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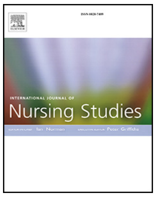

The impact of need-based care on formal caregivers' wellbeing in nursing homes: A cluster randomized controlled trial

Katrin Gillis [a,b,*], Linda van Diermen [c,d], Dirk Lips [e], Hilde Lahaye [a], Marianne De Witte [a,e], Leen Van Wiele [b], Ella Roelant [f,g], Jo Hockley [h], Peter Van Bogaert [b]

[a] Research group Health for Older People (HOPE), Odisee University College, Hospitaalstraat 23, 9100 Sint-Niklaas, Belgium
[b] Centre for Research and Innovation in Care, Antwerp University, Universiteitsplein 1, 2600 Wilrijk, Belgium
[c] Department of Psychiatry, Collaborative Antwerp Psychiatric Research Institute (CAPRI), Faculty of Medicine and Health Sciences, Antwerp University, Campus Drie Eiken, Universiteitsplein 1, 2610 Wilrijk, Belgium
[d] Psychiatric Center Bethanië, Andreas Vesaliuslaan 39, 2980 Zoersel, Belgium
[e] Curando vzw, Pensionaatstraat 58A, Ruiselede, Belgium
[f] StatUa, Center for Statistics, University of Antwerp, Prinsstraat 13, Antwerp, Belgium
[g] Clinical Trial Center (CTC), CRC Antwerp, Antwerp University Hospital, University of Antwerp, Drie Eikenstraat 655, Edegem, Belgium
[h] Primary Palliative Care Research Group, University of Edinburgh, Edinburgh EH8 9AG, Scotland, UK

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ABSTRACT

Background: Need-based care is a structured and standardized model that supports formal caregivers in nursing homes in delivering person-centered care by responding with tailored non-pharmacological interventions on residents' unmet needs as well as having positive effects on behavioral and psychological symptoms on residents with dementia. However, limited resources as well as the shortage of caregivers in nursing homes make the implementation of need-based care challenging, especially when it comes to finding ways to spend more time with residents. The aim of this study is to evaluate the impact of the implementation of need-based care in nursing homes on formal caregivers' wellbeing.

Methods: A three-arm cluster randomized controlled trial was set up in 24 Belgian nursing homes: formal caregivers in the 'need-based care' group (intervention; n = 195) spent time twice a week with residents who had behavioral and psychological symptoms according to the principles of need-based care while formal caregivers in the 'time' group (n = 257) filled in the way they spent time twice a week; a third group delivered standard care (n = 299). An implementation strategy was built upon the Implementation Quality Framework and used in the 'need-based care group'. A total of 741 formal caregivers completed the digital questionnaire at one or more of the five time points (every nine weeks) between November 2021 and July 2022; they rated their sense of competence in dementia care, level of burnout, and, level of engagement. Moments of time were registered in a printed registration book.

Results: Only formal caregivers from the 'need-based care' group experienced a higher sense of competence in dementia care at time points three ($p = 0.010$) and four ($p = 0.001$) compared with baseline with an increase of respectively 1.5 (95 % confidence interval [0.25, 2.84]) and 2.4 (95 % confidence interval [0.77, 4.04]) points. No differences in scores on burnout and engagement were found.

Conclusion: Despite challenging workforce circumstances in nursing homes, caregivers in the need-based care group as well as in the time group were able to spend time twice a week with residents with behavioral and psychological symptoms. No negative effects were found on formal caregivers' wellbeing after the implementation of need-based care in nursing homes. However, it requires strong leadership and the use of well-considered implementation strategies including reflective practice.

Trial registry: Trial registration number ISRCTN56768265 (10/08/2023).

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* Corresponding author at: Odisee University College, Hospitaalstraat 23, 9100 Sint-Niklaas, Belgium.
E-mail addresses: Katrin.gillis@odisee.be (K. Gillis), Linda.vandiermen@uantwerpen.be (L. van Diermen), Dirk.lips@curando.be (D. Lips), Hilde.lahaye@odisee.be (H. Lahaye), Marianne.dewitte2@odisee.be (M. De Witte), Leen.vanwiele@hfkieldrecht.be (L. Van Wiele), Ella.roelant@uza.be (E. Roelant), Peter.vanbogaert@uantwerpen.be (P. Van Bogaert).

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What is already known

- Formal caregivers ration support in activities of daily living, such as eating, drinking, elimination and mobilization less often than social care and emotional support of nursing home residents.
- Need-based care supports formal caregivers in delivering person-centered care by responding with tailored non-pharmacological interventions on residents' unmet needs. However, the implementation is challenging due to limited resources in nursing homes.
- Despite it's positive effect on behavioral and psychological symptoms on residents with dementia, little is known about the effect of the implementation of models like need-based care on caregivers' wellbeing.

What this paper adds

- The findings show that prioritizing social and emotional care according to the need-based care method in residents in nursing homes is feasible despite challenging workforce circumstances in healthcare.
- Despite the required time investment, the implementation of need-based care does not lead to higher levels of burn-out or loss of engagement in formal caregivers.
- The implementation of need-based care may increase formal caregivers' sense of competence in dealing with care challenges and in care for people with dementia.

1. Background

Person-centered care can be described as the cornerstone of qualitative, effective dementia care in nursing homes. It requires developing relationships, promoting the residents' wellbeing and contributing to meaningful lives for the residents. Vassbø et al. (2019) found that for staff in nursing homes, working in a person-centered way meant that they were able to meet individual residents' needs and expressed preferences in close family-like relationships, understanding the residents' rhythms and preferences as the basis of the daily work plans and being able to do 'the little extra things' for residents. They interpreted caregivers' experiences of working in a person-centered way as a psychological state in which individuals experience both a sense of vitality and learning. For residents, expressing their individual needs and preferences may be challenging i.e. for people with dementia, the ability to express themselves verbally disappears and behavior becomes their main language. A study shows that residents' emotional–behavioral problems and need-driven behaviors significantly affect behavior burden in formal caregivers, specifically among residents with pain, medical comorbidities, apathy, agitation and aggression (Norton et al., 2010). Behavior burden or distress attributes to the overall burden of formal caregivers in nursing homes which can be described as "the demands of caring for dependent older adults with a level of competency and responsibility within the context of perceived stress" (Kunkle et al., 2020; Kunkle et al., 2021).

