The Gerontologist
cite as: *Gerontologist*, 2022, Vol. XX, No. XX, 1–11
https://doi.org/10.1093/geront/gnac035
Advance Access publication March 10, 2022

Research Article

Motivation to Engage in Aging Research: Are There Typologies and Predictors?

Dawn C. Carr, PhD,[1,2] Shubo Tian, BS,[3] Zhe He, PhD,[4,5] Shayok Chakraborty, PhD,[4,6] Michael Dieciuc, PhD,[7] Nicholas Gray, PhD,[4,7] Maedeh Agharazidermani, MA,[5] Mia Liza A. Lustria, PhD,[5,8] Andrew Dilanchian, BS,[7] Shenghao Zhang, PhD,[7] Neil Charness, PhD,[4,7] Antonio Terracciano, PhD,[4] and Walter R. Boot, PhD[4,7]

[1]Department of Sociology, Florida State University, Tallahassee, Florida, USA. [2]Pepper Institute on Aging and Public Policy, Florida State University, Tallahassee, Florida, USA. [3]Department of Statistics, Florida State University, Tallahassee, Florida, USA. [4]Institute for Successful Longevity, Florida State University, Tallahassee, Florida, USA. [5]School of Information, Florida State University, Tallahassee, Florida, USA. [6]Department of Computer Science, Florida State University, Tallahassee, Florida, USA. [7]Department of Psychology, Florida State University, Tallahassee, Florida, USA. [8]Department of Behavioral Sciences and Social Medicine, Florida State University, Tallahassee, Florida, USA.

*Address correspondence to: Dawn C. Carr, PhD, Department of Sociology, Florida State University, 207 Pepper Center Building, Tallahassee, FL 32304, USA. E-mail: dccarr@fsu.edu

Received: October 11, 2021; Editorial Decision Date: February 16, 2022

Decision Editor: Suzanne Meeks, PhD, FGSA

Abstract

Background and Objectives: Study recruitment and retention of older adults in research studies is a major challenge. Enhancing understanding of individual differences in motivations to participate, and predictors of motivators, can serve the dual aims of facilitating the recruitment and retention of older adults, benefiting study validity, economy, and power.

Research Design and Methods: Older adults (N = 472) past and potential participants were surveyed about motivations to participate in research, demographic, and individual difference measures (e.g., health status, cognitive difficulties). Latent class and clustering analyses explored motivation typologies, followed by regression models predicting individual motivators and typologies.

Results: Older adults endorsed a diversity of research motivations, some of which could be predicted by individual difference measures (e.g., older participants were more motivated by the desire to learn new technology, participants without a college education were more motivated by financial compensation, and participants with greater self-reported cognitive problems were more likely to participate to gain cognitive benefit). Clustering analysis revealed 4 motivation typologies: brain health advocates, research helpers, fun seekers, and multiple motivation enthusiasts. Cognitive difficulties, age, employment status, and previous participation predicted membership in these categories.

Discussion and Implications: Results provide an understanding of different participant motivations beyond differences between younger and older adults and begin to identify different classes of older adults motivated to participate in research studies. Results can provide guidance for targeted recruitment and retention strategies based on individual differences in stated or predicted motivations.

Keywords: Adherence, Motivation, Recruitment, Research participation

The implementation of strategies for the successful recruitment of older adults into research studies has increased in importance due to recently revised expectations that all National Institutes of Health (NIH)-funded human research must include older adult participants unless there are scientific or ethical reasons for their exclusion (*Revision: NIH Policy and Guidelines on the Inclusion of Individuals Across the Lifespan as Participants in Research Involving Human Subjects, 2017*). NIH has dedicated significant resources to identifying strategies for scholars to recruit older adult volunteers, particularly for intervention studies (*Recruiting Older Adults into Research [ROAR] Toolkit*, n.d.). However, challenges in recruiting older adult research volunteers continue to provide significant barriers to advancing aging research.

Toolkits have been developed for use by scholars seeking to involve older adults in research, with strategic language for recruitment flyers and suggestions for the development of trusting relationships with community partners serving older adults (*Encouraging Older Adults to Participate in Research, 2014*). These strategies acknowledge differences in recruitment approaches needed for older adults relative to younger adults. For instance, older adults are typically more motivated to engage in emotionally meaningful activities, particularly those that facilitate feelings of altruism (e.g., Carstensen & Hershfield, 2021; Carstensen et al., 1999; Sparrow et al., 2021). However, there is little information about variations among older adult research volunteers. While the average older adult is likely to be motivated to participate in research if they feel their participation benefits others, for some older adults, altruistic motivations may be insufficient, or participation may only occur if they believe they will experience immediate and personal payoffs. That is, there could be multiple factors that shape decisions about whether an older adult is interested in participating in a research study that go beyond general differences relative to younger research volunteers.

