using two instruments: the Work Environment Scale – R (WES-R)[19] and the Multi-factor Leadership Questionnaire (MLQ)–Rater Form.[36] The WES-R includes ninety true/false statements measuring staff's perception of their relationships, personal growth and goal orientation, and system maintenance/change within their workplace. Higher scores indicate a more positive perception of the work environment. The MLQ measures specific aspects of the work environment concerning leadership and management support. It is a five-point Likert scale of 45 items measuring the leadership styles (transformational, transactional, and passive-avoidant) and effectiveness (outcomes) perceived by staff. Higher scores indicate a greater tendency towards that particular style. *Transformational leadership* is considered to be the most desirable and effective type of leadership, characterized by proactive qualities such as inspirational, motivating, innovative, and performing beyond expectations. *Transactional leadership* adopts behaviors associated with constructive and corrective transactions,

characterized by a tendency to define expectations and promote performance to achieve these expectations via contingent rewards and corrective actions. *Passive-avoidant leadership* is considered the least desirable type of leadership, characterized by a tendency to react only after problems have become serious and avoid getting involved and making decisions. *Outcomes of leadership* measures how motivating and enabling the leader is, how effective the leader is in meeting individuals' and organizations' demands and needs, and how satisfactory the leader's methods of working with people are. Higher scores indicate greater effectiveness and satisfaction by staff.[36]

Care quality and safety were assessed using: 1) care staff-completed questionnaires of the Approaches to Dementia Questionnaire (ADQ)[37] and the Person-centered Care Assessment Tool (P-CAT);[38] and 2) review of clinical indicators. The ADQ contains 19 items measuring staff attitudes towards dementia care, with a particular focus on optimism towards living with dementia (Hope) and the recognition of people with dementia as valuable, unique individuals (Recognition of Personhood). The P-CAT is a 13-item scale, which measures the extent to which staff perceive their service as person-centered and providing best quality care for people with dementia. Scores are also computed for the subscales – Person-centeredness and Organizational Support, by adding up the scores on relative items. Both the ADQ and the P-CAT are rated on a five-point Likert scale, with higher scores indicating better outcomes. Five clinical indicators were chosen for their appropriateness and relevance to both community and residential care settings: the number of unplanned hospital admissions, falls with injury, unintentional weight loss (>2 kg), new pressure areas, and new urinary tract infections. Information on the clinical indicators was provided monthly by each study site as part of the regular data collection of the collaborating organization. Incidence was calculated as the total number of new events over six months divided by the mean number of clients at each site during the same period.

Information on staff turnover rates was supplied in aggregate form for each site (intervention and control) by the collaborating organization. Six-month rates were calculated by summing separations (voluntary and involuntary) at relevant facilities, and dividing by the mean monthly number of staff at each facility over the same time period; these rates were then converted to percentages by multiplying by 100.[39]

Stress level was assessed using the Work Stressors Index (WSI), a sub-scale of the WES-R.[19] It is the sum of the work pressure (WP) and control (CTL) subscales, and the autonomy (A) and clarity (C) subscales.[40] Job satisfaction, intention to leave current employer, and intention to leave current profession were measured using three items from the Workforce Dynamics Questionnaire (WDQ).[41] Each item is rated on a 10-point Likert scale, with higher scores indicating greater job satisfaction or intention to leave. The collaborating organization provided economic data for implementing the CLiAC program in the form of aggregate data for the intervention sites. Key items included the cost of the CLiAC facilitator's time, teaching materials used in the program, and the facilitator's travel expenses.

Staff absenteeism was defined as the number of unplanned paid days absent (including sick days and compassionate leave) as a proportion of the number of planned days worked.[42] The collaborating organization provided absenteeism data but they were deemed inappropriate for our study as the data did not distinguish between full-time, part-time, and casual staff; and the way in which planned leave days were calculated was not appropriate. For example, all casual hours worked were listed in the collaborating organization's HR database as planned even if a staff member was only filling in at the last minute for a full-time worker on sick leave. Similarly, unplanned days off were unpaid for casual staff but paid for full-time staff.

Potential confounders used in the secondary analyses were age group ($<$ 35, 35-44, 45-54, $\geq$55 years); highest level of education (year 10 of high school or below; year 11/12 of high school, certificate or other training program; diploma, bachelor or postgraduate degree); aged care specific training (none, certificate 3, all other certificates); experience working in aged care/dementia ($<$3, 3–$<$5, 5–10, $>$10 years).

Missing data: All outcomes except for costs were measured at three time points – baseline (Time 1), nine months from baseline (Time 2), and nine months after completion of Time 2, which is six months after the completion of the intervention (Time 3). For all tools included in the surveys, for subscales with $\geq$50% completed items any missing items were replaced with the individual's mean for the other items; subscales with $<$50% complete items were considered missing. Domain totals were only calculated if all relevant subscales were complete, otherwise the domain total was considered missing for that individual. Similarly, total scores were only calculated when all domain scores were complete. For the WDQ all items marked as 'not applicable' were considered missing.