Need-based care is a structured and standardized model that supports formal caregivers in nursing homes in delivering person-centered care by responding with tailored non-pharmacological interventions on residents' unmet needs as well as having positive effects on behavioral and psychological symptoms on residents with dementia and a positive effect on formal caregivers' distress (Gillis et al., 2023). Need-based care stimulates caregivers to go through all the steps of clinical reasoning and decision-making and increases their understanding of behavioral and mood changes in residents (see Fig. 1). The accompanying schedule of non-pharmacological interventions allocated to possible unmet needs broadens their knowledge about alternative solutions when residents show behavioral or psychological symptoms. Non-pharmacological interventions like aromatherapy, reminiscence, hand massage, moments of exercise, music or creative moments and attachment require not only more skills of caregivers but also more time. This makes the implementation of need-based care challenging, especially when it comes to finding ways to spend more time and adapted practices and routines with residents (Gillis et al., 2023). The limited resources as well as the shortage of caregivers in nursing homes (Geng et al., 2019) force individual caregivers to make in-the-moment choices not to carry out certain nursing activities with the consequence of having to withhold beneficial measures from some individuals (Zúñiga et al., 2015). Formal caregivers ration support in activities of daily living, such as eating, drinking, elimination and mobilization less often than social care and emotional support of nursing home residents (Zúñiga et al., 2015). Social aspects of life in a nursing home seem to be the first to suffer because of time constraint (Zúñiga et al., 2015; White et al., 2019). The pressure to complete care tasks and take shortcuts while completing those tasks predicts stress (Ramirez et al., 2006). To change priorities, staff engagement with person-centered innovations is critical (Bokhour et al., 2018), but also risks staff being overloaded by duties and engagement with their residents. This increases the risk for compassion fatigue, characterized by a gradual lessening of compassion and exhaustion (Meranius et al., 2020). In the current context of global economic burden, these findings support the need to investigate the impact of the implementation of need-based care not only on the wellbeing of residents (Gillis et al., 2023), but also on the wellbeing of caregivers. The aim of the study is to evaluate the impact of the implementation of need-based care in nursing homes on formal caregivers' wellbeing. More specifically, what is the effect of the implementation of need-based care on formal caregivers' sense of competence in dementia care, level of burnout and level of engagement? Our hypothesis is that the implementation of need-based care may have a negative effect on formal caregivers' wellbeing.

2. Methods

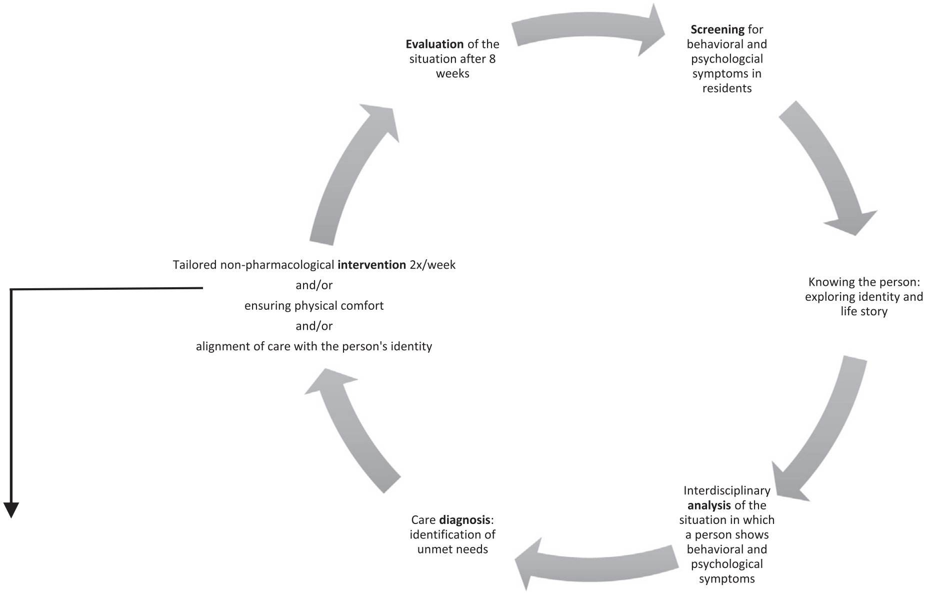
2.1. Design

This study is part of a longitudinal cluster randomized intervention design study with a *need-based group* (intervention), *time group* (placebo) and *standard care group* (control). The objective of one part of the study was to decrease behavioral and psychological symptoms among residents with mild to moderate dementia in nursing homes. The objective of this part of the study was to investigate the effect of the intervention and implementation on caregivers' wellbeing.

2.2. Setting and sampling

The study was set up and carried out in 24 nursing homes in Belgium from October 2021 to July 2022. Due to a predominant focus on task-oriented care, formal caregivers in Belgium as well as internationally, perceive conflict between task-oriented care and person-centered care for residents in nursing homes (Kadri et al., 2018; Gustavsson et al., 2023). Nurses and nurse-assistants are responsible for nursing and care tasks alongside on-site occupational therapists, physiotherapists and activity coordinators responsible for therapies and meaningful activities (Gillis et al., 2023). The staff ratios for nursing homes are regulated by the government. These norms differ according to the needs of residents. For example, for 30 residents with physical and mental health needs a minimum of 5 full-time equivalent nurses, 6.7 full-time equivalent nurse assistants and 1.6 full-time equivalent therapists and activity coordination is required (Gillis et al., 2023). Managers from the nursing homes were contacted by the research team.

Nursing home managers, willing to participate in the study, were informed about the full study design and assured that, if allocated to the *time* or *standard care* group, their teams were entitled at the implementation of need-based care after the study. Based on the inclusion criteria for residents (Mini Mental State Examination Score between 10 and 24) the managers selected which wards were eligible to



	Need for a sense of…					
	Security	Significance	Continuity	Belonging	Purpose	Fulfilment
Aromatherapy	✓					
(Aromatic) ***massage***	✓	✓				
Multisensory stimulation	✓	✓	✓			
A ***moment of reminiscence***		✓	✓	✓		
Attachment figures	✓	✓	✓	✓	✓	
Passive music moments	✓		✓		✓	
Active music moments		✓		✓	✓	✓
Moments of movement	✓		✓	✓	✓	
Creative moments			✓	✓	✓	✓

Fig. 1. Structured process of need-based care and allocation framework.

participate. Wards with no residents with mild or moderate dementia were excluded. A sample size calculation was performed to measure efficacy of need-based care at the resident level using nursing homes as a cluster: a sample size of seven clusters in each group with an average of 20 residents in each group achieves more than 90 % power to detect mean difference scores on resident outcomes, more specific a difference of 2 on the Neuropsychiatric Inventory (NPI). In the calculation, a between subjects standard deviation of 3.3, a coefficient of variation of cluster sizes of 0.85, an ICC of 0.01 and an alpha of 0.025 were used. No sample size calculation on the level of formal caregivers was done. Computer-randomization based on the permuted block design, using an excel sheet system, was performed at the nursing home level to allocate the nursing homes to the intervention, time or control group. After allocation, staff received a printed brochure with information that was only relevant to the group they were allocated to. As well as direct formal caregivers (e.g. nurses, therapists, nurse-assistants), indirect formal caregivers, like logistic staff, kitchen staff and cleaning staff were included in the study. Only students were excluded. The study was approved by the committee of Ethics, Antwerp University Hospital (B300201942084).

