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Promoting Mealtime Independence and Mealtime Experience for Individuals With Dementia: A Study Protocol

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ABSTRACT

Background: Difficulties in eating can profoundly influence the well-being of those living with dementia. Previous research has shown that Spaced Retrieval and Montessori-based interventions can enhance eating independence during meals and optimise nutritional health in people living with dementia in nursing homes. However, few studies examine the effects of these interventions on those living with dementia who follow western-style eating etiquette.

Aim: This pilot study aims to evaluate the effectiveness of the SPREMON (Spaced Retrieval and Montessori-based activities) mealtime intervention on mealtime independence, mealtime engagement and affect (mood), and nutritional status among people living with dementia in a nursing home.

Method: This quasi-experimental study will involve people with dementia living in nursing homes. The intervention consists of Spaced Retrieval and Montessori-based activities designed to enhance eating procedural memory and eating motor skills over 7 weeks. Data will be collected pre-intervention and post-intervention and at 3-month follow-up. Depending on the distribution of the data, an ANOVA or Friedman test will be used to examine the differences in the means for mealtime independence, engagement and affect, and nutritional status over time.

Discussion: There is limited evidence of the impact of Spaced Retrieval and Montessori-based activities in people living with dementia using western dining etiquette. This study bridges this knowledge gap and provides new knowledge about the effectiveness of such interventions to enhance mealtime independence and engagement and affect for people with dementia living in nursing homes.

Trial Registration: ANZCTR identifier: ACTRN12623001031651p

1 | Introduction

Dementia adversely impacts memory, thinking, and reasoning abilities, leading to challenges in daily activities, self-care, and maintaining independence (Australian Institute of Health and Welfare 2024). In 2022, dementia impacted 401,300 Australians and was the country's second leading cause of death (Australian Bureau of Statistics 2021; Australian Institute of Health and Welfare 2023). As dementia progresses, individuals experience declining abilities in eating and drinking. Declining physical

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capabilities, mental illness, comorbidities, and environmental factors (e.g., lighting), also impact the eating independence of those with dementia (Chang et al. 2017; Liu et al. 2016; Plotkin and Taani 2020).

The prevalence of eating difficulties among individuals with dementia living in nursing homes ranges from 32.2% to 60.2% (Chang 2012; Liu et al. 2016). Examples of eating difficulties include challenges with initiating eating, sustaining attention during meals, transferring food into the mouth, chewing, and swallowing (Jung et al. 2021). These eating difficulties have a negative impact on the physical, mental, and psychological well-being of individuals with dementia, ultimately decreasing their quality of life and life expectancy (Chang et al. 2023; Hanson et al. 2013).

1.1 | Background

Residential aged care is crucial for older Australians with high care needs (Australian Institute of Health and Welfare 2023). Some 54% of people living in nursing homes have dementia and rely on care staff for support to undertake activities of daily living (Australian Institute of Health and Welfare 2024). This highlights the need for well-trained staff and a dementia-friendly care environment that ensures individuals receive appropriate care to support their complex needs (Australian Institute of Health and Welfare 2024).

Under the Australian Aged Care Act (1997), it is imperative to support the independent living of individuals with dementia in nursing homes and to foster their social, mental, and physical well-being (Royal Commission into Aged Care Quality and Safety 2021). The Act advocates for high-quality, safe, and timely care services, focusing on preserving basic human rights and enabling a life that is active, self-determined, and meaningful (Royal Commission into Aged Care Quality and Safety 2021).

The National Aged Care Mandatory Quality Indicator Programme, introduced in 2019 in residential aged care, measures indicators like pressure injuries, unplanned weight loss, daily living activities, consumer experience, and quality of life (Aged Care Quality and Safety Commission 2022). All these indicators are impacted by food consumption and nutritional status. For instance, poor nutrition is directly linked to pressure injuries (Giebel et al. 2015; Saghaleini et al. 2018). Addressing eating difficulties and enhancing eating independence among nursing home residents with dementia is crucial and aligns with national aged care standards.

