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The effects of a control-enhancing intervention for nursing home residents: Cognition and locus of control as moderators

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ABSTRACT

Objective: This study aimed to clarify which older adults benefit most from a control-enhancing intervention; in particular, whether cognitive functioning or locus of control might moderate the benefit derived.

Methods: Nursing home residents were randomly assigned to two conditions: (1) a control-enhanced condition that provided the option of caring for a plant ($n = 10$), and (2) a comparison condition that monitored any change under the standard of care ($n = 10$). Comparison group participants were subsequently offered the intervention, which led to a total of 17 intervention participants.

Results: Cognitive function and locus of control were found to significantly moderate the effects of the control-enhancing intervention on residents' perceived health competency, but not depression or life satisfaction.

Significance of results: Interventions for nursing home residents could be tailored to fit specific needs. Screening for cognitive function and locus of control may help predict who is likely to benefit from control-enhancing interventions.

KEYWORDS: Dementia, Choice, Institutionalized

INTRODUCTION

As the older adult population increases in size, so does the need for a sufficient number of nursing homes and assisted-living facilities. Yet, an older adult's transition from his or her home to a nursing home or assisted living facility is often coupled with a significant loss of independence and autonomy (Baltes & Horgas, 1997), even eliciting resident dependency and learned helplessness (Timko & Rodin, 1985; Von Bergen et al., 1999). When an individual is presented with a situation or event over which he or she has no control, or perceives that he

or she has no control, the person may learn to feel helpless, hopeless, and depressed (Seligman, 1975). Within nursing homes, opportunities for personal control are necessarily limited. Much of the mental and physical deterioration in the institutionalized elderly is undoubtedly due to various biological factors of aging, but the expression of this physiological and psychological decline may also be influenced by limited opportunities for control that further their feelings of helplessness (Rodin, 1986; Skinner, 1996; Schultz & Heckhausen, 1999). Thus, a variety of efforts have been made by nursing homes and other institutions to counter the effects of diminished control, in some cases by attempting to enhance a resident's control over a variety of choices and decisions (e.g., Schulz, 1976; Rodin & Langer, 1977; Banziger & Roush, 1983).

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Baltes and Horgas (1977) concluded that dependent behavior is not always the consequence of incompetence due to physical or mental impairment; rather, environmental factors are at least co-responsible in its development and maintenance. Studies in various types of institutional environments, such as prisons and hospitals, have shown that perceived control in such environments is a good predictor of stress, life satisfaction, and quality of life (Duncan-Meyers & Huebner, 2000; Shatz, 2000). Even in well-meaning nursing homes, residents that are given few opportunities for control experience a lowering of morale and increased stress (Miller & Monge, 1986). Their role as adult "choice-makers" is essentially reduced in an environment in which they have little, if any, authority or control.

In personal interviews and surveys, residents have requested interventions aimed at increasing the quality of social life and interactions, and increasing opportunities that promote or facilitate the residents' sense of control over their environment (Kane et al., 1997; Mosher-Ashley et al., 2001). Given the documented mental and physical health benefits of enhancing control and choice options (Langer & Rodin, 1976; Rodin & Langer, 1977; Banziger & Roush, 1983; Haemmerlie & Montgomery, 1987; Silvinske, 1987; Teitelman & Priddy, 1988; Rosen et al., 1997), providing opportunities for control in the nursing home setting could be an important and constructive way in which to improve resident satisfaction and well-being.

Several studies over the past few decades have examined the physical and psychological effects of control-enhancing interventions with older adults. Langer and Rodin (1976; Rodin & Langer, 1977) performed pioneering studies with the institutionalized elderly that clearly demonstrated the powerful positive effects of control-enhancing interventions. In their study, a randomly assigned group of nursing home residents (responsibility-induced group) received a communication stressing their own personal responsibility for conditions in the nursing home, such as the care of a plant and choice of a movie hour (Langer & Rodin, 1976). A separate randomly assigned comparison group received a communication emphasizing the staff's responsibility for the care of the residents and their daily activities as opposed to the residents' own influence and actions. The residents in the responsibility-induced condition showed both short- and long-term mental and physical health benefits of the intervention, whereas the comparison group actually exhibited negative health consequences and increased mortality rates (Langer & Rodin, 1976; Rodin & Langer, 1977). It appeared that the debilitating condition of many of the residents was, in

part, due to the virtually decision-free environment in which they lived, and therefore providing opportunities for decision making had beneficial health and psychological consequences (Langer & Rodin, 1976; Rodin & Langer, 1977).

