Innovation in Aging, 2023, **7**, 1–13
https://doi.org/10.1093/geroni/igad061
Advance access publication 23 June 2023
Original Research Article

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Temporal Relationships Between Nursing Home Staff Care Approaches and Behaviors of Residents With Dementia During Mealtimes: A Sequential Analysis

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Decision Editor: Howard B. Degenholtz, PhD, FGSA

Abstract

Background and Objectives: Optimal dyadic interactions are critical to quality mealtime care and outcomes. Prior work supports associative relationships between staff approaches and individual mealtime behaviors, yet evidence on temporal relationships is limited. This study examined temporal associations between staff approaches and resident behaviors during mealtimes.

Research Design and Methods: Videotaped mealtime observations (N = 160) involving 36 staff and 27 residents (53 staff–resident dyads) in 9 nursing homes were analyzed. Sequential analyses using 5-, 10-, and 15-second time windows were conducted for resident positive, neutral, and challenging behaviors as antecedents as well as consequences of staff person-centered and task-centered approaches.

Results: Residents exhibited positive verbal (35.0%) and positive/neutral nonverbal (12.6%) behaviors, as well as challenging behaviors including functional impairments (27.7%) and resistive behaviors (24.7%). Staff primarily used person-centered approaches (54.1% verbal, 40.3% nonverbal); task-centered approaches were less frequent (5.6%). Immediately (within 5 seconds) after *staff person-centered approaches*, resident positive/neutral and resistive behaviors were more likely, and functional impairments less likely. After *staff task-centered approaches*, resident positive verbal and resistive behaviors were less likely. After *resident positive/neutral behaviors*, staff person-centered approaches were more likely. After *resident functional impairments*, staff person-centered verbal approaches were less likely, and task-centered approaches more likely. After *resident resistive behaviors*, all staff approaches were more likely. The strength of temporal relationships diminished in 10-second and 15-second time windows.

Discussion and Implications: Staff–resident positive interactions were associated with more subsequent positive interactions. Person-centered care was associated with fewer subsequent resident functional impairments and more subsequent resistive behaviors. Resident resistive behaviors were associated with more subsequent person-centered and task-centered care. Findings confirm the importance of facilitating positive staff–resident interactions and managing functional impairments using person-centered care. Resistive behaviors require additional awareness and attention beyond commonly used person-centered care approaches. Further investigation of temporal relationships is needed using larger diverse samples.

Translational Significance: Person-centered mealtime care should be highly recommended for facilitating positive staff–resident interactions and managing functional impairments in practice. Yet, person-centered care is not "one-size-fits-all," and should be individualized, context-based, and resident-oriented. Resistive behaviors, which indicate a mismatch between care provided, mealtime activities, and individual preferences, needs or wants, are not fully managed by person-centered care. Understanding and management of resistive behaviors requires additional reflections, including systematic assessments of what each resident expects, prefers, requests, or wants as well as how and why residents resist during mealtimes to guide the use of tailored, targeted care strategies in practice.

Keywords: Behaviors, Long-term care, Mealtime dyadic interactions, Person-centered care, Task-centered care

Background and Objectives

Dyadic Interactions are Critical to Quality Mealtime Care and Outcomes

Persons with dementia in nursing homes (NHs; residents) commonly experience functional, cognitive, and behavioral symptoms that interfere with the food intake process, resulting in low intake (1), and subsequently malnutrition and dehydration (2). These consequences may further result in increased confusion, functional decline, and ultimately lead to increased infection, weight loss, decreased quality of life, and increased morbidity and mortality (3,4). Mealtime is a daily activity that ensures fundamental health needs as well as a social event. Quality mealtime care is critical to maintain

Received: August 10 2022; Editorial Decision Date: June 3 2023.

food intake, hydration, nutrition, and function (5,6), as well as promote social interactions and enjoyment of meals (7).

Multilevel factors at resident, staff, and environmental levels are associated with resident behaviors and food intake. For example, resident cognition, physical capacity, eating ability, and dental-related function are positively associated with resident behaviors and food intake (6,8,9). Staff mealtime engagement quality is positively correlated with resident behaviors and food intake, especially for those with functional impairments who eat slowly (10–12). In addition, recent work supported the role of a high-quality physical and social dining environment, food stimuli, and institutional infrastructure in fostering positive mealtime experiences, resident positive behaviors, and food intake (5,13,14).

The prioritized modifiable determinants are caregiver knowledge and skills, staff–resident (dyadic) interactions, and quality of physical and social dining environment (4,5,15). Specifically, direct care staff are critically positioned to provide optimal mealtime care through promotion of resident remaining abilities, evidence-based care approaches, and environmental optimization. Optimal mealtime care practice features quality dyadic interactions that focus on social connection, tailored care, empowering the resident, and responding to challenging behaviors (16).

Staff Approaches and Resident Behaviors at Mealtimes

Mealtime dyadic interactions are dynamic, complex, and fluid, involving a mixture of person-centered and task-centered care approaches by staff in responding to resident positive, neutral, and challenging behaviors, which further influences subsequent staff care approaches. Both staff person-centered and task-centered care approaches and resident positive, neutral, and challenging behaviors were frequently observed during mealtime care (11,17,18). Person-centered care (eg, orientation/giving instructions, giving choices; Supplementary Table 1) is defined as the individually tailored and directly delivered verbal and nonverbal assistance provided by staff that aims to engage and motivate residents in mealtime activities and address resident needs and preferences by accommodating resident remaining abilities, dyadic interactions, and the physical and social dining environments (19–21). Particularly, staff person-centered care is operationalized to capture the multilevel aspects of mealtime care to address resident needs and preferences by adjusting to resident functional and cognitive abilities, and modifications of dyadic interactions and physical and social dining environments, which are key elements of and fundamental pathways to person-centered mealtime care. In contrast, task-centered care (eg, ignoring, physically controlling; Supplementary Table 1) is defined as verbal and nonverbal assistance provided by staff that prioritize the completion of mealtime activities *for* (rather than *with*) the individual without adequate consideration of resident remaining abilities or unmet needs and preferences (19–21).

Mealtime involves multilevel stimuli from staff, other residents, dining environment, and meal-related items (eg, food, silverware, utensils) and may trigger a continuum of resident behaviors from positive, neutral, to challenging (17,18). Resident positive, neutral, and challenging behaviors are ways of expressing their enjoyment or emotions, communicating their unmet needs, preferences or wants, and/or responding to care or other stimuli. Resident positive behaviors are defined as verbal and nonverbal expressions indicating help-seeking, cooperation, collaboration, reception, interest, approval, attention, engagement, enjoyment, and functional independence during mealtimes (17,18). Resident challenging behaviors are defined as verbal and nonverbal expressions indicating impairments with functional movements, rejection, distraction, and/or interruption during mealtimes that communicate needs for additional care or attention (17,18). Resident neutral behaviors are verbal and nonverbal expressions that can be interpreted as positive or challenging based on interaction or care contexts and may be further transitioned to either positive or challenging behaviors (17,18). For example, residents may be engaged constructively in mealtime activities (positive), not responding to food or care provided (neutral), and/or resisting care or food provided by staff (challenging). More examples of resident positive, neutral, and challenging behaviors are listed in Supplementary Table 2.