Previous research has investigated various strategies to enhance the independence of individuals with dementia during mealtimes in nursing homes (Abdelhamid et al. 2016; Herke et al. 2018; Liu et al. 2015; Fetherstonhaugh et al. 2019). Notably, the combined use of Spaced Retrieval and Montessori-based activities has attracted significant interest and demonstrated positive outcomes (Bunn et al. 2016; Liu et al. 2015; Sheppard et al. 2016; Yan et al. 2023). Research undertaken in Taiwan demonstrated positive outcomes in feeding difficulties, nutritional status, and depression among participants with dementia who underwent 24 sessions of Spaced Retrieval and Montessori-based activities (Wu

and Lin 2013; Wu et al. 2014). However, these studies primarily focused on spoon-feeding, leaving a gap in research on feeding in the context of western-style eating etiquette, such as knife and fork handling. The work of Cartwright et al. (2022) in Australia provides evidence for the ability to translate findings to a western setting. In their study, Cartwright et al. (2022) showed significant improvements in mealtime experience and staff assistance behaviours following an intervention aligned with Montessori principles. While this outcome is promising, the intervention was more aligned with Montessori principles than being specific Montessori-based activities (Cartwright et al. 2022).

Therefore, this study will evaluate the effectiveness of the SPREMON (Spaced Retrieval and Montessori-based activities) mealtime intervention on mealtime independence, mealtime engagement and affect (mood), and nutritional status among individuals diagnosed with dementia living in a nursing home who use western-style eating etiquette.

1.2 | Aims

This pilot study aims to investigate the effectiveness of the SPREMON mealtime intervention on mealtime independence, mealtime engagement and affect, and nutritional status of individuals with dementia living in nursing homes using western-style eating etiquette.

2 | Methods

2.1 | Design

This pilot study is the initial phase in evaluating the feasibility and effectiveness of the SPREMON mealtime intervention. The study will employ a quasi-experimental design with a single group and repeated measures to assess changes in eating difficulties, engagement and affect, and nutritional status among individuals with dementia. The study protocol follows the SPRIT checklist Data S1, (Butcher et al. 2022).

2.2 | Setting

This study will be undertaken at multiple nursing homes within the same aged care organisation located in a regional area of New South Wales, Australia. Currently, 120–140 residents live at each facility, of whom approximately 50% are living with dementia.

2.3 | Eligibility Criteria

The target group is individuals with dementia experiencing procedural memory impairment or eating difficulties in participating nursing homes.

Eligible participants are those who are (a) formally diagnosed with dementia or cognitive impairment as identified in the health record; (b) those who need constant verbal reminding to proceed with eating; (c) assessed by a speech pathologist or registered nurse as having safe swallowing abilities; (d) capable of

oral eating and safe with a knife, fork, and spoon; and (e) able to sit in a chair for approximately 45 min, as confirmed by staff.

People will be excluded if they (a) need full assistance during mealtime; (b) are not culturally or physically aligned with training involving knife, fork, and spoon usage; (c) do not speak or understand the English language; and (d) have significant behavioural issues or long-term mental health conditions other than dementia, such as schizophrenia, personality disorder, or psychotic disorder.

2.4 | Sample Size

The pilot study aims to enrol 25–30 eligible participants, considering prior studies that have demonstrated a 20%–30% attrition rate (Spichiger et al. 2022; Stockwell-Smith et al. 2018).

2.5 | Recruitment

Nursing home managers will assist in the recruitment of participants by accessing e-health records to confirm if potential participants meet the inclusion criteria before contacting individuals and their responsible person. For those people living with dementia not deemed able to provide consent, consent will be obtained from a person responsible. If an individual living

with dementia is deemed competent to provide consent, a staff member will witness their signature of consent.

3 | Intervention

The prototype of the intervention originates from four Taiwanese studies (Lin et al. 2010; Lin et al. 2011; Wu and Lin 2013; Wu et al. 2014). Adaptations to the intervention have been made to suit the Australian nursing home setting and the western-style eating etiquette. The SPREMON mealtime intervention was co-designed by nursing academics from an Australian higher education institution and aged care experts from a non-profit nursing home in New South Wales, Australia. This process has been reported elsewhere (Authors Own).

The SPREMON mealtime intervention consists of two components: (a) Spaced Retrieval activities to enhance the eating procedural memory and (b) Montessori-based activities to strengthen the motor skills of eating. Table 1 describes the differences between these two approaches.