Although some of the results observed by Langer and Rodin (1976; Rodin & Langer, 1977) have been later revised and challenged (Rodin & Langer, 1978; Munson, 1989), their results have, in part, been replicated and extended in other research using similar control-enhancing interventions in nursing home settings (e.g., Banziger & Roush, 1983; Rosen et al., 1997). When an individual who is in a state of declining health, and furthermore is in an environment with limited choice opportunities, is presented with a control-enhancing intervention, the effects on their mental and physical well-being can be striking (Arbuckle et al., 1999).

In contrast are the results of a study (Schulz, 1976; Schulz & Hanusa, 1978) that attempted to replicate and extend both the short-term and long-term effects of the Langer and Rodin (1976) and Rodin and Langer (1977) studies. Schultz utilized the scheduling of friendly college student visits as the control-enhancing intervention, with a specific aim of examining the influence of predictability. Interestingly, this study produced similar short-term effects, but no significant positive long-term effects were found for the control intervention. Some participants receiving unpredictable visits actually exhibited negative physical and mental health consequences.

The variability in findings across studies and among individuals suggests the possibility that a variety of factors could impact the effectiveness of control-enhancing interventions. In a major review of the literature on control and aging, Fry (1989) notes that there is a substantial gap in the research regarding *which* groups of older adults receive the greatest benefit from interventions. For example, attempting to enhance the amount of control one has for an individual who does not believe control to be an important or relevant feature in his/her life due to several factors may not only be ineffective, but in fact may be counterproductive (Reich & Zautra, 1990). It is important to recognize and identify such potentially moderating psychological variables so that control-enhancing interventions work as effectively as possible without producing detrimental consequences for some residents. Additionally, institutions with limited resources could utilize information about moderator variables for screening and selecting those residents that are most likely to benefit from a control-enhancing intervention.

We hypothesized that a participant's level of cognitive functioning or locus of control could affect

the benefit derived from a control-enhancing intervention. In particular, we were interested in the possible effect of working memory on one's ability to derive benefit from an intervention, perhaps by interfering with the registration or recall of the basic purpose of the intervention. It is conceivable that lower levels of cognition functioning could impact one's ability to benefit from an intervention. One study investigating the possibility of such a moderating effect found that residents who functioned at higher cognitive levels at the beginning of a sensory orientation group benefited most by the end of the group intervention (Thomas & Coleman, 1997–1998).

Similarly, we hypothesized that a resident's dispositional locus of control could moderate the effects of a control-enhancing intervention. Locus of control refers to the degree to which an individual has the belief that she/he has control over life events and his/her environment (internal) as opposed to the belief that what occurs is due to fate, chance, or powerful others (external; Rotter, 1966). One study investigating the possible moderating effect of locus of control found that control enhancement was most effective for those with greater internal locus of control beliefs (Reich & Zautra, 1990).

One's level of depression, life satisfaction, and perceived health competence were the outcomes that we anticipated could be affected by the control-enhancing intervention. Cognitive functioning and locus of control were expected to act as moderators, such that the control-enhancing intervention would result in differential effects. Residents with higher levels of cognitive functioning were expected to derive greater benefit (consistent with Thomas & Coleman, 1997–1998). Similarly, those with an internal locus of control were expected to derive greater benefits from the control-enhancing intervention (consistent with Reich & Zautra, 1990).