Sample size

The sample size calculation was based on the primary outcome, care staff participants' perceived work environment: the subscales of the Work Environment Scale-R (WES-R). The study was designed to have 80% power to detect a difference of 0.49 standard deviations between groups as significant at the 5% level. This assumed that at least 20 of the 24 randomized clusters (sites), each with a minimum of 30 participants, would complete the study, and that the intra-cluster correlation coefficient (ICC) was 0.26 (average estimate from a nursing home staff training intervention carried out in England and Wales[43]) giving a design effect of 8.54. The detectable difference is consistent with the WES-R test developer's recommendation that half a standard deviation represents a meaningful change on the instrument.

Analyses

All data were analyzed on an intention-to-treat basis. All analyses were stratified by type of aged care service (residential or community). For the primary analysis, differences between intervention and control groups in the primary outcomes at Time 3 were each analyzed using a separate linear regression model with a random effect to allow for clustering by site. Outcomes measured at the site level were compared by cluster-level analysis using a negative binomial model of the counts for clinical indicators, with the mean number of clients per site as the offset; change from baseline was tested using the interaction between group and time. A similar analysis was performed for turnover data using logistic regression. All outcomes were similarly tested at Time 2 to determine the short-term effect of the intervention. In the secondary analyses, potential individual-level confounders were also adjusted for.

For the economic evaluation of the CLiAC program, the collaborating organization provided a summary of their costs (budget), which showed the type of resources used (measurement and costs), including the cost of the CLiAC facilitator and of implementing the program at the intervention sites. The economic evaluation was undertaken using relevant costs and effectiveness measures (consequences) data. The first task involved identifying, measuring and valuing the relevant costs and consequences of the intervention and usual practice (control group). The total cost of the CLiAC program included the cost of the CLiAC facilitator, the expert education consultant, and educational materials. The second task involved an incremental analysis of the mean costs and mean effectiveness measures of the CLiAC program (mean-based incremental cost effectiveness ratio, ICER); we calculated the additional mean costs generated by the CLiAC program over usual practice (no intervention) for each additional mean outcome unit generated by the intervention, focusing on primary outcomes found to be significantly different between intervention and control groups at Time 3.

RESULTS

Participant Flow

At each time point, at least 500 care staff completed a survey. Despite the participant identification method employed, only 97 (7.4%) of them were identified as having completed the surveys at all three time points (Note: the numbers are underestimated, as many of them did not put their maternal grandparents' names as instructed). Figure 1 is a flowchart of the CLiAC study recruitment and survey response rates. A total of 1,730 staff surveys were returned across the three time points (on average 41% return rates). Given that the surveys were lengthy, only available in English, and required a significant amount of time to complete (approximately 45 minutes), these response rates were considered to be satisfactory. The collaborating organization assisted us in reaching this moderate success rate of recruitment by allowing staff to complete the surveys during work hours. Two of the 24 sites were disqualified after Time 2 as they underwent major management changes, so no further data were collected for these sites, which were therefore excluded from the statistical analysis.

Figure 1. Flowchart of recruiting study participants

Participant Characteristics

Staff characteristics in the intervention and control groups at the three time points of the study are shown in Table 1. At baseline, 511 eligible care staff returned the evaluation survey (569 at Time 2 and 589 at time 3). The largest group consisted of those aged 45 to 54 years (37%), and the majority of staff were born in Australia (70%), spoke English (94%), and had completed secondary education (57%). The distributions of these characteristics were similar between intervention (CLiAC) and control groups. In both the intervention and the control sites, 76% of staff were unlicensed Assistants in Nursing (AIN) or Personal Care Assistants (PCA). A small

proportion of unlicensed staff (17% intervention, 16% control) had no specific training in aged care. As shown in Table 2, at baseline most site characteristics were similar between the control and intervention group (size of the service, dementia specific service, span of control, and geographical location). Slightly more staff were in the control group but this was proportionate to the size of the service and span of control. A similar pattern in the characteristics of staff was observed at all three time points.

Table 1. Staff participant characteristics

Table 2. Site characteristics at baseline

Primary Outcomes

Work environment

The WES-R has 10 subscales measuring different aspects of the work environment. Staff at the intervention sites reported significantly greater supervisor support at Time 3 (mean 5.8) than staff at the control sites (5.2) (difference 0.61 with 95% CI: 0.04 to 1.18; P=0.04), after adjusting for stratification by facility type and clustering by site. No difference between intervention and control was shown for the other subscales of the WES-R at Time 3, nor for any of the subscales at Time 2 (Table 3).

The CLiAC program had a significant impact on care staff's perceptions of their managers' leadership styles and behaviors at Time 3 only, as measured on a 5-point Likert scale by the MLQ. Staff in the intervention group rated their managers as having a greater tendency towards the transformational style of management (mean 2.71) than did staff in the control group (2.41), with a difference of 0.30 (95% CI: 0.09 to 0.51; P=0.005). They gave a higher rating on all of the

subscales for this leadership style, with evidence ranging from weak (P=0.06 for idealized behaviors) to strong (P=0.001 for individual consideration).

Compared to staff at the control sites, care staff at the intervention sites also perceived their managers' leadership style as more transactional (2.42 vs. 2.20; difference 0.22, 95% CI: 0.05 to 0.39; P=0.01), with a higher rating on the contingent reward subscale (P=0.005). Managers who participated in the CLiAC program were rated by staff as being less passive avoidant than those in the control group (0.95 vs. 1.25; difference 0.30, 95% CI: 0.07 to 0.52; P=0.01); more specifically, they had lower ratings on management by expectation (passive) and laissez-faire styles (P=0.04 and 0.007, respectively).