Participants will be invited to participate in 20 sessions over seven weeks. A maximum of three sessions per week will be held, and all sessions will last approximately 45 min. Activity timing will align with the nursing home's regular daily recreational activity schedules, generally in the late morning. Table 2

TABLE 1 | Delineation between Spaced Retrieval and Montessori-based activities.

Aspect	Spaced Retrieval (Benigas et al. 2016; Creighton et al. 2013; Oren et al. 2014)	Montessori-based activities (Camp 2010; Mbakile-Mahlanza et al. 2020; Yan et al. 2023)
Methodology	Memory training technique	Educational philosophy and approach
Goal	Improving memory and recall abilities	Encouraging independence and learning through self-direct activities
Cognitive focus	Memory and recall skills	A wide range of cognitive and sensory skills, including fine motor skills, problem solving and sensory exploration
Structure	Involves repeated practice and recall of specific information or facts at increasing intervals	Provides a prepared environment with a variety of hands-on materials for individuals to explore and learn at their own pace
Target population	Individuals with memory or cognitive impairment, such as dementia	Applicable to a broader population, including children and adults, with a focus on individualised learning
Learning environment	Usually conducted in a controlled setting, such as a clinical or rehabilitation setting	Emphasises creating a learning environment that mimics real-life situations and encourages active engagement
Implementation approach	Involves structured sessions led by trained professionals or caregivers	Encourages individuals to choose activities based on their interests and abilities, promoting self-initiated learning
Specific techniques	Involves retrieval practice, cues, and systematic review to reinforce memory	Utilises hands-on materials, self-correction, and exploration to promote learning
Key benefits	Enhances memory and information retention	Promotes independence, problem-solving skills, and a sense of purpose and achievement

presents a detailed overview of the sessions. The PhD candidate (ZMY) will deliver the intervention in collaboration with nursing home staff members who will receive training on the intervention. The intervention will be delivered in small groups of a maximum of five individuals per group.

3.1 | Spaced Retrieval

Spaced Retrieval is a memory training technique that assists individuals with dementia in progressively recalling the steps of self-eating, specifically using utensils like a knife, fork, and spoon. Each session focuses on recalling a particular step of eating. Over 20 sessions, participants work through the 10 key eating steps. These steps are reinforced by prompting questions at various intervals during the session: immediately after the introduction and then at 4, 8, 16, and 32 min.

A physical demonstration, such as cutting food into bite-sized pieces, is acceptable for participants who cannot respond verbally. When incorrect responses occur, correct answers are provided to reinforce the correct memory of the eating step. Each session starts by reviewing previous steps before introducing

a new one, helping participants consolidate their learning and contextualise their progress.

3.2 | Montessori-Based Activities

Montessori-based activities in this intervention involve five categories of eating skill training: cutting, scooping, squeezing, pouring, and engaging in small cooking tasks. Montessori-based activities for dementia care are grounded in key principles that focus on maintaining independence, dignity, and engagement (Camp et al. 2017). These principles include person-centered care, where activities are tailored to individual abilities and interests; sensory stimulation, which involves using hands-on, meaningful tasks to engage the senses; and repetition and routine, which help reinforce memory and provide a sense of familiarity (Booth et al. 2020).

3.3 | Risk Management

Previous studies involving Spaced Retrieval and Montessori-based activities did not report any unwanted effects (Lin et al. 2010; Lin et al. 2011; Wu and Lin 2013; Wu et al. 2014).

TABLE 2 | SPREMON mealtime intervention.

Activity details			
Session number	Skill set target	Spaced Retrieval activities (eating procedures): to enhance eating procedural memory	Montessori-based activities: to strength motor skills
1	Eating with knife and fork	1. Realising it is mealtime (2 sessions)	Pouring activity (4 session)
2			
3		2. Picking up the knife and fork (2 sessions)	
4			
5		3. Cutting the food into small bite size (2 sessions)	Cutting activity (4 sessions)
6			
7		4. Picking up the food (with a knife and fork) and putting the food into mouth (2 sessions)	
8			
9		5. Chewing and swallowing food (2 sessions)	Squeezing activity (4 sessions)
10			
11		6. Eating the whole plate of food continuously (2 sessions)	
12			
13	Eating with spoon	7. Picking up the bowl and the spoon (2 sessions)	Scooping activity (4 sessions)
14			
15		8. Scooping a mouthful of food and putting food into mouth (2 sessions)	
16			
17		9. Chewing and swallowing food (2 sessions)	Sensory activities (4 sessions)
18			
19		10. Eating the whole bowl of food continuously (2 sessions)	
20			

Note: Each session will be designated 45 min; participants will undertake three sessions per week over 7 weeks.