Associations Between Staff Approaches and Resident Behaviors

Although evidence is emerging on the importance of quality dyadic interactions during mealtime care, prior work has primarily focused on the associative (vs temporal) relationships between staff person- and task-centered care approaches and resident positive, neutral, and challenging behaviors and food intake, generating limited evidence to guide the development of effective interventions to improve mealtime care quality and resident outcomes. For example, recent mealtime research supported associative relationships of (a) staff person-centered approaches with resident positive and challenging behaviors (11,17,18), and (b) staff person-centered approaches and resident positive and challenging behaviors with resident food intake (12,22). Another study supported associative relationships between positive and negative/neutral interactions during care-related activities (not mealtime-specific) and interaction location and resident participation level, and suggests more research is needed on the role of resident and staff characteristics on quality of dyadic interactions in care of people with dementia (23).

Temporal relationships that consider the sequence of events or behaviors are considered stronger evidence than associative relationships in informing future intervention directions (24). However, investigation of temporal relationships is limited, likely due to lack of psychometrically sound measurements, quality time–event data, and/or expertise in sequential analytical approaches of time–event data. Recent work examined temporal relationships between staff person- and task-centered care and resident agitation (25) and risk of aspiration (26) during mealtimes, and found agitation and risk of aspiration were more likely to occur following task-centered care than person-centered care. These studies included limited resident challenging behaviors (ie, agitation, aspiration) and did not include any resident positive or neutral behaviors, which are equally important outcomes to maintain and improve in quality mealtime care practice.

Overall, limited research has characterized temporal relationships in mealtime dyadic interactions. More information is needed to understand how staff person- and task-centered care and resident positive, neutral, and challenging behaviors are temporally associated. This information will inform the development of innovative mealtime interventions to improve the quality of care and resident outcomes through optimization of dyadic interactions.

Theoretical Framework

This study is guided by the integration of multiple theoretical models (Figure 1), including the Antecedent–Behavior–Consequence (ABC) model (27), Social Ecological Model (SEM) (28,29), and Kales et al.'s model (30) that combines Consequences of Need-driven, Dementia-compromised Behavior model, (31) and the Progressively Lowered Stress Threshold model (32). The ABC model describes how an antecedent (eg, intrinsic factors) may trigger fluctuating behavioral state susceptible to behavioral responses, leading to health-related consequences. Kales et al.'s model describes how interactions among antecedents lead to mealtime behaviors and subsequent consequences. Based on Kales et al.'s model and the ABC model, neurodegenerations associated with dementia increase vulnerability to stressors and difficulties communicating mealtime needs, contributing to fluctuating behavioral states susceptible to challenging behaviors, and subsequent immediate, short-term, and long-term consequences (outcomes). The SEM model conceptualizes multilevel factors (intrapersonal, interpersonal, environment, and policy) associated with mealtime care and resident outcomes. Based on SEM, vulnerability to stressors can be changed through modifications of multilevel factors, which are potential modifiable targets of prevention and intervention efforts for quality care and outcomes. In this study, staff person- and task-centered care that addresses multilevel, modifiable factors are viewed as antecedents as well as consequences of resident positive, neutral, and challenging behaviors, which are considered clinically meaningful outcomes in nursing home mealtime care practice.

Objectives

This study aimed to examine temporal relationships between staff approaches and resident behaviors during mealtime. Staff approaches were conceptualized as person-centered verbal, person-centered nonverbal, and task-centered (verbal and nonverbal combined) approaches. Resident behaviors were conceptualized as positive verbal behaviors, positive/neutral nonverbal behaviors, functional impairments, and resistive behaviors. Our prior research showed that (a) staff person-centered verbal approaches were positively associated with resident positive verbal behaviors and resistive behaviors, and negatively associated with functional impairments; (b) staff person-centered nonverbal approaches were positively associated with resident functional impairments, and (c) staff task-centered approaches were not associated with resident mealtime behaviors (11). Based on the prior work and this study's theoretical framework, we addressed the following research questions:

1. Is there a temporal association between staff approaches as antecedents and resident behaviors as consequences?

We hypothesized that (a) staff person-centered verbal approaches would be followed by resident positive verbal and positive/neutral nonverbal behaviors, (b) staff person-centered nonverbal approaches would be followed by resident positive/neutral nonverbal behaviors, and (c) staff task-centered care approaches would not be followed by any category of resident behaviors. Findings of this analysis will inform how residents may react after staff person-centered and task-centered care and guide the development of

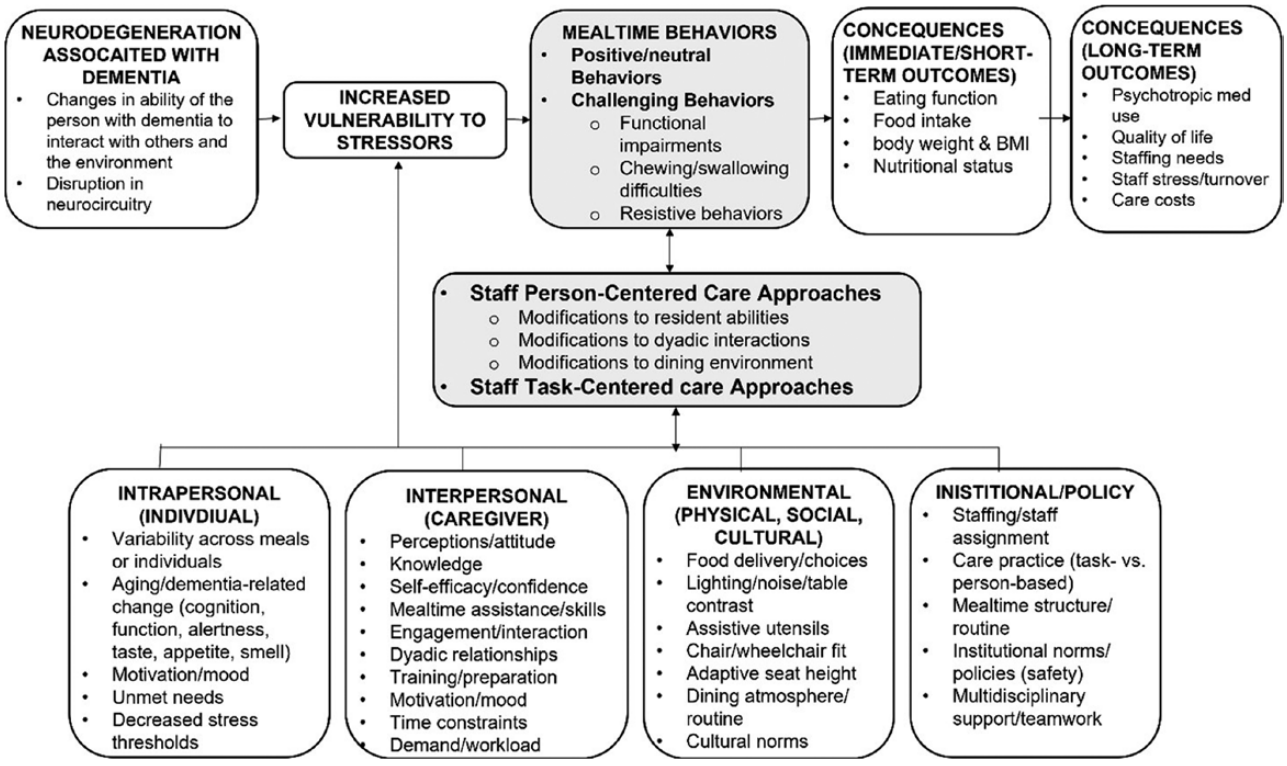

Figure 1. Theoretical framework. BMI = body mass index.

mealtime care interventions and staff training programs to facilitate improvement in resident behaviors from challenging to positive.