METHODS

Participants

The study was conducted in a 72-bed nursing home in the northeastern United States. The nursing home occupied two floors within a general hospital. Residents were assigned to one of the two floors based on availability. Eligible study participants were identified by the nursing home social worker. Criteria for selection of the residents included residents who were physically able to participate (not bed bound) and who were mentally able to participate in data-gathering interviews (not severely de-

mented or aphasic). Informed consent was obtained from 21 interested residents.

The control-enhanced group received a communication emphasizing the residents' responsibility and the opportunity to care for a plant, similar to the procedure used by Langer and Rodin (1976; Rodin & Langer, 1977). The comparison group received the standard of care during the initial phase of the study, but did eventually have the opportunity to receive the communication and plant choice.

Initially, an entire floor was assigned to one condition in an attempt to limit contamination across conditions; therefore residents on one floor were assigned to either the control-enhancing intervention or a wait-listed comparison condition. Thus, 14 residents from one floor were randomly assigned to the control-enhanced group and 7 residents from the other floor were assigned as the comparison group. Unexpectedly, there were several complications on the day the control-enhancing intervention was implemented. Eight of the residents on the intervention floor were not able to attend the group meeting to receive the communication and intervention (due to acute illnesses and limited staff availability). Therefore, 4 of these residents were randomly selected to receive the communication and plant choice on an individual basis. Since the remaining 4 participants were unable to attend the group meeting and the threat of contamination was thus reduced, they were included as part of the comparison group in an effort to even out the sample sizes ($n = 10$ in the intervention group and $n = 10$ in the comparison group). In Phase II of the study, 7 of the wait-listed group participants were also able to receive the control-enhancing intervention after concluding the first phase of the study (3 had either been discharged or were too ill). Thus, data was obtained on a total of 17 residents who participated in the control-enhancing intervention and 10 residents who participated in the comparison group in Phase I.

The average age of the participants was 81 years ($SD = 9.29$), the average education was 11.7 years ($SD = 2.43$), and 70% of participants were female. One participant was African-American; the rest were Caucasian.

Procedure

To introduce the intervention to the control-enhanced group, the nursing home administrator called a meeting in a common dining room and delivered the following communication:

We brought you together today to give you some information about the nursing home here. It is

possible that many of you don't realize the influence **you** can have over your own lives here. Take a minute to think of the decisions **you** could be making (pause . . .).

If you are unsatisfied with anything here, you have the influence to change it. It is **your** responsibility to make your concerns known and to tell us what you would like to change.

I would like to take this opportunity to give each of you a present from our staff. A box of small plants will be passed around to each of you and I would like **you** to make two decisions:

1) first, whether or not you want a plant at all, and

2) second, if you want one—**you choose** which plant you want.

The plants are yours to keep and take care of, as you'd like.

If you have any questions, please feel free to ask at any time. Thank you.

The staff then facilitated the passing of a box of small (4-inch) green, leafy, nonflowering plants so that each resident could decide whether to take a plant or not, and if so, which one. The residents then personalized the plants by putting their names on sticks that were to be placed in the pot of their plants. The participants who were unable to join the group in the dining room for the communication due to extenuating circumstances received the communication and the choice of a plant by a staff member on an individual basis in his/her own room. The comparison group did not receive any sort of communication during the wait-listed period. Pre- and post-assessments were conducted in a private room at the nursing home and lasted approximately 1 h. Assessments were first administered within a few weeks prior to the intervention to serve as a baseline. Outcome measures were readministered approximately 2 weeks following the control-enhanced intervention or start of the wait-listed period.

Measures

Cognistat (Kiernan et al., 2001)

Also referred to as the Neurobehavioral Cognitive Status Examination (NCSE), this instrument was developed to screen cognitive status and dysfunction in older medical inpatients. The Cognistat consists of subtests measuring orientation, attention, comprehension, repetition, naming, visual constructive skills, memory, calculation, abstract reasoning, and judgment. The whole test was administered to

maintain standardization; however, the Calculation subtest (as an indicator of working memory) was the one used to test our hypotheses about cognitive function. The subtest uses a screening-metric format, whereby passing the screening question allows the individual to bypass the usually less demanding metric questions in the section. Higher values are associated with better levels of cognitive functioning.