However, after consultation with the nursing home managers, it was determined that there was some risk of causing irritation or distress from the repetition of questions and tasks. A protocol was developed in consultation with nursing home staff to manage participants who may become distressed (Table 3). Only care staff deemed appropriate by the nursing home managers will be allocated to supervise the intervention. Swallowing safety issues will also be continuously monitored by staff and researchers throughout the intervention sessions.

4 | Outcomes

The primary outcome of this study is mealtime eating difficulties as measured by the Edinburgh Feeding Evaluation in Dementia Questionnaire (EDFED-Q) (Watson 1994). The secondary outcomes are engagement and affect, as measured by the Engagement of a Person with Dementia Scale (Jones et al. 2018), nutritional status, measured by the Mini Nutritional Assessment Short Form (MNA-SF), body weight and responses to the intervention measured on self-developed data recording forms for both Spaced Retrieval and Montessori-based activities.

4.1 | Measurement Tools

The EDFED-Q comprises 10 items that address the eating difficulties of individuals with dementia and nursing interventions. Each item is rated on a 3-point Likert scale of 'never' (scored 0), 'sometimes' (scored 1), and 'often' (scored 2). The total score ranges from 0 to 20, with higher scores indicating more severe feeding difficulties (Watson 1994). The scale demonstrates high reliability, with an internal consistency Cronbach's value of 0.87 and an inter-rater reliability of 0.95 (Stockdell and Amella 2008).

The Engagement of a Person with Dementia Scale consists of 10 items that encompass 5 aspects of engagement: affective (mood), visual, verbal, behavioural, and social engagement (Jones et al. 2018). Each item is rated on a 5-point scale, where 1 indicates strong disagreement, and 5 represents strong agreement. The total score ranges from 10 to 50, with 50 scores indicating higher engagement. The scale also demonstrates high reliability, with a Cronbach's value of 0.94 (Jones et al. 2018).

The MNA-SF is a validated measure of the nutritional status of older adults (Isenring et al. 2012). It consists of six items evaluating factors such as appetite loss, weight loss, mobility, psychological stress, and body mass index (BMI) (Guigoz 2006). The maximum total score is 14. A score of 12–14 indicates normal nutritional status, 8–11 suggests a risk of malnutrition, and 0–7 signifies malnutrition. The MNA-SF demonstrates strong reliability and validity, making it a widely used tool for early detection and intervention in malnutrition among older people (Kaiser et al. 2009). Additionally, food and drink consumption will also be measured by visual estimation of the percentage of food and drink consumed (Williams and Walton 2011). This complements MNA-SF data by providing additional insights into the individuals' eating patterns.

The Spaced Retrieval Data Recording Form was modified by the research team from the work of Benigas et al. (2016). The form includes participant information, prompting questions, expected answer, time intervals, cues used, and responses (Benigas et al. 2016). The research team added an extra column to record participants' original answers without cues to determine whether participants can recall the information automatically, potentially yielding a better training outcome than those who require more cues.

The research team developed the Montessori-Based Activities Data Recording Form to document participants' involvement in the Montessori-based activities. A tick '✓' indicates that a participant completed a full Montessori-based activity session. A cross '✗' represents no participation, and a 'P' means the participant partially completed the activity. The duration of participation in each session will also be recorded.

4.2 | Data Collection

A team of data collectors will collect study data. Data collectors will attend one-day training prior to the study commencement. This training will include orientation to the SPREMON intervention and relevant activities as well as familiarisation with the measurement tools. Data collectors will be provided with the SPREMON mealtime intervention handbook and a series of three videos developed to demonstrate the correct technique for implementing the intervention and for promoting interrater reliability.

Demographic data, including age, gender, and education, will be collected following recruitment. Outcomes will be measured at three time points: pre-intervention, immediately after the completion of the intervention sessions, and 3 months after intervention completion. Researchers at each training session will document participants' responses to Spaced Retrieval and their engagement in Montessori-based activities.