2. Is there a temporal association between resident behaviors as antecedents and staff approaches as consequences?

We hypothesized that (a) resident positive verbal behaviors would be followed by staff person-centered verbal approaches, (b) resident positive/neutral nonverbal behaviors would be followed by staff person-centered verbal and nonverbal approaches, (c) resident functional impairments would be followed by staff person-centered nonverbal approaches, and (d) resident resistive behaviors would be followed by staff person-centered verbal and nonverbal approaches. Findings of this analysis will inform how staff may react after resident positive verbal behaviors, positive/neutral nonverbal behaviors, functional impairments, and resistive behaviors, and guide the development of mealtime care interventions and staff training programs to facilitate appropriate staff approaches to improve mealtime care quality and resident behaviors.

Mealtime care practice is interactive in nature, where staff provide care based on assessment of resident mealtime behaviors, observe resident reactions to the care provided, and further adjust care approaches. The 2 research inquiries are critical for understanding and facilitating the process of optimizing mealtime care practice to fit individual needs, wants, and abilities.

Research Design and Methods

Study Design

A secondary analysis of videotaped mealtime observations was conducted. Videotaped observations were collected during 2011–2014 from a staff communication clinical trial that aimed to improve staff communication and decrease resident resistiveness to care (33,34). Ethical approvals were obtained from Institutional Review Boards of universities where the parent study and this study were conducted.

Sample and Setting

In the parent study, 127 staff and 83 residents from 13 NHs in Kansas, United States, were enrolled. Residents were eligible if they (a) were diagnosed with dementia based on medical records, (b) had long-stay status (ie, at least 3–6 months future residency), (c) were resistive to care based on staff report, and (d) were able to hear communication. Staff were eligible if they: (a) were aged 18 years or older, (b) spoke English, (c) were permanent employees in the NH study site, and (d) provided direct care for a resident participant at least 2 times/week over the previous month (33).

Videotaped observations archived in the parent study were eligible for this study if they lasted at least 1 minute and captured: (a) mealtime activities, (b) one-to-one interactions between 1 staff and 1 resident, and (c) verbal and nonverbal behaviors with adequate video/audio quality. Videos were excluded if the resident was taking medication, was present in the dining area but not eating a meal, or was being transferred to or from the dining area. A total of 1 748 videos were screened, of which 1 588 videos were excluded due to: (a) lasting <1 minute (n = 63), (b) missing mealtime activities (n =1 486), (c) capturing more than 1 staff or more than 1 resident (n = 34), and (d) having poor quality (n = 5). Therefore, 160 eligible videos were included in this study with mean ± SD duration of 4.5 ± 3.8 minutes (range = 1.0–23.8). One hundred and ten videos were collected before the communication intervention and 50 were collected after the intervention.

Video Coding

In this study, the refined Cue Utilization and Engagement in Dementia (CUED) Mealtime Video-Coding Scheme was used to assess resident behaviors and staff care approaches during mealtime care. The refined CUED is a novel observational tool developed from systematic review and evaluation of existing measures published since 1980 that assess (a) resident mealtime behaviors, eating ability, and chewing and swallowing abilities (35,36); (b) mealtime caregiving knowledge, attitudes, and behaviors (37); and (d) dyadic interactions and physical and social dining environment (38), including Person-Centered Behavior Inventory (39) and Task-Centered Behavior Inventory (40) that facilitated the categorization of staff person-centered and task-centered care approaches for this study. The refined CUED tool is validated to assess both staff person-centered and task-centered approaches and resident positive, neutral, and challenging behaviors (34). Particularly, the refined CUED showed adequate evidence for ease of use, feasibility, intercoder reliability (Cohen's Kappa range = 0.93–0.99, 95% CI = 0.92–0.99, ± 1-second tolerance; percent agreement range = 93.63%–99.17%, all p < .001, ± 1-second tolerance), content validity, construct validity, and predictive validity (6,18,34,38,41). A recent systematic review of 17 existing mealtime dyadic interaction assessments indicated that the refined CUED was rated highest on psychometric quality (38).

Four trained coders completed the coding of all videotaped observations during 2018–2020 using the refined CUED in Noldus Observer 14.0 (Noldus Information Technology Inc., Leesburg, VA). All coders were trained following standardized videos as well as training manual by coding videos randomly selected from the study sample on their own, and meeting as a group with the first author to discuss coding challenges and disagreements and identify appropriate solutions. Multiple rounds of separate coding and group meetings were held to establish intercoder reliability before trained coders independently coded the sample. All resident behaviors and staff approaches were coded as point events on a time scale (ie, only the onset time of each event was coded). Thus, occurrences (rather than durations) of behaviors and approaches relative to time were coded. All behavioral codes and their operational definitions as well as the process of coder training and video coding were described in prior work (6,18,34,41).

Three general categories of staff approaches were defined based on original codes (Supplementary Table 1): (a) *person-centered verbal approaches* represented by 8 verbal approaches (eg, giving choices), (b) *person-centered nonverbal approaches* represented by 27 nonverbal approaches that support resident abilities, dyadic interactions, and dining environments (eg, adjusting proximity between staff and resident), and (c) *task-centered approaches* represented by 10 verbal and nonverbal behaviors (eg, verbal refusal/disagreement, outpacing). Four general categories of resident behaviors were defined based on original codes (Supplementary Table 2): (a) *positive verbal behaviors* represented by 8 verbal behaviors (eg, asking for help/cooperation), (b) *positive/*

neutral nonverbal behaviors represented by 5 nonverbal behaviors (eg, wiping away oral spillage/drool), (c) *functional impairments* represented by 10 nonverbal behaviors (eg, difficulty using utensil properly), and (c) *resistive behaviors* represented by 16 verbal and nonverbal behaviors (eg, interrupting/changing topic, pushing away help/food). In this study, all codes within each category of staff approaches and resident behaviors are mutually exclusive, indicating at each time point in a video only 1 staff approach within each category and only 1 resident behavior within each category could be applied.

Data Analysis

A time-window sequential analysis approach is used (24). We pooled data from all videos rather than analyzing each video separately for 3 reasons. First, this study focused on the overall patterns of distributions and relationships of resident behaviors and staff approaches across all videos. Second, the 160 videos were collected as part of a large trial, and they captured staff–resident interactions during routine mealtime care scenarios. Thus, the beginning and ending times of each video were matters of convenience and opportunity determined by the occurrence of staff–resident mealtime interactions. Most of the videos captured segments of a meal (rather than the whole meal) and had varying durations. Third, frequencies of staff approaches and resident behaviors in the majority of videos were too small to allow for separate sequential analyses of individual videos. Therefore, it was appropriate to pool over all videos for analysis because of the nature of the data.