CLiAC also had a significant impact on the leadership outcomes at Time 3, for which care staff at the intervention sites gave higher ratings on the total score (2.85) than those at the control sites (2.50), a difference of 0.35 (95% CI: 0.13 to 0.56; P=0.001). Intervention mean scores were higher on all leadership outcome subscales: extra effort (P=0.004), effectiveness (P=0.001) and satisfaction (P=0.01).

Care quality and safety outcomes

Care quality and safety were assessed using both care staff perceptions and clinical quality indicators. There were no differences in care staff attitudes towards dementia and dementia care (ADQ) or their perceptions of the extent to which person-centered care was valued and provided by the organization (P-CAT) between the intervention and control sites at Time 3 or Time 2 (Table 4).

For the clinical indicator data (Table 5), during baseline all sites had between 4 (19 sites) and 9 (3 sites) missing values due to delays in commencement of data collection at individual sites. The

only significant difference between intervention and control was observed in unintentional weight loss (>2 kg) at Time 3, for which the intervention sites (12%) reported a greater incident rate than the control sites (8%) (IRR=2.84 [1.32 to 6.12], P=0.01).

Staff turnover rates

Turnover at intervention sites was 7.9%, 7%, and 11.3% at Times 1, 2, and 3 respectively, and at control sites was 8.4%, 9.2%, and 10.5% at the corresponding time points. Logistic regression analysis showed there was no effect of the intervention on staff turnover rates at Time 2 (P=0.92) or Time 3 (P=0.16).

Secondary Outcomes

Care staff job satisfaction and intention to leave were measured using three questions from the WDQ (Table 6). No differences were found between intervention and control sites in overall job satisfaction, intention to leave the current employer, or intention to leave the current profession among the care staff at Time 3 or Time 2. Stress levels were measured using the Work Stressor Index (WSI) from the WES-R. No difference was found for stress levels between staff at the intervention sites and those at the control sites at Time 3 or Time 2.

Table 3. Work Environment for the intervention and control groups at three time points

Table 4. Perceived care quality between the intervention and control groups at three time points

Table 5. Clinical indicators for the intervention and control groups at three time points

Table 6. Job satisfaction and intention to leave between the intervention and control groups at three time points

Economic evaluation

Over 74% of the total cost of the intervention was attributable to the CLiAC program facilitator's time and travel. The largest component of these costs was her salary for the 12 months she was employed on the program: AUS$45,096 (inclusive of on-costs) or 52.2% of total costs. The travel and accommodation costs for the CLiAC facilitator amounted to AUS$9,257 (10.7% of total costs). The cost of printing the learning materials and related stationery for participating managers amounted to AUS$63 (or <1% of total costs). The cost of the expert education consultant (mentor) was AUS$10,881 (12.9 of total costs). The average cost of the CLiAC program was AUS$7,206 for 12 intervention sites.

The main effect of the CLiAC program was on the different MLQ components at Time 3. The mean-based ICERs are: AUS$1,584 for a one-point increase in the mean score on the most desirable form of leadership, *transformational leadership;*[44] and AUS$1,343 for a one-point increase in the mean score on *overall leadership*. The costs of the resources used in the CLiAC program and a more detailed description of the mean-based ICERs are presented in Appendix 1.

Secondary analyses

Adjusting for potential confounders, as planned, made no difference to the results, so these analyses are not reported here (e.g., See Appendix 2 for the results of the secondary analysis for the MLQ). We were unable to adjust for baseline outcome values because too few care staff used the same coded identifier on multiple occasions: only 97 (7.5%) staff were identified as having completed the surveys at all three times.

DISCUSSION

Population ageing and fiscal constraints are pressing healthcare aged care policymakers and providers to develop sustainable, effective care services for an increasingly dependent population. Human resource issues can have a significant impact on care provision, including the quality and influence of care managers. Common barriers to implementing quality care services and achieving optimal outcomes for care recipients are lack of knowledge and education among care staff, time restraints arising from low staff-to-resident ratios, unmodifiable physical environments and lack of management leadership and support.[5] With increases in funding for additional care staff being unlikely in the current Australian political climate, managerial leadership is potentially an important factor in maintaining a quality aged care system.[45]

The findings of this study indicate that the CLiAC program can increase care staff's perception of management support and leadership contributions to the workplace. Perceived improvements in other aspects of the work environment, however, were less apparent with the CLiAC, including goal orientation, system maintenance and system change. It is possible that a longer observation period may have been required to show an effect of the intervention on these other aspects of the organizational environment.

Compared to the control group, intervention site staff perceived their managers' leadership styles as significantly more transformational, constructive (contingent reward) and less passive avoidant, and rated their mangers higher in terms of leadership effectiveness and satisfaction. Transformational leaders are known as inspirational, motivational and intellectually stimulating, and they empower followers to recognize what is important and how best to reach their potential in innovative ways.[36] Research suggests that transformational leadership is the most desirable leadership style because it is associated with better client outcomes and care quality[28,29] as well as positive staff outcomes such as job satisfaction, retention, supportive organizational climate.[44]

Alternatively, transactional leadership can be characterized as a task-oriented, negative, and undesirable management style because it focuses on a corrective transaction of monitoring and fixing mistakes and errors, and consequent punishment and rewards. Numerous studies report an association between transactional leadership style and negative patient and staff outcomes.[16,29] However, most research on leadership styles tends to treat transactional leadership as one-dimensional.