4.3 | Data Management

Data management will adhere to Human Research Ethics Committee requirements. The collected data will be de-identified, and individuals' identities will not be disclosed in any form within the database or publications. Participants will be allocated a unique code for follow-up purposes. Only the chief investigator holds the list of these codes and participants' personal details. Data will be stored securely on a password-protected computer and backed up to university-approved storage for 5 years. Only the research team will have access to the raw data.

4.4 | Data Analysis

Data will be collected on hard copy data forms and entered into the Statistical Package for the Social Sciences (SPSS; IBM Corp. Released 2019). Descriptive statistics will summarise the distribution of all variables. Variables such as total score of eating difficulties, engagement and affect and nutritional status will be summarised with means, standard deviations (SD), and ranges. Categorical variables will be listed as frequencies

TABLE 3 | Protocol to manage participant involvement.

Strategies	Detail explanation
1. Pre-activity assessment:	a. Conduct a comprehensive assessment of participants' abilities, interests, and any known triggers for distress b. Assess physical and cognitive capabilities to determine suitable activities c. Obtain information from caregivers or family members regarding the participant's behaviour patterns and potential distress indicators
2. Activity planning:	a. Choose activities that align with participants' interests, preferences, and cognitive abilities b. Incorporate sensory stimulation, reminiscence, and familiar themes to engage participants effectively c. Ensure activities are appropriately paced and adapted to meet individual needs
3. Establish a comfortable environment:	a. Create a safe and supportive environment that minimises potential distress triggers, such as excessive noise, bright lights, or clutter b. Provide a quiet area or safe space where participants can retreat if they feel overwhelmed
4. Monitoring for distress:	a. Behavioural cues: Observe changes in behaviour, such as increased agitation, restlessness, agitation, pacing, increased vocalisation, aggression, or withdrawal. These behaviours may indicate the person's distress b. Nonverbal cues: Pay attention to nonverbal communication, like facial expressions, body language, fidgeting, grimacing, clenched fists, or tense muscles. These cues can provide insight into the person's level of distress c. Verbal expressions: Listen for verbal cues, even if they may be repetitive or fragmented. Recognise any expressions of frustration, fear, confusion, or distress communicated by the person with dementia d. Physiological signs: Observe physical changes, such as rapid breathing, increased heart rate, flushed skin, sweating, or changes in appetite. These signs may indicate distress e. Changes in engagement: Notice if the person becomes disinterested, avoids or refuses to participate in activities, or demonstrates a decreased attention span. These changes may suggest distress during activities f. Caregiver intuition: Caregivers who spend significant time with the individual may have a sense of their typical behaviours and mood. If a deviation from the person's usual patterns is noticed and it is accompanied by signs of distress, it may further indicate the presence of distress during activities
5. Emergency response:	a. If a participant shows clear signs of distress or agitation: i. Remain calm and approach the individual with a soothing demeanour ii. Use gentle, supportive language and provide reassurance iii. Validate their feelings and express empathy iv. Offer simple choices or alternative activities to redirect their focus b. If the distress escalates and poses a safety risk: i. Implement appropriate crisis management strategies (as trained) ii. Involve additional staff members for assistance, if necessary iii. Prioritise safety by removing any potential hazards iv. Assess the need for medical intervention or consultation with healthcare professionals c. Document observations of distress incidents, describing the context, behaviour exhibited, and any interventions used for reference and future planning
6. Post-activity reflection and modification:	a. Evaluate the success of activities based on participants' responses and levels of distress b. Discuss and learn from each experience to modify future activities and enhance the overall care and well-being of participants c. Make necessary adjustments to the environment, activity choices, or engagement techniques to better support participants and minimise distress

and percentages and analysed through bivariate analysis. The data analysis method will be determined based on a test for normal distribution and other assumptions. Since our sample is less than 50 people, the Shapiro–Wilk test, as suggested by Mishra et al. (2019), will be employed to assess normality. If the assumptions are met, a repeated measures ANOVA will be conducted; otherwise, the Friedman test will be utilised (Kim 2014). Regression analysis will be employed to explore the relationship between outcomes and participation in the intervention. A p-value of ≤ 0.05 will be considered statistically significant.