The time-window sequential analysis approach requires specifying (a) onset times of antecedent events (ie, resident behaviors, staff approaches), (b) time windows following antecedent events, and (c) rates of target events (ie, staff approaches, resident behaviors) that occur inside and outside time windows; and then determining whether target events are more likely to occur inside or outside of time windows. Onset times of antecedent events were coded using Noldus Observer 14.0 with varying numbers of decimal digits. Then, using Excel, these data were converted into files that could be read and processed by Generalized Sequential Querier (GSEQ) 5 software (24). For events that occurred exactly at the same time, only one of such events can be included in the analysis using GSEQ. To preserve all resident behaviors and staff approaches in the data for sequential analysis, we made adjustments to onset times of events that coincided (eg, 1 staff verbal approach and 1 staff nonverbal approach; 1 resident nonverbal behavior and 1 staff verbal approach) so that all events had distinct onset time.

We defined windows of 5, 10, and 15 seconds that began with onset times of antecedent events. Although the selection of the time windows was a priori and arbitrary, there are 2 predetermined rationales for this selection: (a) our primary interest was the occurrences of resident behaviors and staff approaches immediately after, or close in time, to the antecedents (eg, 5, 10, and 15 seconds following the occurrence of the antecedents), and (b) the video sample of this study captured segments of meals (rather than full meals). Start times for video sessions were set at the beginning (second 0) of one-on-one staff–resident interaction during mealtimes. To accommodate the longest window used in our time-window analysis, we then set the stop time to 15 seconds after the last resident behavior or staff approach coded, resulting in 732.5 minutes of total video duration. Of all videos, 74% ended with a staff approach and 26% ended with a resident behavior.

Using GSEQ, we calculated: (a) frequencies of target resident behaviors inside and outside of 5-, 10-, and 15-second time windows following antecedent staff approaches; and frequencies of target staff approaches inside and outside 5-, 10-, and 15-second time windows following antecedent resident behaviors, and (b) total durations of time inside and outside 5-, 10-, and 15-second windows following antecedent staff approaches and resident behaviors (see Figure 2). Next, the data on frequencies of events and duration of time inside and outside windows were exported to SAS. In SAS, a log-linked Poisson model was fit to the data (frequencies and time durations) to estimate rates (ie, the number of resident behaviors or staff approaches per minute inside and outside time windows), ratios of rates (rate inside time windows divided by rate outside time windows), and corresponding 95% confidence intervals (CIs). Rates inside and outside time windows were calculated for all combinations of antecedent events (ie, 3 categories of staff approaches and 4 categories of resident behaviors) and target events (3 categories of staff approaches and 4 categories of resident behaviors), using 3 time windows

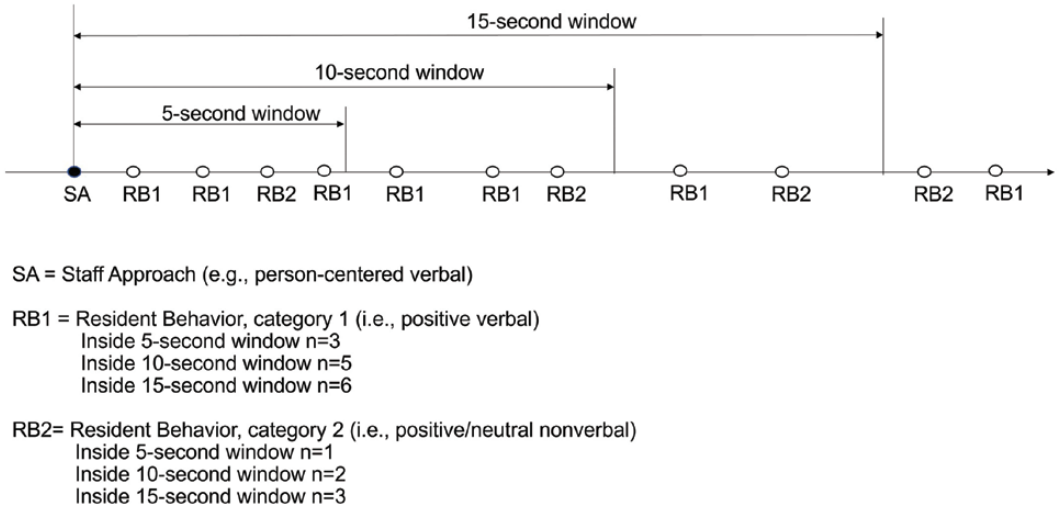

Figure 2. Calculation of frequencies of resident behaviors inside time windows after a staff approach as an antecedent: an example.

(5, 10, and 15 seconds), for a total of 72 rates for inside time windows and 72 rates for outside time windows. The use of rates was appropriate because rates account for varying frequencies of resident behaviors and staff approaches and for varying duration of time inside versus outside time windows for resident behaviors and staff approaches as antecedents.

The primary statistic is the ratio of rates of events inside versus outside time windows. If this statistic is greater than 1, it indicates greater likelihood for a target event to occur inside windows that follow an antecedent event compared with outside the windows. Values lesser than 1 indicate lower likelihood. Because the ratio of rates is conceptually similar to an odds ratio, we can interpret their magnitudes the same way. Thus, we characterize ratios greater than 3 (and less than 0.33), greater than 2 (and less than 0.50), and greater than 1.25 (and less than 0.80) as large, medium, and small effects, respectively (42).

Results

Participant Characteristics

The 160 videos involved 27 residents and 36 staff (53 unique staff–resident dyads) in 9 NHs. Resident participants were all White and had a mean age of 85.6 ± 8.6 years (range = 64–104). The majority were female (63.0%) and non-Hispanic (92.6%). Residents had moderately severe (70.0%) or severe (30.0%) dementia as measured by Functional Assessment Staging in Alzheimer's Disease (FAST score ranging from 1, normal cognition/functioning, to 8, very severe dementia) (43) using data extracted from Minimum Data Set (MDS) 3.0. Residents had moderate levels of functional disability (mean ± *SD* = 24.4 ± 5.6, range = 12–39) as measured by MDS 3.0 Section G-ADL self-performance and support provided (total score ranges from 0 to 160, higher scores indicate more dependence in self-performance and more support needed). Residents had low to moderate levels of physical comorbidities (mean ± *SD* = 27.1 ± 5.3, range = 19–36) as measured by the Modified Cumulative Illness Rating scale (total score ranges from 0 to 70, higher scores indicate more comorbidities) (44) based on data extracted from MDS 3.0 and clinical records.

Staff participants had a mean age of 35.9 ± 12.4 years (range = 19–79) and worked as a caregiver for a mean duration of 9.5 ± 8.6 years (range = 0.3–31) and at the current NH for a mean duration of 4.0 ± 3.7 years (range = 0.1–13). Most staff were female (80.6%) and non-Hispanic (75%). Three quarters were White (75%) and the rest were African American (25%). The majority had completed or were attending college (72.2%), although 27.8% completed high school only. The majority were Certified Nursing Assistants (85.7%), and the rest were Licensed Practical Nurses (8.6%) or Registered Nurses (5.7%).