2.3. Study interventions

In the *need-based care group* and the *time group*, formal caregivers were asked to spend time twice a week with residents who had dementia and who showed signs of agitation or aggression as determined on the Neuropsychiatric Inventory (Kat et al., 2002). To identify these residents two nursing home staff per resident were designated as observers throughout the entire study. For every resident with symptoms of agitation or aggression, "time moments" (duration and content decided by staff member) were prescribed over an eight-week period. The intervention started in January 2022 and consisted of three cycles of eight weeks with one week in between wherein no time moments were provided during which a re-evaluation of residents' behavioral and psychological symptoms of dementia was undertaken (measurement and evaluation week).

The way formal caregivers spent time with residents differed between the two groups. In the *need-based care group*, the "time moments" were tailored on the resident's identity and unmet needs, based on the framework of Gillis et al. (2019) and refined in Gillis et al. (2023) (see Fig. 1). The content of the moments was prescribed during an interdisciplinary meeting and could be one of the following non-pharmacological treatments: aromatherapy, massage, multisensory stimulation, reminiscence, attachment, music, moments of movements or creative moments. In *the time group*, formal caregivers were individually free to fill in how they spent extra time with residents. The minimum amount of time was 10 min (recommended time between 15 min and 40 min). In the *standard care group* formal caregivers were not asked to spend extra time with residents.

A total of 481 residents with mild to moderate dementia participated in this study: 142 in the *need-based care group*, 169 in the *time group* and 170 in the *standard care group*. Forty-four percent of the participating residents had symptoms of agitation or aggression, without any significant difference in prevalence between the three groups (Gillis et al., 2023).

2.4. Fidelity of intervention

Before investigating the impact of the implementation of need-based care, it is necessary to monitor the fidelity of the intervention. To know whether formal caregivers in the *need-based care* and *time groups* really spent extra time twice a week with residents with behavioral and psychological symptoms of dementia, a pre-printed registration booklet (tick-box style in order to reduce time spent filling it in) was offered for every participating resident per cycle. Furthermore, staff were only asked to briefly describe how they filled the time with a resident or, in case of lack of time, to describe the reason (i.e. illness of a colleague).

2.5. (Development of) the implementation strategy for the need-based care group

An implementation strategy (looking at needs, resources and fit) was set up based on the four phases of the Quality Implementation Framework (Meyers et al., 2012). Ten focus groups were held with 60 formal caregivers from 10 different teams from eight nursing homes between October 2019 and January 2020. To reduce bias in the trial, none of these nursing homes were involved as a participating nursing home in the implementation study; however, four teams had had experience with the method of 'need-based care' since they participated in a pilot study back in 2016 (Gillis et al., 2019). Eighty-seven percent of the participants were female, 38 % were nurse-assistants, 22 % nurses, 19 % therapists, 15 % ward managers, 3 % logistic staff and 3 % nursing home managers. All participants recognized that current person-centered practice in nursing homes is not optimal. They expressed the hope for alternative effective strategies and readiness for innovation when the following conditions could be fulfilled: guarantee of continuity of care, a sense of competence in 'need-based care', and, a sense of motivation and perspective on the sustainability of the implementation of 'need-based care'. Based on these findings, an implementation strategy was built with five components: 1) *educational strategy* to enhance a sense of competence, 2) *leadership trajectory* for ward managers to enhance facilitating leadership and ensuring continuity of care and motivation, 3) ongoing recognition of *ward champion(s)* to strengthen clinical leadership with the focus on sustainability and motivation, 4) *supervision* sessions on perceived problems and challenging situations to develop problem-solving competences and creating an open culture of trust and 5) *support* of an expert in need-based care (see Fig. 2).

Adaptation of the intervention was not permitted. However, adaptation of the implementation strategy was possible for the educational aspect and the supervision sessions: the e-learning was recommended but not obligated; and, ward managers could either choose the full package of workshops for all formal caregivers or the more comprehensive package that included the wider supportive workforce. In some nursing homes the general practitioner attended the workshops. Supervisory sessions were recommended "every month" but could differ depending on capacity.

To assess the capacity and readiness, the intervention and the accompanying implementation strategy were presented to the ward managers of all participating facilities. Their affirmation implied that they had obtained explicit support from critical stakeholders and that a supportive organizational climate was fostered.

After agreement, the randomization of the nursing homes to the different groups (*need-based care*, *time group* and *standard care group*) was performed and one of the research team members (experienced in need-based care) was allocated to the need-based care team as the expert. The ward managers and the expert formed the implementation team. The expert provided the educational workshops, guided the analysis of residents' behavior and held the supervision sessions. The expert's role was expected to change depending on the level of leadership from the ward manager and the ward champion(s). Ward managers attended a leadership course one day every month for three months and built a supportive feedback mechanism to the team of formal caregivers. All teams in the intervention group underwent the implementation strategy. All formal caregivers in the need-based care

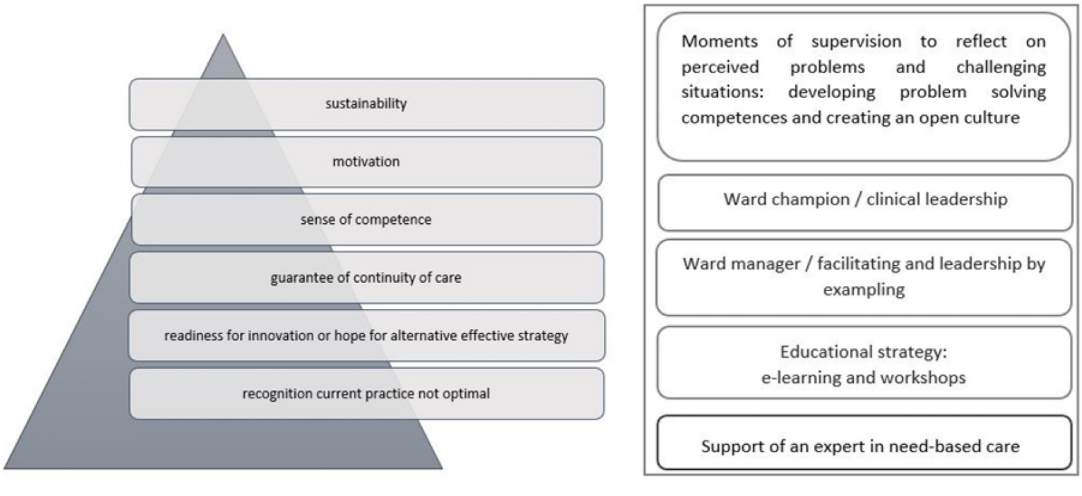


Fig. 2. Needs, resources and fit assessment and strategies for implementation of need-based care: formal caregivers' perspectives.