4.5 | Ethical Considerations

Ethical approval for this study will be obtained from the Human Research Ethics Committee of the University at which the PhD candidate is enrolled. Initial consent will be obtained from people living with dementia where possible, and also from a person responsible. Ongoing consent will be obtained at the commencement of every training session.

5 | Discussion

This study aims to evaluate the implementation of the SPREMON mealtime intervention in nursing homes. It specifically seeks to enhance mealtime independence (by reducing eating difficulties) and improve the mealtime experience (by improving the mealtime engagement and affect) of individuals with dementia. This research aligns with the mandatory aged care standards established in Australia to enhance the quality of care and dining experience for residents. Findings of this study will provide valuable evidence for healthcare professionals and researchers who are seeking effective interventions to alleviate eating difficulties, promote mealtime engagement and emotional well-being and enhance nutritional status in people with dementia living in nursing homes. As a pilot study, it will inform future research to develop an evidence base around interventions to support feeding for people with dementia.

To enhance the implementation of the intervention, several modifications were made to the work of other studies. These adjustments specifically focus on the training content, the number of training sessions, and the timing of participant response assessments for Spaced Retrieval. In relation to training content, this intervention incorporates training in the use of a knife and fork to align with western-style eating etiquette, unlike the previous Taiwanese studies that omitted these utensils (Lin et al. 2010; Lin et al. 2011; Wu and Lin 2013; Wu et al. 2014). Furthermore, to enhance social engagement and affect, small group cooking activities will be introduced to provide enhanced sensory experiences. The selection of the small cooking activities based on the preferences of participants and focused on stimulating the senses of smell, sight, touch, and taste will motivate participants to engage in meaningful and enjoyable activities. This innovation of integrating small cooking activities distinguishes this study from previous research, which primarily focused on sensory activities such as matching games (Wu and Lin 2013; Wu et al. 2014).

In previous studies, between two and four Spaced Retrieval training sessions were held per eating procedure. The number of sessions was based on at least 50% of participants correctly recalling information during the 32-min interval test (Wu and Lin 2013; Wu et al. 2014). However, Benigas et al. (2016) note that there are no formal recommendations for determining when to conclude Spaced Retrieval training, as the number of sessions required varies among individuals. They describe how some people may successfully recall information after just one session, while others may need up to 30 sessions. As this is a pilot study, a minimum of two training sessions per eating procedure will be implemented, but the number of sessions will be reviewed as part of the evaluation.

The final modifications were made to the time intervals of participant response assessments for Spaced Retrieval to ensure the comfort and engagement of the participants. Previous studies report using different intervals, including an immediate, 1-min, 2-min, 4-min, 8-min, 16-min, and 32-min (Lin et al. 2010; Lin et al. 2011; Wu and Lin 2013; Wu et al. 2014). The shorter intervals used in previous studies could present challenges for individuals with dementia in processing the information and promptly responding to the prompts. In contrast, Benigas et al. (2016) describe how longer time intervals maximise the effectiveness of training. In this study, we sought to use sufficient time intervals to allow participants to absorb and process information and confidently provide their answers. To this end, the intervention will use an immediate test and follow-up tests at 4-min, 8-min, 16-min, and 32-min. This seeks to reduce any potential haste in responding or frustration that may arise from shorter intervals.

6 | Conclusions

The high prevalence of eating difficulties among people with dementia living in nursing homes is widely acknowledged. However, there is a notable absence of specific interventions tailored to Western-style eating etiquette that have been developed and tested. The SPREMON intervention seeks to bring together a unique combination of Spaced Retrieval and Montessori-based activities in a single intervention. This intervention aims to enhance mealtime independence and mealtime experience for individuals with dementia. The findings of this study will provide evidence to inform the management of feeding difficulties and promote meaningful engagement among people with dementia living in nursing homes. Furthermore, the study will provide valuable new knowledge for healthcare professionals and researchers in terms of the effectiveness of the intervention and its implementation that can inform further trials.

Ethics Statement

The protocol study obtained ethics approval from the University of Wollongong Human Research Ethics Committee, Approval number: 2023/268.

Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

The authors have nothing to report.

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Supporting Information

Additional supporting information can be found online in the Supporting Information section.