Staff Approaches and Resident Behaviors

A total of 5 484 staff approaches were coded in the 160 videos (Supplementary Table 1), primarily person-centered verbal (54.0%) and nonverbal (40.3%) approaches. Only 5.6% of staff approaches were task centered. All staff person-centered verbal approaches were observed with high frequency, including "orientation/giving instructions" (*n* = 927), "showing interest" (*n* = 658), "showing approval/agreement" (*n* = 329), "giving choices" (*n* = 274), "asking for help/cooperation" (*n* = 248), "assessing for comfort/condition" (*n* = 271), and "gaining attention verbally" (*n* = 204). Among the staff person-centered nonverbal approaches, the most frequently observed behavior was "giving a bite of appropriate size" (*n* = 468), followed by "offering beverage" (*n* = 259), "appropriate use of affectionate touch" (*n* = 207), and "resident-directed gaze" (*n* = 157). Staff task-centered behaviors were primarily "ignoring/lack of interactions" (*n* = 137) and "leaving the table/resident" (*n* = 78).

A total of 2 208 resident behaviors were coded in the 160 videos (Supplementary Table 2). Nearly half of the behaviors were positive or neutral (35.0% verbal and 12.6% nonverbal behaviors), although the other half were challenging behaviors (27.7% functional impairments and 24.7% resistive behaviors). Among all resident positive/neutral behaviors, "showing interest" (*n* = 294) was most frequently observed, followed by "showing approval/agreement" (*n* = 265) and "affirmative nodding" (*n* = 103). Among all resident challenging behaviors, the most frequently observed behavior was "prolonged/continuous chewing/sipping" (*n* = 422), representing 68.9% of all behaviors indicating functional impairments, followed by "disengaged/distracted from meal" (*n* = 142).

Temporal Relationships: Staff Approaches as Antecedents of Resident Behaviors

Table 1 and Figure 3 show the model-estimated ratios and rates, respectively, of resident behaviors per minute inside versus outside 5-, 10-, and 15-second time windows after staff approaches as antecedents. The results for 10- and 15-second time windows were similar to the 5-second time window results, only showing weaker relationships. Accordingly, the 5-second time window results are described here. In general, staff person-centered verbal approaches were more effective in eliciting resident behaviors than either person-centered nonverbal or task-centered approaches.

- In the 5 seconds after a *staff person-centered verbal approach*, resident positive verbal behaviors were 8.56 times (large effect), positive/neutral nonverbal behaviors 2.22 times (medium effect), and resistive behaviors 4.13 times (large effect) more likely (all *p*s < .001) than at other times (ie, all the time duration of the video that is outside the 5-second time windows). In contrast, resident functional impairments were 0.72 times (small effect) less likely after a staff person-centered verbal approach than at other times ($p < .001$).
- In the 5 seconds after a *staff person-centered nonverbal approach*, resident positive verbal behaviors were 1.38 times ($p = .001$), positive/neutral nonverbal behaviors 1.35 times ($p = .025$), and resistive behaviors 1.62 times ($p < .001$) more likely than at other times (all small effects). In contrast, functional impairments were 0.79 times (small effect) less likely after a staff person-centered nonverbal approach than at other times ($p = .027$).
- In the 5 seconds after a *staff task-centered approach*, resident positive verbal behaviors were 0.51 times ($p = .014$) and resistive behaviors 0.57 times ($p = .068$) less likely than at other times (both small effects). Positive/neutral nonverbal behaviors were less likely, but the magnitude of the effect was near 1 (no effect). Functional impairments were 1.28 times (a small effect) more likely, but this effect was not significant ($p = .20$).

Table 1. Ratios of Frequencies of Resident Behaviors per Minute (Inside Time Windows vs Outside Time Windows): Staff Approaches as Antecedents

Resident Behavior Category	Staff Approaches as Antecedents					
	Person-Centered Verbal		Person-Centered Nonverbal		Task-Centered[a]	
	Ratio (95% CI)	*p*	Ratio (95% CI)	*p*	Ratio (95% CI)	*p*
5-s windows	Inside = 194.0 min Outside = 538.5 min		Inside = 161.2 min Outside = 571.3 min		Inside = 25.4 min Outside = 707.1 min	
Positive verbal	8.56 (7.27,10.09)	<.001	1.38 (1.18,1.61)	.001	0.51 (0.30,0.87)	.014
Positive/neutral nonverbal	2.22 (1.75, 2.81)	<.001	1.35 (1.04,1.76)	.025	0.93 (0.48,1.80)	.825
Functional impairments	0.72 (0.59,0.88)	<.001	0.79 (0.65,0.97)	.027	1.28 (0.87,1.89)	.203
Resistive[a]	4.13 (3.48,4.90)	<.001	1.62 (1.35,1.94)	<.001	0.57 (0.32,1.04)	.068
10-s windows	Inside = 293.7 min Outside = 438.8 min		Inside = 283.7 min Outside = 448.8 min		Inside = 49.8 min Outside = 682.7 min	
Positive verbal	9.19 (7.50,11.26)	<.001	1.33 (1.15,1.53)	<.001	0.42 (0.28,0.64)	<.001
Positive/neutral nonverbal	2.07 (1.63,2.62)	<.001	1.28 (1.01,1.63)	.038	0.67 (0.38,1.17)	.159
Functional impairments	0.67 (0.57,0.80)	<.001	0.70 (0.59,0.83)	<.001	0.98 (0.72,1.35)	.924
Resistive[a]	3.44 (2.87,4.13)	<.001	1.36 (1.15,1.61)	<.001	0.71 (0.49,1.05)	.089
15-s windows	Inside = 364.0 min Outside = 368.5 min		Inside = 375.8 min Outside = 356.7 min		Inside = 73.3 min Outside = 659.2 min	
Positive verbal	8.29 (6.61,10.40)	<.001	1.24 (1.08,1.43)	.003	0.44 (0.31,0.61)	<.001
Positive/neutral nonverbal	1.87 (1.46,2.39)	<.001	1.14 (0.90,1.44)	.290	0.69 (0.44,1.09)	.116
Functional impairments	0.96 (0.82,1.13)	.622	1.70 (1.44,2.01)	<.001	0.87 (0.66,1.15)	.328
Resistive[a]	2.79 (2.31,3.38)	<.001	1.15 (0.97,1.37)	.097	0.79 (0.58,1.07)	.133

Note. Total duration of videos = 732.5 min. Inside = inside time window. Outside = outside time window.
[a]Both verbal and nonverbal.

Temporal Relationships: Resident Behaviors as Antecedents of Staff Approaches

Table 2 and Figure 4 show the model-estimated ratios and rates, respectively, of staff approaches per minute inside versus outside 5-, 10-, and 15-second time windows after resident behaviors as antecedents. The results for 10- and 15-second time windows were similar to the 5-second time window results, only showing weaker relationships. Accordingly, the 5-second time window results are described here. In general, resident positive verbal and resistive behaviors were more effective in eliciting staff approaches than resident positive/neutral nonverbal behaviors or functional impairments.