Rotter Internal/External Locus of Control Scale (Rotter, 1966)

This scale assesses an individual's generalized expectancies for internal versus external control of reinforcement. The present study used an abbreviated version of the Rotter scale derived from the example of other abbreviated versions of the Rotter scale used in prior studies with the aged (Brown & Granick, 1983). Filler items and those items relating to politics, school, leadership, and friendships were eliminated from the originally 29-item scale, resulting in an 11-item measure, each consisting of two statements, to which the individual chose the answer with which he or she more strongly agreed (e.g., "Many of the unhappy things in people's lives are partly due to bad luck/ People's misfortunes result from the mistakes they make."). Scores were measured by how many external choices were selected. Scores can range from 0 to 11, with a higher number indicating a more external locus of control orientation.

Geriatric Depression Scale (Yesavage et al., 1983)

This scale was developed specifically for measuring depression in those elderly for whom traditional depression measures may not be appropriate (Yesavage et al., 1983). The "short form" scale consists of 15 yes/no items (e.g., "Do you feel that your life is empty?") which yielded scores between 0 and 15, with a higher number indicating more depressive symptoms.

Satisfaction With Life Scale (Diener et al., 1985)

This scale provides a measure of the cognitive component of subjective well-being (Diener et al., 1985). The scale consists of five items (e.g., "In most ways my life is close to my ideal"), each rated on a 7-point Likert scale, 7 representing strongly agree and 1 representing strongly disagree. Total scores range from 5 to 35, with a greater number indicating a greater satisfaction with life.

Perceived Health Competence Scale (Smith et al., 1995)

This domain-specific measure was developed to provide a measure of perceived competence and indicates the degree to which an individual feels capable of effectively managing his or her health outcomes (Smith et al., 1995). Eight items comprise this measure (e.g., "I succeed in the projects I undertake to improve my health"), with a 5-point Likert scale (1 represents strongly disagree and 7 represents strongly agree). Total scores range from 8 to 40, with a higher score indicating a higher perception of health competence.

RESULTS

To test the main hypotheses regarding the role of cognitive function and locus of control as possible moderators of the effects of the intervention, participants were categorized on these two variables by way of median splits. Thus, cognitive function analyses compared participants who scored relatively higher and those that scored relatively lower on working memory. Similarly, locus of control analyses compared participants who were relatively more internalizing as compared with those that were relatively more externalizing in their locus of control.

The study hypotheses were tested via three repeated measures analysis of variance procedures (ANOVAs; conducted using SPSS, v.11.0). For each

moderator (working memory and locus of control), an ANOVA was conducted using the change scores for each of the three dependent variables (life satisfaction, depression, and health competency). Of primary interest were the results for the three-way interactions (change over time \times intervention group \times moderator).

Phase I results (comparison and intervention groups each had sample sizes of 10) were examined for the possible impact of working memory and locus of control on depression, life satisfaction, and perceived health competency. A significant three-way interaction was found for locus of control and health competency ($p = .05$) and a trend toward significance was found for working memory and health competency ($p = .08$). No significant interactions were found for life satisfaction or depression (see Tables 1, 2, and 3).

In an attempt to further test our hypotheses with a larger sample, data collected in Phase II from an additional seven participants was added to the original sample and reanalyzed (thus, the comparison and intervention groups each had sample sizes of 10 and 17, respectively). Results were again examined for the possible impact of working memory and locus of control on depression, life satisfaction, and perceived health competency. Significant three-way interactions were found for working memory and health competency ($p = .026$), locus of control and health competency ($p = .011$), but not for life satisfaction or depression (see Tables 1, 2, and 3).