Scant attention has been given to constructive aspects of transactional leadership, such as its impact on client and staff outcomes and care quality, which was evaluated in the present study with the Multi-factor Leadership Questionnaire (MLQ).[36] The MLQ measures two types of transaction – constructive (Contingent reward) and corrective (Management by expectation: active) styles. While corrective leaders focus on monitoring, correcting and punishment, leaders with the constructive style clarify expectations and provide recognition when goals are achieved.[36,46] A few studies have reported the importance of contingent reward and its close association with transformational leadership[44] and patient satisfaction.[29] For example a recent cross-sectional study of 40 nursing home wards in Norway has demonstrated the importance of active, task-oriented leadership, which shares similar characteristics with the constructive style of transactional leadership, in improving care quality and staff job satisfaction.[47,48] The authors argue such leadership style provides staff with structure, coordination and clarification of roles and expectations, and is therefore particularly relevant in a work environment where the majority of staff are unlicensed, have low level of autonomy and require more direction and support from supervisors.[47,48] Our findings on transactional leadership and leadership outcomes corroborate Havig et al.'s findings.[47,48]

The least desirable leadership style is passive-avoidant, where leaders do not show any leadership or direction in their approach to staff or role as a manager, ignoring and avoiding problems and

issues. In our study, the staff in the intervention group rated significantly lower in passive-avoidant leadership behaviors than their counterparts in the control group. There is a strong consensus in the literature that such passive avoidance leadership style correlates with poor patient and staff outcomes.[16,29,44]

While the CLiAC leadership program had direct impact on the primary process outcomes (management support, leadership actions, behaviors and effects), this was insufficient to change the systems required to support care service quality and client safety. This was particularly the case for five clinical indicators (unplanned hospital admissions, falls with injury, unintentional weight loss, new pressure areas and new urinary tract infections). The results for these clinical indicators were somewhat mixed, for example, the incidence of unintentional weight loss was found significantly higher in the intervention sites than the control sites at Time 3. Previous research has shown an association between increased client age, type and level of disability/function and cognitive ability, and the presence of diabetes, cognitive impairment, mobility and terminal illness. Since we did not obtain data on these clinical measures, or undertake a risk adjustment for case-mix types at all three time points, the client outcome data need to be interpreted with caution.[49] As Kane pointed out, "good outcomes do not necessarily mean that patients improve; they need only fare as well or better than would reasonably be expected".[50, p.1378] An increase in reported client incidences, therefore, might have reflected an improvement in incident reporting, rather than an increase in actual incidences occurring. In addition, the incidence of unintentional weight loss appeared to be unusually low at baseline in the CLiAC group.

Contrary to earlier studies on the link between leadership and staff outcomes,[16,26,27] we found no evidence of the intervention having an effect on staff job satisfaction, intention to stay at their current workplace or profession, or turnover. Care staff turnover remained relatively stable over

the course of the study in both study arms, and only slightly increased at Time 3. Staff turnover was low (7.9% for intervention sites and 8.4% for control sites at baseline) compared to similar indicators for Australia (20% intention to leave within the next 12 months for all care staff based on the 2012 national survey)[51] and turnover rates in the US, which were 47-54% for licensed nurses and 65-75% for care workers based on the 2004 National Nursing Home Survey.[52,53] Low baseline care staff turnover rates indicated a strong floor effect, suggesting that the margin for improvement was low. A turnover rate of 15% in five years is considered reasonable[54] and anecdotally, aged care providers consider 10% turnover to be desirable to prevent staff stagnation.

Strengths and limitations

This is the first double-blind cluster RCT to test a leadership and management intervention in the aged care sector. We successfully managed to blind participating care staff to their managers' involvement in the leadership program. It is the only study to demonstrate a direct and consistent improvement in care staff's perceptions of management support in their work environment and their managers' leadership styles and outcomes. The design of the intervention program was based on a comprehensive literature review[6,32] and an aged care specific leadership and management qualities framework.[35] The collaborating organization's strategic support and a genuine partnership as well as on-going consultations between the researchers and the senior management throughout the processes were critical to the success of the program and the RCT. We have reported the estimated intra-cluster correlation coefficient for all our outcomes. In all cases they were smaller than the 0.26 we assumed for our sample size calculation. We assumed 20/24 sites would complete but 22 did. Although the mean site size of 26.8 at Time 3 was smaller than the assumed 30, the lower ICCs and larger number of sites resulted in the study having adequate power.

All the participating facilities were recruited from one organization which allowed us to control for organizational factors such as pay, annual leave, and organizational structure which are known to be associated with job satisfaction, intention to leave, and turnover.[55] The feedback from the collaborating organization has shown the power of the intervention and its practical implications, such as *"A great opportunity to build a manager team which helped to resolve clinical issues, and an excellent opportunity to discuss issues and scenarios (across residential and community services) and work through them."* and *"A strength of CLiAC was that it was planned, structured, long-term and tailored to the organization."* A video describing the views of the program participants, researchers and aged care key stakeholders about the CLiAC and the research can be found on YouTube http://www.youtube.com/watch?v=0HrPBHgBaAQ). Since the completion of the study the collaborating organization has appointed the CLiAC facilitator as a clinical leadership director to integrate the CLiAC program into an overall organization leadership program, supporting managers from the control group and other managers not involved in the study to complete the program.