- In the 5 seconds after a *resident positive verbal behavior*, staff person-centered verbal approaches were 3.85 times (large effect) and person-centered nonverbal approaches 1.65 times (small effect) more likely than at other times (both *p*s < .001). Staff task-centered approaches were less likely, but the magnitude of the effect was near 1.
- In the 5 seconds after a *resident positive/neutral nonverbal behavior*, staff person-centered verbal approaches were 1.31 times (small effect) more likely than at other times (p = .004). Staff person-centered nonverbal approaches and task-centered approaches were equally or less likely, respectively, but the magnitude of the effect was near 1.
- In the 5 seconds after a *resident functional impairment*, staff person-centered verbal approaches were 0.77 times (small effect) less likely than at other times (p = .001). In contrast, task-centered approaches were 1.55 times (small effect) more likely after a resident functional impairment than at other times (p = .019). Staff person-centered nonverbal approaches were less likely, but the magnitude of the effect was near 1.
- In the 5 seconds after a *resident resistive behavior*, staff person-centered verbal and nonverbal approaches, and task-centered approaches were all at least 2 times more likely than at other times (2.45, 2.03, and 2.21 times, respectively, all medium effects, all *p*s < .001).

Discussion and Implications

This study is among the first to examine temporal relationships between staff person-centered and task-centered care and resident positive, neutral, and challenging behaviors during mealtimes. The use of videotaped observations and the refined CUED, an established behavioral coding scheme, facilitated this investigation of how staff approaches and resident behaviors interact in a sequential manner. The discussion focuses on temporal relationships where resident behaviors are conceptualized as both antecedents and consequences of staff approaches. Rather than organizing the discussion of findings according to research questions or hypotheses, it is centered around resident behaviors, which are clinically meaningful outcomes of interest that mealtime research and practice aim to improve.

Resident Positive Behaviors

Increase in resident positive verbal and positive/neutral nonverbal behaviors was associated with preceding staff person-centered approaches and more subsequent staff

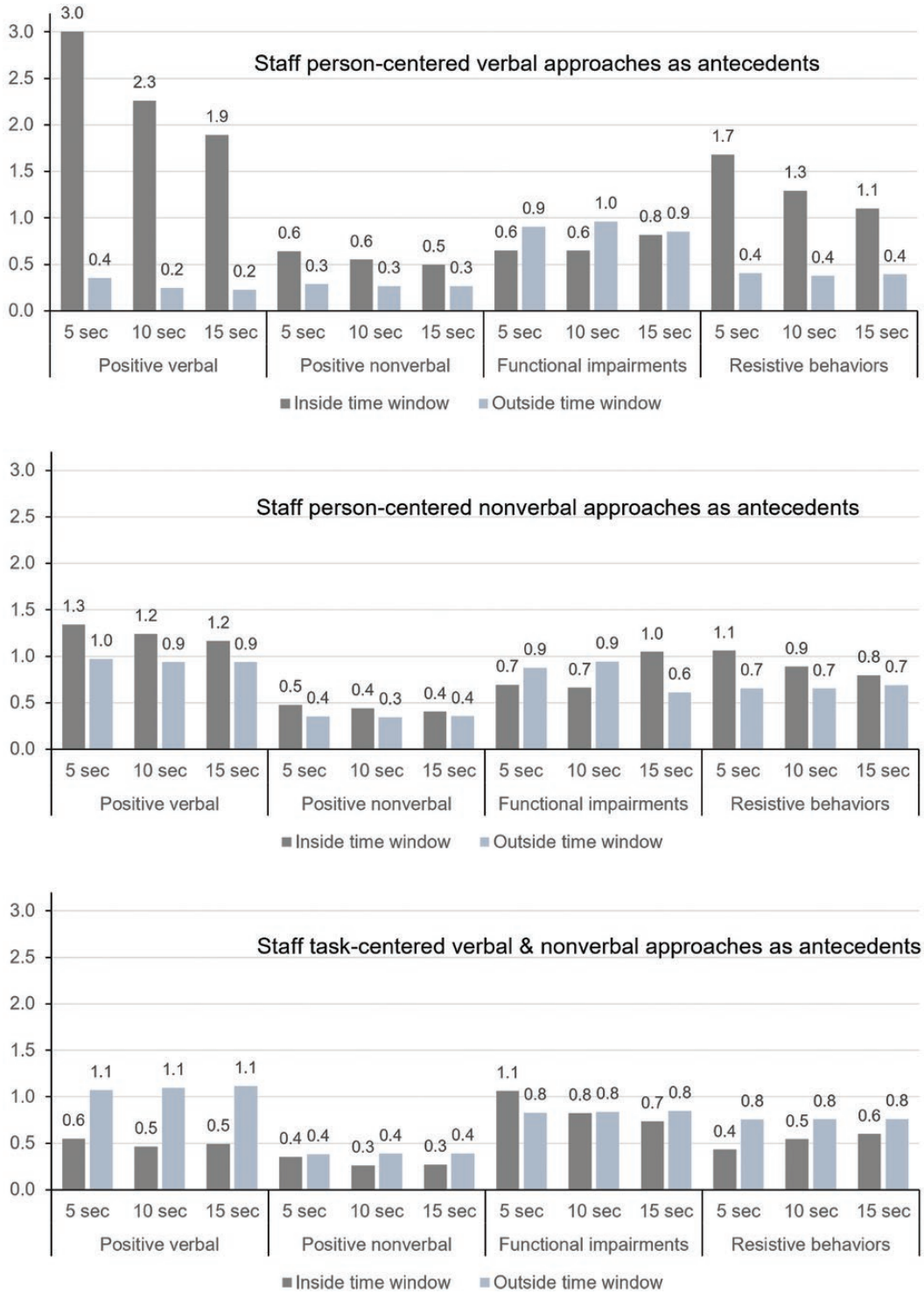

Figure 3. Rates (frequencies per minute) of resident behaviors inside and outside of 5-, 10-, and 15-second time windows after staff approaches as antecedents.

person-centered approaches, supporting our hypotheses related to resident positive behaviors and staff person-centered approaches in both research questions. Findings suggest that positive dyadic interactions as reflected by an integration of staff person-centered approaches and resident positive behaviors may be temporally associated with more subsequent positive dyadic interactions throughout mealtimes. Findings are consistent with prior research supporting positive associative relationships between staff person-centered approaches and resident positive behaviors (11). Additionally, staff task-centered care approaches were temporally associated with fewer subsequent resident positive verbal behaviors, supporting the recommended practice of minimizing task-centered care at mealtimes (20). Although the findings did not support the hypothesis related to staff task-centered care approaches, future validation in larger, more diverse samples is needed.