group started the e-learning (2 h) and 18 % of them also completed the digital course with a certificate. Afterward this, three educational sessions (total of 9 h) were conducted on-site for all formal caregivers of the participating teams between November 1 and December 31 2021. A written toolkit was developed to lead the teams through all the steps of need-based care. To optimize the analysis of residents' behavior, caregivers used the tools to collect information about the life, identity, wishes and preferences of residents with agitated or aggressive behavior between 1st of December 2021 and 10th of January 2022.

2.6. Measurements

Outcomes were measured using the Sense of Competence in Dementia Care Staff (SCIDS) (Schepers et al., 2012) and the Dutch version of the Utrecht Burn-Out Scale (UBOS) (Schaufeli and Van Dierendonck, 2000) and the Utrecht Engagement Scale (UBES) (Schaufeli and Bakker, 2003).

- The SCIDS measures staffs' sense of competence in dementia care and has acceptable psychometric properties (Schepers et al., 2012). The original scale has 17 items, scored on a Likert scale (1 = not at all–4 = very much). The scale was translated to Dutch with a process of forward and backward translation, cognitive interviews (n = 7) and reviewed by an expert panel (n = 10). After splitting the item 'How well can you decide what to do about risk in a person with dementia' in two items (risk toward others/risk toward himself) the content validity index (S-CVI(Ave)) was 0.99. The SCIDS has four subscales: professionalism (5–20), building relationships (4–16), care challenges (5–20) and sustaining personhood (4–16). The total score was calculated by adding up all the sub-scores and could therefore range between 18 and 72. Cronbach's alphas of the Dutch version of the SCIDS were $\alpha = 0.90$ (total) versus respectively 0.91, $\alpha = 0.68$ (professionalism) versus respectively 0.82, $\alpha = 0.79$ (building relationships) versus respectively 0.83, $\alpha = 0.80$ (care challenges) versus respectively 0.78 and $\alpha = 0.71$ (sustaining personhood) versus respectively 0.70 (Gillis et al., 2019). To measure construct validity Pearson correlation with the Person-centred Care Assessment Tool (P-CAT) was calculated (Edvardsson et al., 2010). P-CAT analyzes the relationship between organizational support, environmental accessibility and the extent to which care is personalized. In the study there was a weak Pearson correlation (0.28) between P-CAT and SCIDS total ($p < 0.0001$).
- The UBOS measures the level of (risk for) burnout with 20 items scored on a Likert scale (0 = never–6 = always). A mean score on three subscales is calculated: emotional exhaustion (8 items), depersonalization (5 items) and diminished personal accomplishment (7 items). A higher score indicates a higher level of burn-out (Schaufeli and Van Dierendonck, 2000). The psychometric qualities of the Dutch version are similar to those of the original version (Schaufeli and Van Dierendonck, 1993).
- The short version of UBES measures the level of engagement with 9 items on a Likert scale (0 = never–6 = always). The UBES contains three subscales of three items: vitality, absorption and dedication (Schaufeli and Bakker, 2003). A higher mean score on each subscale indicates a higher level of engagement. The UBES had good psychometric qualities (Schaufeli and Bakker, 2003).

2.7. Data collection and data analysis

Measurements took place in October 2021 (T0), January 2022 (T1), March 2022 (T2), May 2022 (T3) and July 2022 (T4). Data were collected by a digital form in Qualtrics (XM). Participants had two weeks to fill in the questionnaire. After one week ward managers received the status of response (n). Demographics of the formal caregivers were also collected. One researcher managed all data and no interim analyses were performed.

Baseline characteristics are described overall and per group with mean (SD), minimum and maximum for the numeric variables and observed "n" and % for the categorical variables. Demographics and outcomes at baseline were compared between the three groups using a linear mixed model with group as a fixed effect and a random intercept for the nursing home. For the numeric variables a linear mixed model was used, for the binary variables a logistic generalized linear mixed effects model, for educational level an ordinal generalized linear mixed effects model and for Function a nominal generalized linear mixed effects model was used. In the case of a significant group effect, post hoc comparisons with Tukey correction were conducted. To see if the outcomes evolved differently over time in the three groups, a linear mixed model was used with time, group and the interaction between time and group as fixed effects, and with subject and nursing home as random intercepts. In case of a significant interaction between time and group, several post hoc tests are performed: a first set per time point to do a two-by-two comparison between the groups with Tukey-correction for multiple testing in three groups, and a second set per group namely a two-by-two comparison between the time points with Tukey-correction for multiple testing on 5 time points. The reported results are from a model adjusted for education in person-centered care (borderline significantly different at baseline between the three groups $p = 0.051$).

All analyses were done in R version 4.1.2 (R Core Team, 2021) except for the ordinal and nominal generalized linear mixed effects model which were done in SAS version 9.4 (SAS Insititute Inc, n.d.). Significance was set at the 5 % significance level.

2.8. Trial registration

The study was registered on the ISRCTN registry ISRCTN56768265 (10/08/2023).

3. Results

3.1. Fidelity of the intervention

Although all employees from the *need-based care group* underwent the educational strategy and all managers of the teams participated in the leadership trajectory, two teams from different nursing homes never started the intervention. In one team, the ward manager became seriously ill at the start of the intervention and the daily operation of the ward continued without explicit replacement of the ward manager. In the second team, disagreements between staff and management were present due to internal discussions about changing terms of employment. Seventy-five percent of the team's staff, including the ward manager, left the nursing home during the intervention period. Because there was zero fidelity in both teams to the intervention, data from these teams were excluded from analysis which left 7 nursing homes in the intervention group. Moreover, none of the staff in either team had completed the digital questionnaires at time points 3, 4 and 5. In one other team, the ward manager was also absent due to illness, but the ward manager of another department took over the implementation of need-based care. Data from this team were not excluded from analysis. In the *time group* there were no major fidelity problems in any team or nursing homes. The registration of the time-moments in the preprinted books was below average. In the *time group* 1115 moments (38 %) were registered (on a total of 2912 prescribed moments). In the *need-based group* many registration books were empty, and the quality of registration was low. In both groups, no clarifications were written in case of no time.