Table 1. Descriptive data for cognitive functioning (working memory) subgroups

	Relative level of cognitive function	n	Cognitive function (COG)		Satisfaction with life (SLS)		Health competence (PHCS)		Depression (GDS)	
			X	SD	X	SD	X	SD	X	SD
Pretest										
Comparison group	Low	3	2.00	1.73	21.67	12.22	23.33	5.03	3.67	1.15
	High	7	4.00	0.00	20.71	9.36	23.29	6.52	8.00	4.20
Control-enhanced intervention	Low	9	1.22	1.39	22.78	10.16	28.00	4.50	5.56	4.56
	High	8	4.00	0.00	18.25	10.42	23.50	3.46	5.63	3.93
Posttest										
Comparison group	Low	3			28.00	7.21	31.00	1.73	3.67	1.53
	High	7			19.00	10.26	21.86	7.27	7.57	4.31
Control-enhanced intervention	Low	9			22.33	7.75	30.00	7.25	4.67	4.44
	High	8			13.75	8.01	25.00	4.11	5.50	3.66
Change scores										
Comparison group	Low	3			6.33	10.26	7.67	3.51	0.00	1.00
	High	7			-1.71	10.93	-1.43	5.47	-0.43	1.51
Control-enhanced intervention	Low	9			-0.44	6.35	2.00	4.95	-0.89	1.27
	High	8			-4.50	8.38	1.50	1.77	-0.13	0.99

Table 2. Descriptive data for locus of control subgroups

	Relative degree of locus of control	n	Locus of control (LOC)		Satisfaction with life (SLS)		Health competence (PHCS)		Depression (GDS)	
			X	SD	X	SD	X	SD	X	SD
Pretest										
Comparison group	Internal	4	2.75	1.50	24.75	11.67	27.50	4.65	7.00	5.83
	External	6	6.33	1.03	18.50	8.04	20.50	4.97	6.50	3.02
Control-enhanced intervention	Internal	8	3.38	1.19	27.38	5.21	26.13	5.69	4.00	3.55
	External	9	6.33	1.12	14.67	9.99	25.67	3.61	7.00	4.30
Posttest										
Comparison group	Internal	4			27.25	7.04	24.00	6.16	7.00	4.69
	External	6			18.00	10.51	25.00	8.74	6.00	4.00
Control-enhanced intervention	Internal	8			21.88	8.54	28.75	8.56	3.00	3.34
	External	9			15.11	8.19	26.67	3.74	6.89	3.76
Change scores										
Comparison group	Internal	4			2.50	12.07	-3.50	5.26	0.00	1.15
	External	6			-0.50	11.00	4.50	5.32	-0.50	1.52
Control-enhanced intervention	Internal	8			-5.50	8.55	2.63	4.37	-1.00	0.93
	External	9			0.44	5.27	1.00	3.04	-0.11	1.27

Working memory and locus of control accounted for 20% and 25%, respectively, of the unique variance in perceived health competency over and above other variables ($\varepsilon^2 = .20$ and $\varepsilon^2 = .25$, respectively).

The direction of change was examined for the intervention and comparison subgroups for each of the moderating variables on perceived health competency. The wait-listed high cognitive functioning group decreased on perceived health competency, whereas competency increased among higher functioning individuals in the intervention condition (see Fig. 1). Similarly, perceived health competency decreased for the more internalizing wait-listed group as contrasted with an increase seen in the intervention group (see Fig. 2). It appears that the intervention reversed declines in perceived health

competency that would normally be observed for more internalizing individuals or individuals with higher levels of working memory.

DISCUSSION

The effects of a 2-week control-enhancing intervention were evaluated with 20 nursing home residents in a randomized wait-list control study. The results of this study suggest that one's level of cognitive functioning (specifically working memory) and locus of control orientation act as moderators of the effects of a control-enhancing intervention on perceived health competence. Level of cognitive function and locus of control do not appear to moderate any effects of a control-enhancing intervention on

Table 3. ANOVA results for tests of moderator effects

3-way interaction	F	H ₀ df	Err df	p	ε^2
Change × group × working mem					
SLS	0.295	1	23	.592	.013
PHCS	5.648	1	23	.026	.197
GDS	1.294	1	23	.267	.053
Change × group × locus of control					
SLS	1.587	1	23	.220	.065
PHCS	7.549	1	23	.011	.247
GDS	1.976	1	23	.173	.079