Table 2. Ratios of Frequencies of Staff Approaches per Minute (Inside Time Windows vs. Outside Time Windows): Resident Behaviors as Antecedents

Staff Approach Category	Resident Behaviors as Antecedents							
	Positive Verbal		Positive/Neutral Nonverbal		Functional Impairments		Resistive*	
	Ratio (95% CI)	*p*	Ratio (95% CI)	*p*	Ratio (95% CI)	*p*	Ratio (95% CI)	*p*
5-s windows	Inside = 58.3 min Outside = 674.2 min		Inside = 22.9 min Outside = 709.6 min		Inside = 50.8 min Outside = 681.7 min		Inside = 40.0 min Outside = 692.5 min	
Person-centered verbal	3.85 (3.54,4.18)	<.001	1.31 (1.09,1.57)	.004	0.77 (0.66,0.90)	.001	2.45 (2.20,2.73)	<.001
Person-centered nonverbal	1.65 (1.45,1.87)	<.001	1.01 (0.80,1.28)	.917	0.87 (0.73,1.03)	.110	2.03 (1.77,2.33)	<.001
Task-centered*	0.84 (0.54,1.31)	.450	0.82 (0.41,1.66)	.585	1.55 (1.08,2.24)	.019	2.21 (1.56,3.14)	<.001
10-s windows	Inside = 99.0 min Outside = 633.5 min		Inside = 44.8 min Outside = 687.7 min		Inside = 100.0 min Outside = 632.4 min		Inside = 73.4 min Outside = 659.1 min	
Person-centered verbal	3.13 (2.89,3.37)	<.001	1.32 (1.16,1.51)	<.001	0.84 (0.75,0.94)	.002	2.15 (1.96,2.36)	<.001
Person-centered nonverbal	1.53 (1.38,1.70)	<.001	1.06 (0.90,1.26)	.481	0.88 (0.78,1.00)	.057	1.74 (1.56,1.95)	<.001
Task-centered*	0.79 (0.55,1.13)	.197	0.73 (0.43,1.25)	.247	1.46 (1.10,1.94)	.009	1.53 (1.12,2.10)	.008
15-s windows	Inside = 131.6 min Outside = 600.9 min		Inside = 64.8 min Outside = 667.7 min		Inside = 146.4 min Outside = 586.1 min		Inside = 103.3 min Outside = 629.2 min	
Person-centered verbal	2.75 (2.56,2.97)	<.001	1.32 (1.18,1.48)	<.001	0.88 (0.80,0.97)	.009	1.88 (1.73,2.05)	<.001
Person-centered nonverbal	1.38 (1.25,1.52)	<.001	1.07 (0.92,1.23)	.388	0.87 (0.78,0.97)	.010	1.62 (1.46,1.79)	<.001
Task-centered*	0.82 (0.60,1.12)	.208	0.83 (0.54,1.27)	.385	1.24 (0.95,1.61)	.111	1.41 (1.06,1.87)	.019

Notes: Total duration of videos = 732.5 minutes. Inside = inside time window. Outside = outside time window. CI = confidence interval.
*Both verbal and nonverbal.

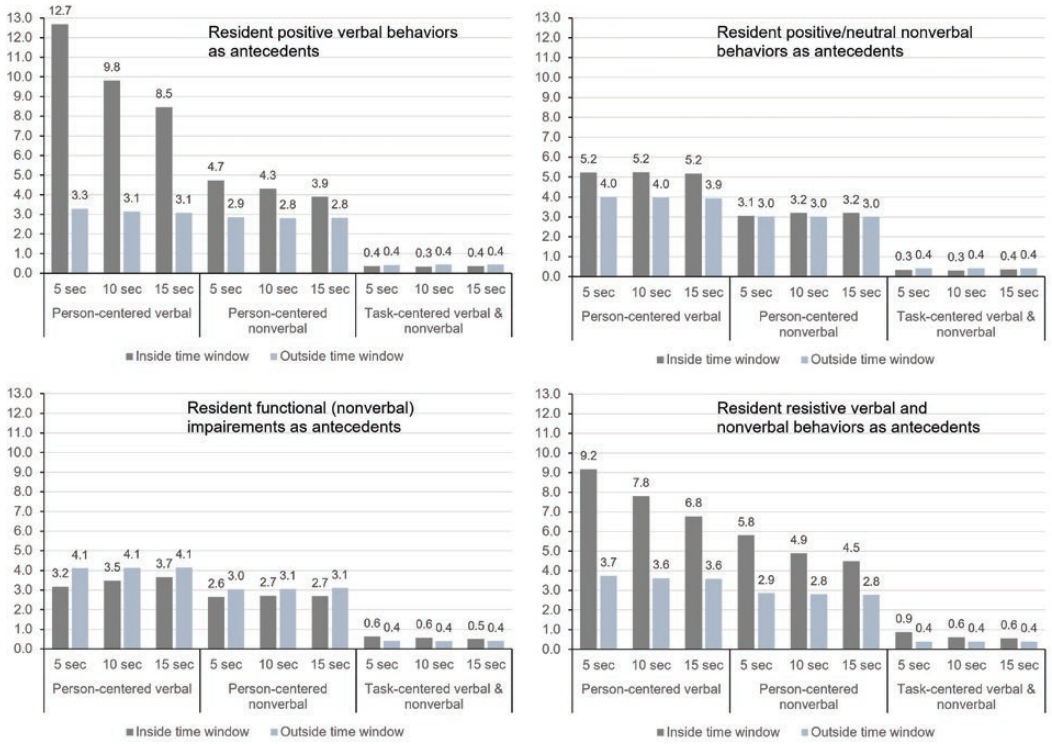

Figure 4. Rates (frequencies per minute) of staff approaches inside and outside of 5-, 10-, and 15-second time windows after resident behaviors as antecedents.

Resident Functional Impairments

Decrease in resident functional impairments was temporally associated with preceding staff person-centered approaches, and functional impairments were temporally associated with increase in subsequent staff task-centered approaches rather than person-centered approaches, which did not support the study hypothesis in the second research question. Findings show that although person-centered care approaches may be helpful in managing functional impairments, staff tended to use task-centered (vs person-centered) care approaches when residents showed functional impairments. Such evidence confirms the importance of using person-centered (vs task-centered) care approaches as potentially effective strategies to manage functional impairments during mealtimes, such as difficulties in use of utensils and chewing and swallowing food (20,45).

Resident Resistive Behaviors

Increase in resident resistive behaviors was temporally associated with preceding staff person-centered care approaches and more subsequent staff person- and task-centered care approaches, which supported our hypothesis in the second research question. Findings suggest that staff tend to use both person-centered and task-centered approaches to manage resistive behaviors. This is consistent with recently identified gaps between common and good practices in interpreting and managing resistiveness to eating in people with dementia that include (a) resistiveness to eating, as a common situation that care staff encounter during mealtimes, is continued to be viewed as a problem to be eradicated/avoided, rather than a behavior to be understood by staff; and (b) there is no common procedure to manage resistiveness to eating—less than half of the interviewed staff considered person-centered strategies as a best practice, and strategies used in daily care practice varied across person- and task-centered approaches (46).