Generalization of these findings needs to be approached with caution as we used a self-selected sample of staff who volunteered to complete and return the surveys, resulting in only a small proportion of staff who spoke English as their second language participating in the survey. One major difficulty we found was to gain participants' trust sufficiently that they would risk identifying themselves, even in a confidential way, so that we could link their outcome measures from one occasion to the next. In the absence of a gold standard measure for care quality and safety, we chose indicators that were based on usual quality practices for residential and community aged care services, which have been adopted by major Australian aged care providers including the participating organization. While the study was conducted in sites managed by one organization, the variability of their clientele limited the capacity to discern associations between the intervention and care quality. It was beyond the scope of this study to control for other

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clinical conditions that might have exacerbated clients' deterioration at a rate that could have been affected by the quality of care services.

Implications and conclusion

The current study provides solid evidence for the effectiveness of the CLiAC leadership program in the aged care sector. The findings send a strong message that leadership and management skills in aged care managers can be nurtured and used to change leadership behaviors at a reasonable cost. Our methodology draws on the strengths of the RCT design and raises critical questions about using clinical indicators to measure care quality and safety. The lack of immediate effect of the leadership program at Time 2 suggests that such an intervention takes time to penetrate to the staff level. Although the CLiAC program was effective in improving staff's perceptions towards their managers' support and their leadership styles, behaviors and outcomes, changing organizational climate and care quality at a system level requires more than a leadership program to address its complex dynamics. A longer period of observation may have shown an effect on the organizational-level outcomes, signifying that further investigation of the CLiAC program is required to assess potential longer term impacts. While current management literature tends to focus on transformational leadership, our findings support the value of a more balanced leadership style that is both transformational and constructive transactional for achieving desirable and practical management improvements for the aged care sector.

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Appendix 1 Economic evaluation

Table A1. Cost breakdowns for the CLiAC intervention

Appendix 2 Example of Secondary analysis

Table A2. Leadership style

Table

Table 1. Staff participant characteristics

Characteristics, n (%)	Baseline		Time 2		Time 3	
	CLiAC (n=202)	Control (n=301)	CLiAC (n=229)	Control (n=315)	CLiAC (n=240)	Control (n=342)
Age (years)	(n=198)	(n=291)	(n=218)	(n=298)	(n=217)	(n=321)
< 35	27 (14)	53 (18)	25 (11)	69 (23)	30 (14)	58 (18)
35-44	44 (22)	52 (18)	48 (22)	50 (17)	55 (25)	50 (16)
45-54	81 (41)	99 (34)	84 (39)	98 (33)	75 (35)	119 (37)
≥ 55	46 (23)	87 (30)	61 (28)	81 (27)	57 (26)	94 (29)
Mean	46.5	47.1	47.4	45.6	46.8	47.4
Country of Birth	(n=199)	(n=297)	(n=223)	(n=305)	(n=229)	(n=328)
Australia	152 (77)	197 (66)	157 (70)	197 (65)	155 (68)	231 (70)
Other countries	47 (23)	100 (34)	66 (30)	108 (35)	74 (32)	97 (30)
Preferred Language	(n=198)	(n=291)	(n=221)	(n=302)	(n=219)	(n=314)
English	187 (94)	273 (94)	202 (91)	281 (93)	204 (93)	300 (96)
Other language	11 (6)	18 (6)	19 (9)	21 (7)	15 (7)	14 (4)
Current Position	(n=192)	(n=294)	(n=214)	(n=312)	(n=233)	(n=334)
RN	9 (5)	28 (10)	11 (5)	26 (8)	7 (3)	24 (7)
EN/Care Supervisor	17 (9)	27 (9)	10 (5)	31 (10)	19 (8)	22 (7)
AIN/PCA	146 (76)	223 (76)	176 (82)	228 (73)	191 (82)	276 (83)
Diversional Therapist/Activity Officer	9 (5)	9 (3)	6 (3)	12 (4)	6 (3)	4 (1)
Other care staff	11 (6)	7 (2)	11 (5)	15 (5)	10 (4)	8 (2)
Highest Level of Education	(n=201)	(n=301)	(n=229)	(n=315)	(n=240)	(n=342)
Year 10 of high school or below	74 (37)	101 (34)	103 (45)	123 (39)	90 (38)	140 (40)
Year 11/12 of high school, certificate or other	87 (43)	114 (38)	71 (31)	98 (31)	72 (30)	112 (32)
Diploma, bachelor or postgraduate degree	40 (20)	86 (29)	55 (24)	94 (30)	78 (33)	90 (29)
Aged care specific training	(n=192)	(n=288)	(n=222)	(n=297)	(n=226)	(n=333)
No aged care specific training	33 (17)	45 (16)	40 (18)	55 (19)	30 (13)	57 (17)
Aged care certificate 3	112 (58)	161 (56)	141 (64)	166 (56)	127 (56)	184 (55)
Further specific training	47 (24)	82 (28)	41 (18)	76 (26)	69 (31)	92 (28)
Aged care experience (years)	(n=187)	(n=287)	(n=209)	(n=300)	(n=186)	(n=304)
< 3	40 (21)	68 (24)	57 (27)	74 (25)	55 (30)	77 (25)
3 to < 5	47 (25)	57 (20)	41 (20)	60 (20)	35 (19)	37 (12)
5 to < 10	47 (25)	69 (24)	53 (25)	89 (30)	66 (35)	100 (33)
≥ 10	53 (28)	93 (32)	58 (28)	77 (26)	30 (16)	90 (30)

Due to missing data, the n for each variable is somewhat smaller than the total number of participants.
Data are number (%) of participants unless stated otherwise.