3.2. Characteristics of the formal caregivers

A total of 747 (85 %) formal caregivers completed the digital questionnaire at some of all different time points: 195, 257 and 299 participants in the *need-based care group* (7 nursing homes), the *time group* (7 nursing homes) and the *standard group* (9 nursing homes) respectively, with a mean number of 32.5 formal caregivers (SD = 15.6) per nursing home (a minimum of 12 formal caregivers and a maximum of 65 caregivers) (Table 1). The median of the completed questionnaires is three time points and 124 formal caregivers completed them at all five time points. The mean age was 41.6 years (SD = 12.4) and 91.5 % of the formal caregivers were female. Half of the participants were nurse-assistants, 20 % were registered nurses and 12.3 % were therapists. Almost 50 % of the caregivers had an undergraduate degree. Forty-six percent of the formal caregivers had personal experience with informal caregiving for people with dementia. Respectively 67.6 % and 72.3 % of the participants received extra education on person-centered care and dementia care. In the *need-based care group* only 56.8 % of the participants had extra education on person-centered care versus 71.4 % in the *time group* and 71.7 in the *control group* (p = 0.051). No other statistical differences in baseline characteristics between the groups were found. The mean baseline sum score (SD) on SCIDS was 52.7 (6.8) with subscores of 11.6 (1.8) on building relationships, 11.9 (1.8) on sustaining personhood, 15.6 (2) on professionalism and 13.6 (2.5) on care challenges. Statistically significant differences in SCIDS total and SCIDS subscores were found at baseline between the groups (sum scores) where the posthoc comparisons showed a significant difference between the *need-based care group* and the *time group* on SCIDS total (p = 0.011), building relationships (p = 0.020), sustaining personhood (p = 0.040), professionalism (p = 0.024) and care challenges (p = 0.016) with systematically lower scores in the need-based care group. No statistical differences were found at baseline between the *need-based care group* and the *standard care group*, or the *time group* and the *standard care group*. The burn-out mean score (SD) for emotional exhaustion was 1.8 (1), for personal accomplishment 4.1 (0.7) and for depersonalization 1 (0.7). The engagement mean score (SD) for vitality was 3.8 (1.1), for absorption 4.1 (1) and for dedication 4.5 (1). No statistically significant differences were found at baseline (mean scores) on subscales of burn-out and engagement.

3.3. Outcomes across the different groups over time

Because of the borderline significant difference in education in person-centered care at baseline, the models were adjusted for this variable and results are given from the adjusted model. There was a statistically significant interaction between 'group' and 'time' for SCIDS total (p = 0.016) and SCIDS care challenges (p = 0.008) (see Table 2) meaning that there was a difference in the evolution over time between the three groups (see Fig. 3). No significant interaction was found for building relationships, sustaining personhood, professionalism, emotional exhaustion, personal accomplishment, depersonalization, vitality, absorption and dedication (p > 0.05 in all cases). Post-hoc tests were used to gain insight into where the differences lie and showed a significant difference for SCIDS total only in the *need-based care group* between T0 and T3 (p = 0.010), T0 and T4 (p = 0.001) and T1 and T4 (p = 0.004) with an increase of respectively 1.5 (95 % CI [0.25, 2.84]), 2.4 (95 % CI [0.77, 4.04]) and 2.1 points (95 % CI [0.47, 3.81]). For care challenges a significant difference was found in the *need-based care group* between T0 and T2 (increase of 0.8 95 % CI [0.28, 1.33]), T0 and T3 (increase of 0.9 95 % CI [0.35, 1.39]), T0 and T4 (increase of 1.1 95 % CI [0.45, 1.75]) and T1 and T4 (increase of 0.7 95 % CI [0.08, 1.41]). In the *time group* there were significant differences between T0 and T3 (increase of 0.5 95 % CI [0.002, 0.99]) and T0 and T4 (increase of 0.5 95 % CI [0.04, 1.05]). In the *standard care group* an increase of 0.5 was found between T0 and T3 and T1 and T3 (respectively 95 % CI [0.10, 0.96] and 95 % CI [0.03, 0.89]).

4. Discussion

4.1. Findings

Need-based care is a model that supports formal caregivers in providing person-centered care by responding with tailored non-pharmacological interventions on residents' unmet needs. Despite its positive effects on residents' wellbeing, it requires a strong implementation process in which caregivers are challenged to rearrange their

Table 1
Descriptive statistics of baseline characteristics overall and per group.

		Total n = 747			Need-based care n = 191			Time n = 257			Standard care n = 299			p-Value
		n valid			n valid			n valid			n valid			
Gender														
Male	n/%	744	63	8.5	190	21	11.1	257	14	5.4	297	28	9.4	0.072
Female	n/%		681	91.5		169	88.9		243	94.6		269	90.6	
Age	Mean/SD	688	41.6	12.4	183	42.7	12.5	234	41.5	11.9	271	40.9	12.7	0.438
	Min/max		18	67		20	63		19	66		18	67	
Experience care for older adults (years)	Mean/SD	688	15.3	11.7	183	14.6	11.8	234	16.7	12	271	14.4	11.2	0.273
	Min/max		0	44		0	42		0	43		0	44	
Educational level														
Undergraduate degree	n/%	691	338	48.9	184	89	48.4	235	113	48.1	272	136	50	0.924
Graduate degree	n/%		188	27.2		45	24.5		74	31.5		69	25.4	
Bachelor degree	n/%		144	20.8		45	24.5		41	17.4		58	21.3	
Master degree	n/%		21	3		5	2.7		7	3		9	3.3	
Function														
Therapists	n/%	741	91	12.3	191	24	12.6	254	31	12.2	296	36	12.2	0.215
(Team) managers	n/%		56	7.6		19	9.9		14	5.5		23	7.8	
Kitchen, cleaning and logistic staff	n/%		61	8.2		23	12		12	4.7		26	8.8	
Nurses	n/%		148	20		34	17.8		61	24		53	17.9	
Nurse-assistants	n/%		372	50.2		88	46.1		134	52.8		150	50.7	
Others	n/%		13	1.8		3	1.6		2	0.8		8	2.7	
Work percentage	Mean/SD	660	79.3	19.3	182	80.3	19.5	211	76.9	19.1	267	80.4	19.3	0.264
	Min/max		20	100		30	100		25	100		20	100	
Additional education or experience														
Education person-centered care	n/%	689	466	67.6	183	104	56.8	234	167	71.4	272	195	71.7	0.051
Education dementia care	n/%	689	498	72.3	183	130	71	234	171	73.1	272	197	72.4	0.937
Informal caregiver experience dementia	n/%	688	317	46.1	183	94	51.4	234	98	41.9	271	125	46.1	0.156
Formal dementia care educator	n/%	747	15	2	191	5	2.6	257	3	1.2	299	7	2.3	0.455

Table 2
Outcomes per time point by group and overall, mean (SD). p baseline is the p-value of the fixed effect group in the model for baseline outcomes. p interaction model is the p-value of the interaction between group and time in the model for the outcomes over time with adjustment for education in person-centered care.