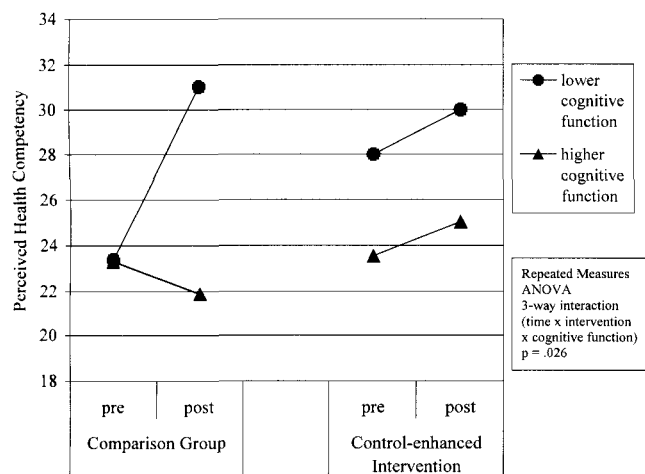


Fig. 1. Cognitive function moderates effect of a control-enhancing intervention on perceived health competency.

geriatric depression or satisfaction with life. These results provide interesting new information about who may benefit most from a control-enhancing intervention.

From pre- to postassessments, wait-listed participants with relatively higher levels of cognitive functioning decreased significantly in their perceived health competence in comparison with participants of lower cognitive function. In contrast, control-enhancing intervention participants, at both levels of cognitive functioning, showed comparable positive change in their ratings of perceived health competence. Similarly, from the pre- to postassessments, the more internally oriented wait-listed participants decreased significantly in their perceived health competence in comparison with more exter-

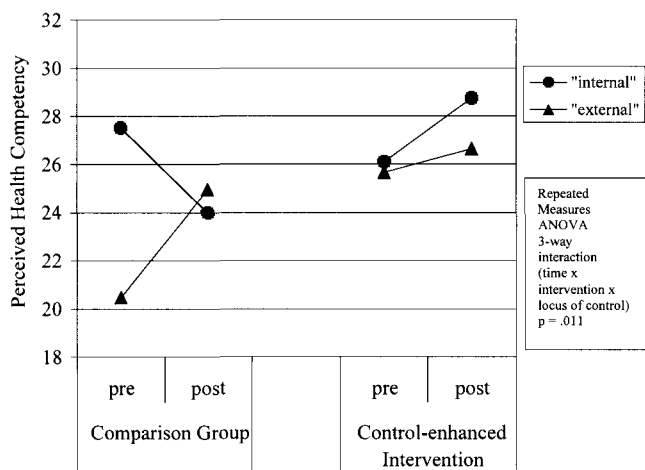


Fig. 2. Locus of control function moderates effect of a control-enhancing intervention on perceived health competency.

nally oriented participants. In the control-enhancing intervention group, both the more internally and the more externally oriented residents showed comparable positive change in their ratings of perceived health competence. It appears that the control-enhancing intervention prevented a downward slide (seen with the standard of care) in perceived health competency among participants with higher levels of cognitive functioning or who were more internally oriented.

Thus, results suggest that a control-enhancing intervention does affect nursing home residents differently based on their level of cognitive functioning and locus of control beliefs. More specifically, the results suggest that while *not* having opportunities for control affects residents in significantly different ways depending on their cognition or locus of control orientation, this difference is remedied by a control-enhancing intervention. The residents who appear to benefit the most are those that have relatively higher levels of cognitive functioning (working memory) or that endorse a relatively stronger internal locus of control.

The positive change in perceived health competence for those individuals with relatively higher levels of cognitive functioning (working memory) seems understandable given that such individuals may be better able to register and recall the purpose of the intervention. Perhaps these individuals are able to grasp more deeply the meaning of the choice given during the introduction of intervention. In contrast, the individuals with relatively lower levels of cognitive functioning seem relatively unaffected by the intervention, suggesting that they may not register or recall the implications of the choice they were given such that the intervention may become simply another part of their daily experience. The greater effectiveness of the intervention for more internally oriented participants might be explained due to control attributions that are projected inward. This orientation may have made the intervention more noticeable to internally oriented residents because it validated their tendency to want to take control.