Table

Table 2. Site characteristics at baseline

Characteristics	Intervention sites (n=10)*	Control sites (n=12)
Mean (range) number of eligible staff at each site†		
Residential aged care facilities (RACFs)	58 (27-95)	74 (29-147)
Community aged care services (CACSs)	46 (14-65)	57 (21-103)
Mean (range) number of participating staff at each site		
RACFs	18 (13-28)	28 (12-42)
CACSs	22 (7-47)	23 (14-49)
Mean (range) size of the service (number of clients)		
RACFs	96 (62-146)	102 (62-157)
CACSs	27 (11-48)	28 (7-78)
Mean span of control (care staff to management ratio)		
RACFs	34.5	34.4
CACSs	13.5	15.8
Number of sites with dementia specific care		
Dementia Specific Unit in RACFs	3	4
Extended Aged Care at Home-Dementia in CACSs	5	6
Number of sites located in major cities (RA1) of Australia‡		
RACFs	3	4
CACSs	3	3

*Excluding the two RACF sites that were disqualified after Time 2.

†Total number of eligible care staff was 673 in RACFs and 615 in CACSs.

‡Based on the Australian Standard Geographical Classification – Remoteness Area (ASGC-RA) system: RA1 – Major Cities of Australia, RA2 – Inner regional Australia, RA3 – Outer Regional Australia, RA4 – Remote Australia, RA5 – Very Remote Australia. All sites in the study were either within RA1 or RA2.

Table

Table 3. Work Environment for the intervention and control groups at three time points

Work Environment (WES_R) Subscales	Baseline Means		Time 2				Time 3			
	CLiAC (n=202)	Control (n=299)	CLiAC (n=231)	Control (n=326)	ICC	$P_2{}^*$	CLiAC (n=234)	Control (n=331)	ICC	$P_3{}^*$
Involvement (I)	6.7	6.5	6.7	6.5	0.057	0.64	6.7	6.5	0.082	0.72
Peer cohesions (PC)	5.8	5.7	5.7	5.8	0.117	0.99	5.8	5.6	0.104	0.61
Supervisor support (SS)	5.7	5.6	5.7	5.5	0.082	0.82	5.8	5.2	0.053	0.04
Autonomy (A)	5.0	5.2	5.1	4.9	0	0.13	5.0	4.8	0.074	0.36
Task orientation (TO)	7.0	7.2	7.2	7.0	0.053	0.36	7.1	7.0	0.070	0.96
Work pressure (WP)	5.1	5.5	5.2	5.3	0.095	0.63	4.9	5.1	0.095	0.73
Clarity (C)	6.0	6.0	6.2	5.7	0.088	0.14	6.0	5.8	0.051	0.43
Control (CTL)	6.8	6.7	6.8	6.8	0.023	0.59	6.9	6.8	0.011	0.39
Innovation (INN)	5.0	4.9	5.0	5.1	0.089	0.89	5.2	4.6	0.057	0.06
Physical comfort (COM)	6.0	6.1	6.5	6.3	0.187	0.75	6.4	6.0	0.158	0.44
Work Stressors Index (WSI)	18.8	19.0	18.7	19.6	0.069	0.55	18.8	19.3	0.107	0.59
Work Relationships Index (WRI)	18.2	17.9	18.2	17.8	0.114	0.81	18.2	17.3	0.084	0.29

Multifactor Leadership Questionnaire Rater Form (MLQ)										
Transformational	(n=182)	(n=258)	(n=183)	(n=265)			(n=182)	(n=262)		
Idealised attributes (IA)	2.70	2.66	2.78	2.66	0.070	0.47	2.81	2.51	0.035	0.007
Idealised behaviours (IB)	2.60	2.63	2.81	2.64	0.086	0.26	2.76	2.54	0.051	0.06
Inspirational motivations (IM)	2.75	2.76	2.86	2.77	0.069	0.67	2.89	2.60	0.058	0.02
Intellectual stimulation (IS)	2.35	2.34	2.43	2.41	0.044	0.95	2.49	2.23	0.016	0.007
Individual consideration (IC)	2.41	2.32	2.47	2.43	0.064	0.88	2.55	2.19	0.021	0.001
Total (Transformational)	2.57	2.54	2.67	2.57	0.083	0.50	2.71	2.41	0.044	0.005
Transactional	(n=179)	(n=268)	(n=190)	(n=271)			(n=187)	(n=271)		
Contingent reward (CR)	2.47	2.43	2.60	2.48	0.068	0.50	2.68	2.33	0.043	0.005
Management by expectation (active), MBEA	2.22	2.09	2.15	2.18	0.060	0.97	2.18	2.06	0.025	0.27
Total (Transactional)	2.35	2.25	2.39	2.33	0.074	0.57	2.42	2.20	0.025	0.01
Passive avoidant	(n=184)	(n=275)	(n=194)	(n=274)			(n=193)	(n=281)		
Management by expectation (passive), MBEP	1.14	1.16	1.13	1.26	0.071	0.44	1.07	1.29	0.026	0.04
Laissez-Faire (LF)	0.99	1.00	0.98	1.14	0.059	0.35	0.87	1.22	0.050	0.007
Total (Passive avoidant)	1.08	1.08	1.05	1.19	0.074	0.37	0.95	1.25	0.050	0.01
Outcomes of leadership	(n=180)	(n=264)	(n=191)	(n=278)			(n=184)	(n=267)		
Extra effort (EE)	2.36	2.33	2.41	2.37	0.052	0.77	2.48	2.19	0.020	0.004
Effectiveness (EFF)	2.82	2.79	2.94	2.74	0.095	0.29	3.00	2.62	0.034	0.001
Satisfaction (SAT)	2.85	2.84	2.93	2.82	0.089	0.69	3.03	2.66	0.067	0.01
Total (Leadership)	2.68	2.66	2.77	2.64	0.098	0.51	2.85	2.50	0.034	0.001