	Scores						
	p baseline	T_0	T_1	T_2	T_3	T_4	p interaction model
		n = 538	n = 514	n = 405	n = 334	n = 251	
		Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	
SCIDS sense of competence in dementia care total (SUM 18–72)							
Need-based care	**0.014**	50.7 (7.1)	51.6 (6.3)	52.1 (5.8)	53.2 (6.4)	53.9 (6.3)	**0.016**
Time		54.1 (6.4)	54.1 (6.3)	53.4 (6.7)	54.3 (6.7)	55 (6.5)	
Standard care		53 (6.5)	52.8 (6.9)	52.9 (6.4)	53.3 (7.2)	52.6 (6.9)	
All		52.7 (6.8)	52.9 (6.6)	52.9 (6.4)	53.6 (6.8)	53.8 (6.7)	
SCIDS building relationships (SUM 4–16)							
Need-based care	**0.023**	11 (2)	11.2 (1.7)	11.3 (1.5)	11.6 (1.7)	11.7 (1.4)	0.430
Time		12 (1.8)	11.8 (1.7)	11.7 (1.9)	12 (1.7)	12.2 (1.6)	
Standard care		11.7 (1.6)	11.6 (1.7)	11.7 (1.7)	11.7 (1.7)	11.7 (1.7)	
All		11.6 (1.8)	11.6 (1.7)	11.6 (1.7)	11.8 (1.7)	11.9 (1.6)	
SCIDS sustaining personhood (SUM 4–16)							
Need-based care	**0.041**	11.5 (1.9)	11.7 (1.7)	11.7 (1.5)	12 (1.6)	12.2 (1.8)	0.133
Time		12.2 (1.6)	12.1 (1.7)	12 (1.7)	12.1 (1.7)	12.3 (1.5)	
Standard care		12 (1.8)	11.9 (1.9)	11.8 (1.8)	12.1 (1.9)	11.8 (1.6)	
All		11.9 (1.8)	11.9 (1.8)	11.8 (1.7)	12.1 (1.7)	12 (1.6)	
SCIDS professionalism (SUM 5–20)							
Need-based care	**0.026**	15.2 (1.9)	15.2 (2)	15.3 (1.9)	15.5 (2)	15.7 (2)	0.108
Time		15.9 (2)	15.9 (2)	15.7 (1.9)	15.8 (2.1)	15.7 (2)	
Standard care		15.5 (2)	15.5 (2.1)	15.5 (1.9)	15.4 (2.1)	15.3 (2.1)	
All		15.6 (2)	15.6 (2)	15.5 (1.9)	15.6 (2.1)	15.5 (2)	
SCIDS care challenges (SUM 5–20)							
Need-based care	**0.018**	12.9 (2.7)	13.5 (2.2)	13.9 (2.2)	14.2 (2.3)	14.4 (2.5)	**0.008**
Time		14.1 (2.3)	14.3 (2.3)	14 (2.4)	14.5 (2.4)	14.8 (2.4)	
Standard care		13.7 (2.3)	13.7 (2.4)	13.9 (2.2)	14.1 (2.5)	13.8 (2.4)	
All		13.6 (2.5)	13.8 (2.4)	13.9 (2.3)	14.2 (2.4)	14.3 (2.5)	
UBOS emotional exhaustion (mean 0–6)							
Need-based care	0.286	2 (1)	1.9 (1)	1.9 (1.2)	2 (1.1)	1.9 (1.1)	0.545
Time		1.7 (0.9)	1.7 (0.8)	1.6 (0.9)	1.7 (1)	1.5 (0.8)	
Standard care		1.9 (1.1)	2 (1.1)	1.9 (1.1)	1.7 (1)	1.8 (1)	
All		1.8 (1)	1.8 (1)	1.8 (1.1)	1.8 (1)	1.7 (1)	
UBOS personal accomplishment (mean 0–6)							
Need-based care	0.072	4 (0.7)	4 (0.7)	4.1 (0.7)	4.2 (0.7)	4.2 (0.6)	0.694
Time		4.2 (0.7)	4.2 (0.7)	4.2 (0.7)	4.2 (0.8)	4.2 (0.8)	
Standard care		4.1 (0.7)	4.1 (0.8)	4.1 (0.8)	4.2 (0.8)	4.1 (0.8)	
All		4.1 (0.7)	4.1 (0.7)	4.2 (0.8)	4.2 (0.8)	4.1 (0.8)	
UBOS depersonalization (mean 0–6)							
Need-based care	0.151	1.1 (0.7)	1 (0.6)	1.1 (0.7)	1.1 (0.7)	1.1 (0.8)	0.372
Time		0.9 (0.6)	0.8 (0.6)	0.9 (0.6)	0.9 (0.7)	0.9 (0.7)	
Standard care		1 (0.7)	1.1 (0.8)	1.1 (0.7)	1 (0.8)	1.1 (0.8)	
All		1 (0.7)	1 (0.7)	1 (0.7)	1 (0.7)	1.1 (0.8)	
UBES vitality (mean 0–6)							
Need-based care	0.433	3.8 (1.1)	3.7 (1.1)	3.8 (1.1)	3.8 (1.1)	3.9 (1)	0.667
Time		3.9 (1.1)	3.9 (1)	3.9 (1)	3.9 (1.1)	3.9 (1.1)	
Standard care		3.8 (1.2)	3.7 (1.1)	3.8 (1.1)	3.8 (1.1)	3.8 (1.1)	
All		3.8 (1.1)	3.8 (1.1)	3.8 (1.1)	3.8 (1.1)	3.9 (1.1)	
UBES absorption (mean 0–6)							
Need-based care	0.482	4 (1)	4.1 (1.1)	4 (1.1)	4.1 (1.1)	4 (0.9)	0.553
Time		4.2 (1)	4.2 (1)	4.2 (0.9)	4 (1.1)	4.2 (1)	
Standard care		4 (1.1)	4 (1)	4 (1)	4 (1.2)	4 (1.1)	
All		4.1 (1)	4.1 (1)	4.1 (1)	4 (1.1)	4 (1)	
UBES dedication (mean 0–6)							
Need-based care	0.214	4.4 (1)	4.4 (1)	4.5 (1.1)	4.4 (1)	4.4 (0.9)	0.916
Time		4.6 (1)	4.7 (0.9)	4.5 (1)	4.4 (1.1)	4.6 (1)	
Standard care		4.4 (1.1)	4.3 (1.1)	4.3 (1)	4.3 (1.2)	4.3 (1.1)	
All		4.5 (1)	4.5 (1)	4.4 (1)	4.4 (1.1)	4.4 (1)	