Prior research showed that staff task-centered care and lack of interaction were associated with resident agitation, and recommended that, when encountering agitation, staff avoid task-centered care (eg, verbal controlling, inappropriate touch) or no response and instead promote person-centered approaches (47). Although person-centered care has been highly recommended, our study showed that person-centered care may potentially trigger resistive behaviors. Thus, person-centered mealtime care as the commonly recommended practice for managing resistive or agitated behaviors may warrant more reflections when attempting to accommodate what each resident expects, prefers, requests, or wants (48). Resistive behaviors, which usually result from a lack of attention to individual preferences and, therefore, indicate a mismatch between provided care, eating activities, and individual preferences, needs or wants, may warrant more awareness and attention to both the persons and activities (48,49).

Implications for Practice and Research

Staff person-centered approaches, particularly verbal approaches, were temporally associated with more subsequent resident positive behaviors and fewer subsequent functional impairments. Although the directions of the effects of staff person-centered verbal and nonverbal approaches on resident behaviors were similar, the effect size was relatively larger for verbal approaches than for nonverbal approaches. Particularly, staff person-centered verbal behaviors had the biggest effect on resident positive verbal behaviors within the specified time windows. This finding confirmed staff encouragement and reinforcement such as using positive verbal prompts as one of the first practical and useful strategies to

engage residents and facilitate independence during mealtimes (50–53). Although person-centered mealtime care should be highly recommended for maintaining resident positive behaviors and reducing functional impairments, management of resistive behaviors may require more individualized attention and systematic assessment on why and how residents resist to guide the use of more targeted care strategies.

Direct care staff who provide mealtime assistance are typically nursing assistants certified by completion of state-approved training programs, which are not specific to mealtime care of people with dementia. Therefore, staff are not prepared to provide optimal mealtime care to residents with dementia due to lack of effective trainings that focus on (a) assessment and management of resident positive, neutral and challenging behaviors, and (b) use of person-centered care vs task-centered care approaches (4,45,54). Staff report mealtime care of residents with dementia as challenging and frustrating due to lack of training with person-centered care, and staff learn new skills and accumulate experiences during routine care practices (4,55).

Although emerging evidence supports the use of person-centered care, a gap exists in creating and empirically evaluating effective, person-centered care interventions (56). Future intervention efforts should focus on promoting person-centered care and responding to challenging behaviors, such as those most frequently observed during mealtimes (eg, prolonged/continuous chewing/sipping, disengaged/distracted from meal). Also, efforts should focus on minimizing task-centered care, promoting positive behaviors, and reinforcing the transition of challenging or neutral behaviors to positive behaviors. Multicomponent mealtime interventions that incorporate staff training to promote interprofessional, foundational person-centered care culture as well as ensure implementation flexibility for staff, residents, and organizations are considered best evidence-based practice to optimize resident behaviors (49,57). It is critical that staff training programs build upon stakeholder engagement, supportive leadership, and collaborative decision-making to improve staff autonomy in optimal mealtime care practice (58). Such practice should prioritize optimal social engagement, empowering residents, and responding to common, challenging behaviors with adequate considerations of individual needs and preferences (16,49,59).

Video-recorded observations as an optimal means of demonstrating dyadic interactions may be a useful pedagogic tool to operationalize person-centered and task-centered care scenarios in training programs to improve staff knowledge, attitude, and skills in optimal mealtime care practice. In addition, this study focused on the relationships between staff approaches and resident mealtime behaviors, and future research is needed to examine the relationships of staff approaches and resident behaviors with resident functional and nutritional outcomes, such as aspiration, food intake, body weight, as well as caregiver- and institutional-level outcomes. These efforts will facilitate the shift of mealtime care practice to optimal as well as the process of empirically embedding effective, feasible programs into direct care workforce training to optimize both individual and institutional outcomes.

Limitations

Resident participants were all White. Although procedures (eg, practice recording sessions where video equipment and photographer are visible in the dining room, but videotaping is off) were implemented to minimize the influence of videotaping on dyadic interactions, staff may have performed differently from their usual care practice. Videos were collected between 2011 and 2014 and may not fully represent current NH practice as influenced by the pandemic and other changes. Videos captured primarily one-on-one interaction in segments of mealtimes. Videos were collected before and after a dementia communication intervention and the potential impact of the intervention on dyadic interactions cannot be controlled for. Videos captured fewer staff task-centered care practices, making conclusions about their relationships with resident behaviors less generalizable. The categorization of resident behaviors as positive, neutral, and challenging stems from the perspectives of staff and may not fully represent the values and preferences of residents with dementia. Future work should explore alternative categorizations of resident behaviors. The categorization of staff person-centered and task-centered care approaches is based on existing conceptual underpinnings and instruments for person-centeredness of care. Future work should continue the validation of the categorization of staff approaches and resident behaviors. Staff approaches and resident behaviors were coded as point events and duration of events was not considered in the study. Limited durations of time windows were examined. Participant characteristics and clustering effects at participant and dyad levels were not adjusted for. Generalizability of findings is limited to NH direct care staff and residents with moderately severe to severe dementia and staff-reported resistiveness to care, rather than care providers and individuals in other care settings (eg, community, assisted living, hospitals) or residents without staff-reported resistiveness to care. Although most videos captured morning care activities, the type of meal (breakfast, lunch, dinner, snack) was not described due to lack of data from the parent study. Therefore, findings may not be generalizable to a specific type of meal.

Conclusion

Person-centered mealtime care is temporarily associated with positive dyadic interactions, may help to manage functional impairments, and may not fully manage resistive behaviors in NH residents with dementia. Person-centered mealtime care is not "one-size-fits-all," and should be individualized, context-based, and resident-oriented. Resistive behaviors may require additional attention beyond commonly used person-centered care approaches. Further investigation of temporal relationships is needed using full meal observations that capture different types of meals in diverse samples in varied care settings.

Supplementary Material

Supplementary data are available at *Innovation in Aging* online.

Funding

This study was supported by National Institute of Aging at National Institute of Health (NIH/NIA, R03AG063170) as well as American Nurses Foundation Nursing Research Grant (PI: W.L.). W.L. was also supported by a Career Development Award from NIH/NIA (K23AG066856, ClinicalTrials.gov Identifier: NCT05255068) for preparation of this manuscript. The sponsors were not involved in study design, data collection and analysis, interpretation of findings, and manuscript preparation.

Conflict of Interest

None.

Acknowledgments

The parent study where mealtime video observations were collected was supported by National Institute of Nursing Research at National Institute of Health (NIH/NINR, NR011455-04, ClinicalTrials.gov Identifier: NCT01324219), Changing Talk to Reduce Resistiveness in Dementia Care (CHAT), PI: Kristine Williams. The sponsors were not involved in study design, data collection and analysis, interpretation of findings, and manuscript preparation. The authors acknowledge Dr. Kristine Williams for providing access to the data collected in the parent study and technical support on Noldus Observer XT coding. The authors acknowledge the research assistants for coding the video data which were analyzed in this study.

Author Contributions

W. L., Y. P., and R. B. contributed to study conceptualization, data analysis plans, interpretation of findings, and writing and revision of the manuscript. W. L. contributed to video screening and coding, and exporting/managing data for analysis. M. H. contributed to data cleaning and analyses. R. B. contributed to technical support of using Generalized Sequential Querier (GSEQ) software for window-based sequential analyses, data preparation/management, and data analyses. All authors meet the criteria for authorship and have approved the final draft submitted. All those entitled to authorship are listed as authors.

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