* P-value for comparing groups at this time, taking account of stratification by facility type and clustering using a random-effects linear regression model

Values of n are for the majority of subscales; sample size may vary slightly for other subscales and is up to 6% lower for COM

Table

Table 4. Perceived care quality between the intervention and control groups at three time points

	Baseline Means		Time 2				Time 3			
	CLiAC	Control	CLiAC	Control	ICC	P_2*	CLiAC	Control	ICC	P_3*
Perceived care quality										
Attitudes about dementia (ADQ)	(n=206)	(n=304)	(n=236)	(n=331)			(n=242)	(n=343)		
Hope	25.9	26.3	25.8	25.7	0.065	0.97	25.9	26.7	0.049	0.18
Person-centred Care	48.1	48.1	47.8	48.3	0.066	0.45	48.1	48.4	0.031	0.59
Total	74.1	74.5	73.7	74.1	0.109	0.71	74.2	75.2	0.072	0.35
Person-centred Care Assessment Tool (P-CAT)	(n=192)	(n=297)	(n=228)	(n=319)			(n=236)	(n=334)		
Extent of personalizing care	26.9	26.6	27.1	27.0	0.160	0.77	27.8	26.4	0.143	0.09
Amount of organizational support	15.3	15.2	15.6	15.3	0.063	0.95	15.9	15.6	0.049	0.64
Degree of environmental accessibility	7.3	7.3	7.2	7.4	0.065	0.34	7.6	7.4	0.113	0.45
Total	49.7	49.2	50.0	49.7	0.164	0.90	51.5	49.5	0.162	0.16

* P-value for comparing groups at this time, taking account of stratification by facility type and clustering using a random-effects linear regression model

Values of n are for the total of each scale; sample size for each scale item may be somewhat larger

Table

Table 5. Clinical indicators for the intervention and control groups at three time points

Clinical Indicator	Time 1 (Baseline)		Time 2				Time 3			
	CLiAC	Control	CLiAC	Control	IRR (95% CI)	P_2*	CLiAC	Control	IRR (95% CI)	P_3*
Fall with injury (%)	22	22	30	29	1.08 (0.56, 2.06)	0.82	28	27	1.07 (0.54, 2.13)	0.84
Unplanned hospital admission (%)	51	30	50	32	1.01 (0.68, 1.48)	0.98	37	37	0.73 (0.42, 1.27)	0.27
New pressure area (%)	9	11	5	12	0.59 (0.22, 1.60)	0.30	7	6	1.27 (0.82, 1.96)	0.28
New urinary tract infection (%)	20	22	18	19	1.05 (0.49, 2.24)	0.90	18	21	0.92 (0.47, 1.82)	0.82
Unintentional weight loss (%)	7	12	15	12	2.15 (0.87, 5.28)	0.10	12	8	2.84 (1.32, 6.12)	0.01

*P-value for comparing groups at this time for change from baseline, taking account of stratification by facility type, and using negative binomial regression of facility-level data

IRR = incident rate ratio for change in intervention group vs control group, so IRR<1 indicates better result for intervention group and IRR>1 indicates worse result for intervention group

Table

Table 6. Job satisfaction and intention to leave between the intervention and control groups at three time points

Workforce Dynamics Questionnaire (WDQ)	Baseline		Time 2				Time 3			
	CLiAC	Control	CLiAC	Control	ICC	P_2*	CLiAC	Control	ICC	P_3*
Overall satisfaction (%)	(n=194)	(n=285)	(n=224)	(n=303)			(n=228)	(n=319)		
	74.3	73.3	75.6	73.1	0.091	0.60	76.0	72.3	0.045	0.16
	(n=176)	(n=270)	(n=205)	(n=299)			(n=208)	(n=311)		
Intention to leave employer (%)	30.6	32.2	31.7	32.7	0.0005	0.93	28.3	31.9	0.007	0.20
Intention to leave profession (%)	28.4	29.5	26.6	30.4	0	0.33	27.6	26.1	0	0.48

* P-value for comparing groups at this time, taking account of stratification by facility type and clustering using a random-effects linear regression model

Appendix 1 Economic evaluation

Table A1. Cost breakdowns for the CLiAC intervention

Appendix 2 Example of Secondary analysis

Table A2. Leadership style

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Appendix 2 Example of Secondary analysis