P-values in bold met the significance level of 5 %.

priorities and to spend extra time with residents. This is in contrast to the scarcity of time, attention and resource staff, as well as the increased complexity of care, in nursing homes. Missed care due to inadequate time or resources is common in nursing homes and is associated with registered nurses' burn-out and job dissatisfaction (White et al., 2019). Managers may use these findings to argue that investment in person-centered care is impossible due to lack or risk for lack of resources. The aim of this study was to investigate

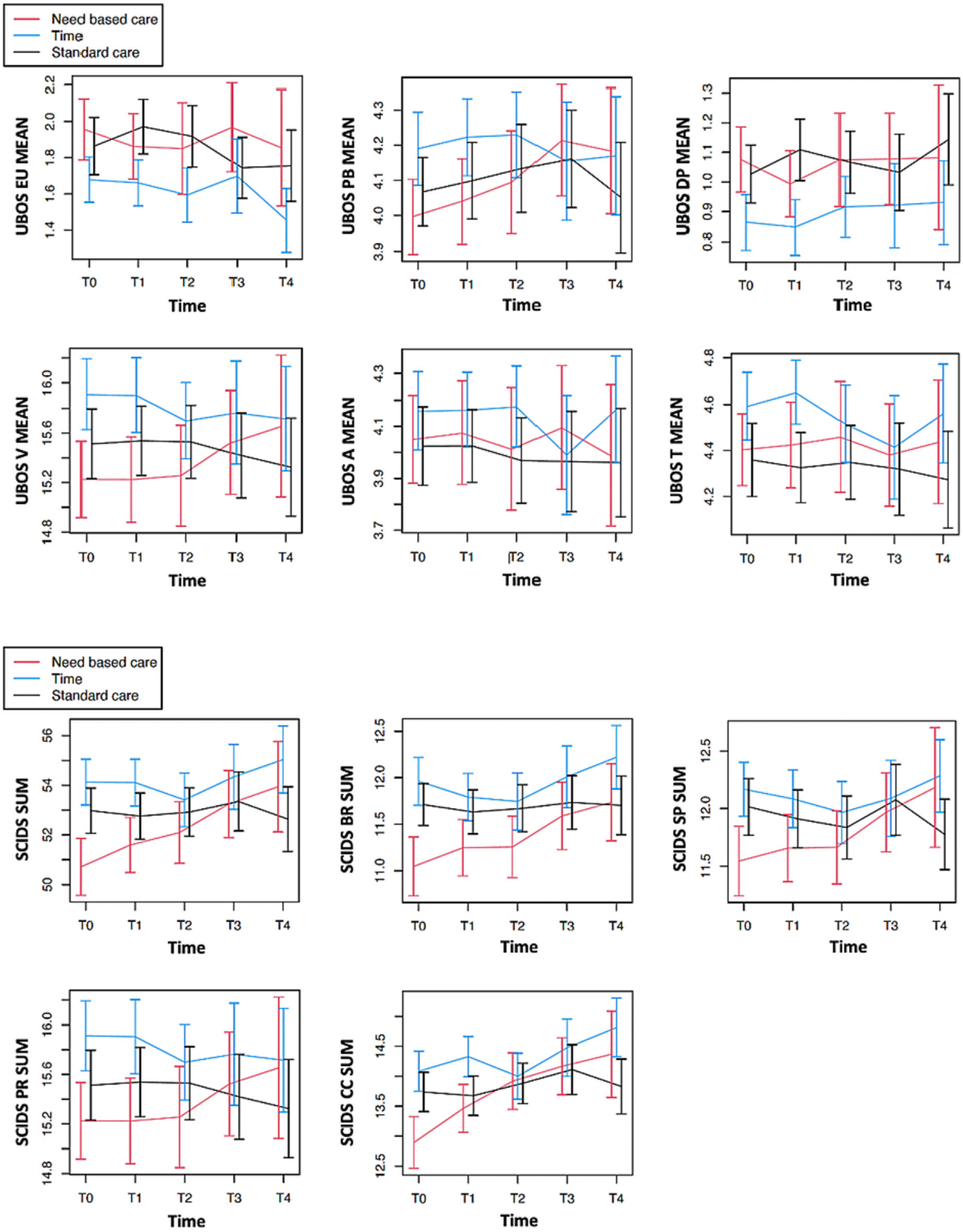


Fig. 3. Changes in scores in need-based care group, time group and standard care group for SCIDS total and subscales, UBOS subscales and UBES subscales. Values shown are means with 95 % confidence interval.

the impact of the implementation of need-based care on caregivers' wellbeing.

The results showed that formal caregivers in nursing homes succeeded – even just after the fourth COVID-19 wave when staff absence due to long-term stress was high – to rearrange their priorities and to provide more emotional and social support of residents. A study on rationing among caregivers in nursing homes found that the perception of staffing was significantly related to rationing while the actual staffing was not (Zúñiga et al., 2015). Staff levels did not significantly change during our study, but there was an influence on the perception of time and the perception of staffing during the clinical supervision sessions. Changing these perceptions is not easy in a global media context in which almost daily stories of caregiver burden reach people.

Two teams failed and were excluded from further analyses. We used the implementation framework of Meyers et al. (2012) but it was difficult to assess in-depth the capacity and readiness because a comprehensive assessment could create bias in a randomized study. This supports the importance of a capacity and readiness assessment before starting the implementation of need-based care and the presence of a supportive leadership. In Belgium, passive-avoidant leadership is excessively present in nursing homes (Poels et al., 2020). This leadership style negatively influences staffs' satisfaction with work, job and their leaders, staffs' health and wellbeing as well as staffs' productivity and effectiveness (Cummings et al., 2018).