These findings appear consistent with the limited research that has been done looking at the possible moderating effects of cognition and locus of control on interventions with older adults. Thomas and Coleman (1997–1998) found that participants with higher levels of cognitive functioning derived greater benefit from a sensory orientation group. Reich and Zautra (1990) found that locus of control moderated the effects of a control-enhancing intervention, such that more internal participants derived greater benefit. Although the findings of this study will need confirmation, the results reported

herein appear consistent with the limited prior research in this realm.

Although residents' ratings of perceived health competence were affected by the control-enhancing intervention, it is curious that ratings of depression or satisfaction with life were not. Since residents' physical health is often a direct reason for their nursing home residency (Timko & Rodin, 1985), a small intervention aimed at increasing control opportunities may only influence one of the most relevant perceptions that the residents are faced with daily, their health. The small opportunity for control that was given through the communication and the plant may have affected residents' perception of their own influence on their health, as their health is a tangible, observable characteristic of their daily functioning, whereas psychological variables such as depression or life satisfaction are more global constructs. Perhaps a broader intervention with more opportunities for control would extend the influence and effects of the intervention to other psychological areas such as depression or satisfaction with life.

There are several limitations of the present study. The relatively small sample size may have limited statistical power to detect significant differences in depression or life satisfaction and allowed for the possible untoward effect of individual cases. Although initial results using only the Phase I data indicated that locus of control was a significant moderator and suggested the possibility that cognition was also a moderator, boosting the sample size via the Phase II participants enhanced power sufficiently to confirm the role of cognition as a significant moderator. However, the cross-over design in which wait-listed individuals eventually received the intervention in Phase II allowed for some statistical nonindependence. Thus, these results should be interpreted with caution and confirmed with larger, independent samples.

In addition, this study is not seen as a very rigorous test of a control-enhancing intervention due to the rather simplistic nature of the intervention. Other studies included several additional control-enhancing opportunities within the nursing home (e.g., choice of a movie hour, reinforcement of the control communication; Langer & Rodin, 1976; Rodin & Langer, 1977). The intervention in the present study was fairly small in magnitude relative to previous control-enhancing interventions, and thus the nursing home staff was not significantly involved in the intervention, other than during the delivery of the communication. Therefore, one wonders if reminders to the residents regarding the care of the plant throughout the course of the intervention would have further enhanced the dif-

ferences between the group that received the communication and the comparison group. Without the continuing involvement of the nursing home staff, the presence of only the plant may not have been strong enough to remind the residents of the communication stressing personal responsibility and control. Future research regarding how to maximize the benefits of control-enhancing interventions could investigate whether the amount of control-enhancement offered in the intervention affects the outcomes. Last, a further limitation of this study relates to its generalizability. It is not clear that these results would apply to older adults in other settings or even residents in this nursing home that did not participate in the study.

Future studies should investigate the effects of interventions when residents are categorized as either high or low in cognitive function, or internal or external in locus of control based on normative cutoffs as opposed to median splits. Although beyond the scope of this study, future research could examine the potential differences in physical outcomes of control-enhancing interventions in light of apparent moderating effects of cognitive function and locus of control. This seems especially important in light of past research that has suggested a possible link between control and mortality (e.g., Rodin & Langer, 1977; Krause & Shaw, 2000).

It is generally believed that control-enhancing opportunities are psychologically beneficial to individuals; this study lends support to that contention, while at the same time indicating that there is some variability in benefits derived due to moderation by one's level of cognitive function (i.e., working memory) and one's locus of control orientation. Level of cognitive function and locus of control beliefs were found to moderate the extent to which individuals benefited from the intervention. Participants who had relatively higher levels of cognitive function benefited more from the control-enhancing intervention; and similarly, those who were relatively more internally oriented in their locus of control benefited more from the intervention. If future research confirms the role of these moderators, perhaps institutions attempting to provide quality care to their residents with limited resources can tailor interventions to those individuals who might have the most to gain.

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