Table A2. Leadership style

Multifactor Leadership Questionnaire Rater Form (MLQ) Characteristic, Scale	Baseline Means		Time 2				Time 3			
	Grp1	Grp2	Grp1	Grp2	ICC	P$_2$*	Grp1	Grp2	ICC	P$_3$*
Transformational	(n=182)	(n=258)	(n=147)	(n=221)			(n=127)	(n=223)		
Idealised attributes (IA)	2.70	2.66	2.79	2.65	0.138	0.69	2.88	2.46	0	<0.001
Idealised behaviours (IB)	2.60	2.63	2.78	2.66	0.174	0.70	2.76	2.49	0.075	0.08
Inspirational motivations (IM)	2.75	2.76	2.86	2.77	0.109	0.89	2.88	2.55	0.065	0.05
Intellectual stimulation (IS)	2.35	2.34	2.42	2.41	0.045	0.73	2.44	2.20	0.013	0.03
Individual consideration (IC)	2.41	2.32	2.45	2.43	0.050	0.90	2.54	2.15	0	<0.001
Total (Transformational)	2.57	2.54	2.66	2.58	0.143	0.91	2.69	2.38	0.001	0.002
Transactional	(n=179)	(n=268)	(n=154)	(n=226)			(n=127)	(n=229)		
Contingent reward (CR)	2.47	2.43	2.61	2.51	0.102	0.85	2.71	2.28	0.055	0.005
Management by expectation (active), MBEA	2.22	2.09	2.14	2.13	0.019	0.89	2.15	2.03	0	0.16
Total (Transactional)	2.35	2.25	2.39	2.32	0.091	0.81	2.42	2.17	0	0.002
Passive avoidant	(n=184)	(n=275)	(n=156)	(n=229)			(n=133)	(n=237)		
Management by expectation (passive), MBEP	1.14	1.16	1.10	1.25	0.058	0.47	1.01	1.32	0.077	0.07
Laissez-Fair (LF)	0.99	1.00	0.92	1.15	0.067	0.27	0.84	1.21	0.078	0.003
Total (Passive avoidant)	1.08	1.08	1.01	1.19	0.078	0.35	0.91	1.27	0.102	0.03
Outcomes of leadership	(n=180)	(n=264)	(n=156)	(n=232)			(n=126)	(n=224)		
Extra effort (EE)	2.36	2.33	2.41	2.36	0.084	0.90	2.52	2.15	0	<0.001
Effectiveness (EFF)	2.82	2.79	2.95	2.73	0.052	0.30	3.00	2.56	0.015	<0.001
Satisfaction (SAT)	2.85	2.84	2.94	2.83	0.089	0.83	3.09	2.61	0.074	0.006
Total (Leadership)	2.68	2.66	2.77	2.64	0.079	0.66	2.88	2.45	0.025	<0.001

* P-value for comparing groups at this time, taking account of age group, education, aged care training, aged care experience, stratification by facility type and clustering using a random-effects linear regression model

Values of n are for the total of each scale; sample size for each scale item may be somewhat larger

Appendix 1 Economic evaluation

Table A1. Cost breakdowns for the CLiAC intervention

Costs items	Partner organisation's costs	
	Total $	(%)
(a) Delivery (Program Facilitator 0.5 FTE over 12 months on CLiAC)		
Human resources		
Wages and salaries	45,096	(52.2)
Superannuation	4,223	(4.9)
Leave accrual (annual leave and long service leave)	4,616	(5.3)
Workers compensation	4,426	(5.1)
Other staff related costs (i.e. training, conferences, seminars)	5,760	(6.7)
Consumables		
Printing and stationery	63	(0.1)
Staff/visitors amenities	1,981	(2.3)
Space and overheads		
Business costs – Insurance (Group allocated)	158	(0.2)
Travel and accommodation	9,257	(10.7)
(b) Expert education consultant (mentor): 0.1 FTE for Professional Staff		
Level 7 over 13 months	10,881	(12.9)
Total Cost	86,461	(100)

Note: The cost of the CLiAC program facilitator was determined by their total hours worked on the program and current wage rate; the cost of the expert education consultant (who mentored the program facilitator) was determined by their total hours worked on the program (mentorship) and current wage rate; and the cost of educational materials for participants was determined by the quantity of items used and commercial rates (prices).

The main effect of the CLiAC program was on the different MLQ components at Time 3. In addition, the type of leadership deemed to be the most desirable and effective is transformational leadership, which incorporates several proactive qualities in leaders such as inspirational, motivating, innovative, and performing beyond expectations. For these reasons, the mean-based incremental cost-effectiveness ratios (ICERs) (Weinstein and Stason, 1977) were only calculated using mean scores on transformational leadership style and overall leadership at Time 3. In this study, the mean-based ICER is calculated as: (mean cost of the intervention – mean cost of no intervention)/(mean effectiveness of the intervention – mean effectiveness of no intervention) where 'mean effectiveness' refers to the mean score for a particular leadership style (MLQ). See, for a discussion of the theoretical foundation for the mean-based ICER (welfare economics), Garber and Phelps,1997; Gardiner, Bradley and Huebner, 2000. Here, the mean-based ICER may be interpreted as the mean cost of a one-point improvement in the mean score on a particular leadership measure.

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