A moderate but positive effect on the sense of competence in dementia care was shown only in the *need-based care group*. Interestingly, this effect is only significant when baseline is compared to time point 3 and time point 4, almost five months after the educational strategy, when staff had had experience of practicing need-based care alongside having received reflective support with supervision sessions. These results are similar to the findings of a systematic review of Rivett et al. (2019) on self-perceived staff competence and confidence in dementia care homes. They showed that teaching alone is not an adequate method of improving competence, and that supportive interventions that allow for reflection are important in helping to change feelings of competence and confidence. Clinical supervision is a common reflective strategy to enhance person-centered practice. Our results may contribute to fill in the gap in research on clinical supervision, that is under-researched in the context of nursing homes (Edgar et al., 2022). An increase of scores on ‘care challenges’ compared to baseline was found in all groups. This may be induced by the reorganization of care post COVID-19 in all nursing homes. Anyway, the increase of scores on care challenges at time point 3 compared to baseline is similar in the control group as in the *time group* (+0.5). In the *need-based care group* a significant increase of scores on care challenges is higher and already visible on time point 2 (+0.8, +0.9, +1.1). So, rationing as such is not enough to deal better with care challenges. We assume that the implementation of need-based care strengthens the process of shared decision-making and the vision of person-centered care which may influence the climate of the work environment in nursing homes. A more positive work environment supports dealing with care challenges.

No differences in levels of engagement and burnout were shown, which indicates that we found no negative impact on formal caregivers' wellbeing. These results confirm the findings of Van Duinen-van den Ijssel et al. (2019) whereby no difference in levels of burn-out and job satisfaction after implementation of an intervention for management of behavioral and psychological symptoms of dementia was found. However, the scores within our research of burn-out are of interest. Despite the described increase of levels of burn-out in healthcare personnel due to the COVID-19 pandemic (Lluch et al., 2022) the scores on emotional exhaustion (1.8 versus 1.72) and depersonalization (1 versus 1.03) are respectively similar to the scores of a sample of 709 formal caregivers in a study, also in the context of Belgian nursing homes, of Van Bogaert and colleagues ten years ago (Van Bogaert et al., 2014). Such comparisons may raise concerns about the scientific value of burn-out scores and encourage reflection on whether burn-out is not a characteristic of a group rather than a sensitive outcome. More debate on caregiver sensitive outcomes in residential care research is recommended.

4.2. Strengths and limitations of the work

The strength of this study is the use of a three-arm randomized controlled trial and the follow-up over time between the three groups. This strength could have effect on formal caregivers' response rate. Even though there was a response rate of 85 % of formal caregivers that completed the digital questionnaire at some of all different points, only 124 (14 %) filled in the questionnaire at all time points. While paper questionnaires might have increased the response rate, it would likely have contained more missing data. It was also difficult to follow up the fidelity to the intervention in the *time group* and the *need-based care group* because of a lack of registration of intervention moments in the registration books. The idea of offering preprinted books in checklist style did not have the expected effect. So, we have made some assumption on the results of the effect of need-based care on residents' BPSD and schemes made by ward managers with an overview per week of residents and their non-pharmacological interventions to ensure a certain fidelity to the intervention (Gillis et al., 2023). A limitation of this study is the retrospective trial registration, especially because the study was part of a larger randomized controlled trial with outcomes on resident and caregiver levels. An alternative could be the publication of the research protocol with the development of the implementation strategy included prior to the start of the trial. However, the research team worked with a strict peer-reviewed protocol and had to report on progress and follow-up to a steering group. In addition, analyses were carried out by an independent statistician who was not involved in the practical implementation of the study. The statistician clearly discussed the research questions with the research team in advance and did not deviate from them in her analyses.

4.3. Recommendations for further research

Attention was given to the development of a comprehensive implementation strategy using the Quality Implementation Framework (Meyers et al., 2012) resulting in five components: education, a leadership trajectory, recognition of ward champions, supervision sessions and expert support. It is not possible to explain whether the results from this study are due to the implementation strategy, due to the need-based care formal caregivers applied or due to both. Both the implementation strategy as well as the application of need-based care connect team members in achieving a common goal: improving the psychosocial wellbeing of residents. When teams achieve this shared goal they add, according to Teisberg et al. (2020), value to residents' quality of life. Value-based health care connects formal caregivers to their professional purpose, supports their professionalism, and can be a powerful mechanism to counter caregiver burnout (Teisberg et al., 2020). However, further research is recommended to determine whether the implementation of need-based care is feasible with a less extensive implementation strategy. Despite its positive effects on residents and no negative impact on formal caregivers' wellbeing, need-based care demands an ongoing attention toward residents' needs with tailored non-pharmacological interventions. Regarding the turnover of formal caregivers in nursing homes, research on the sustainability of the implementation of need-based care is also recommended.

4.4. Recommendations for practice and for management

Professional care relationships are important in sustaining the personhood of residents in nursing homes and enhancing care quality (Kadri et al., 2018). In times of shortage of nursing staff, focusing on efficiency and staff retention may be a pitfall for managers in nursing homes causing attention to processes that improve person-centered care to fade into the background. Managers are responsible for organizing a structure in which formal caregivers are able to invest in the professional relationship with the residents and to improve their psychosocial wellbeing. Our study shows that care providers effectively shift their priorities when they experience a shared vision in which caring for psychosocial well-being is everyone's responsibility and shared decision-making is common. Need-based care requires managers with a supportive leadership style who encourage reflection, with or without clinical supervision, and who are willing to change and adapt daily practices and routines in favor of person-centered care strategies and methods that offer not only more valued care for the residents, but certainly also more valuable work for the staff.

5. Conclusion

The implementation of need-based care in nursing homes, which includes greater prioritizing of social and emotional support toward residents, can be integrated in daily practice when all components of the Quality Implementation Framework are present alongside a supportive and strong leadership. Formal caregivers experience a greater sense of competence in dementia care as well an increased sense of competence in dealing with care challenges. Ongoing support and reflection, including reflection on perception on staffing and perception on time, will lead to behavioral changes in formal caregivers toward more person-centered care. Staff are able to invest in the relationship with residents without suffering higher levels of burn-out or loss of engagement.

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CRediT authorship contribution statement

Katrin Gillis: Writing – original draft, Visualization, Resources, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Linda van Diermen:** Writing – review & editing, Supervision, Methodology. **Dirk Lips:** Writing – review & editing, Supervision. **Hilde Lahaye:** Investigation, Conceptualization. **Marianne De Witte:** Investigation. **Leen Van Wiele:** Software, Formal analysis, Data curation. **Ella Roelant:** Methodology, Formal analysis. **Jo Hockley:** Writing – review & editing. **Peter Van Bogaert:** Writing – review & editing, Validation, Supervision, Methodology.

Data availability

Data sets generated during the current study are available from the corresponding author on reasonable request.

Declaration of Competing Interest

The authors declare to have no conflicts of interests.

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