A better understanding of variations among older adults and individual difference predictors of motivations for participation can help enhance the ability of researchers to develop targeted approaches to facilitate recruitment, retention, and intervention adherence. A major reason for the failure of many clinical trials is an inability to meet recruitment goals, and meeting recruitment goals can incur substantial unexpected trial costs due to unanticipated recruitment challenges (Fogel, 2018). Further, the cost of nonadherence in clinical trials, in terms of threats to validity and statistical power, can be substantial, and adherence-enhancing strategies need to be explored (Robiner, 2005). Understanding motivations to participate can play a key role in shaping such strategies. Better insights into what initially draws older adults to participate might be used to tailor motivational messaging to improve long-term engagement and study adherence.

The purpose of the current study is to evaluate how different motivations and combinations of motivations relate to older adults' willingness to participate in research. Specifically, this study draws on a community-based study of older adults who agreed to be included in a participant registry at a research university located in a midsize city. Some of the individuals on the registry list already participated in at least one study, while others had not yet participated in any research studies. Both groups were surveyed to determine what factors motivated them/would motivate them to participate in a research study. Our study was designed to: (a) evaluate factors associated with each given type of motivation; (b) identify clusters of older adult research participants based on the variety of motivations that shaped their willingness to participate in research studies; and (c) evaluate the factors that differentially predict selection into each cluster. We also considered the role of previous participation status on these associations. Based on our findings, we provide suggestions for recruitment and retention strategies that may be integrated alongside other toolkits.

Background and Objectives

One of the most well-established theories explaining age-based changes in motivation is *socioemotional selectivity theory* (SST; Carstensen, 1992a; Carstensen & Mikels, 2005). A robust body of evidence in support of SST shows that, as our perceived time remaining in our lives grows shorter (i.e., our time horizons shorten), we become more strategic about how we use our time and attentional assets (Blanchard-Fields, 2007; Carstensen, 1993; Gross et al., 1997; Löckenhoff & Carstensen, 2004; Urry & Gross, 2010). Specifically, SST argues that in later life, we are more likely to engage in activities and interact with others if the activities are emotionally meaningful. Scholars have argued that one reason individuals develop an increased drive to give back to society and leave a legacy for future generations as we age is related to SST. That is, older adults, relative to their younger counterparts, are motivated to participate in activities that support future generations and relatively less likely to seek out activities that focus on learning new things or engaging in activities that only provide benefits in the future. For example, previous research evaluating motivations to volunteer found the underlying motivations driving older adults focused more heavily on factors that shaped generative outcomes such as the well-being of the community and future generations, whereas younger adults indicated higher motivations related to factors that personally affected their own future well-being (Yamashita et al., 2019). Therefore, when it comes to participation in research, *altruistic* motivations have been argued to be a key factor shaping older adults' decisions to volunteer (Newburg et al., 1992; Souder, 1992).

However, it is important to recognize the diversity of the older adult population and that some older adults may not be motivated primarily or exclusively by opportunities to be altruistic. Rather, some older individuals seek out

activities that provide more immediate gratification or alternatively, provide benefits to themselves over time or in the future. They may wish to learn something new or learn something about themselves, including their health or cognitive status (Ryan & Campbell, 2021; Tolmie et al., 2004). For disease-focused trials, some may participate in the hope for an effective treatment. Or, older adult participants may engage in a form of temporal discounting—for example, engaging in an intervention now in the hopes of obtaining some future benefit to themselves (e.g., Harrell et al., 2019; Toril et al., 2014). A review of the motivations of healthy volunteers in general found that although monetary compensation was a key motivator, compensation by itself was never sufficient (Stunkel & Grady, 2011). Other considerations may play key roles, including study risk and time commitment (Grady et al., 2017). It is likely that there are a number of motivational forces at play within and between older participants, and it is important to explore the breadth of these forces and whether specific motivations might be predicted as a function of participant characteristics that can be easily measured, such as age, gender, race, and age. This knowledge might help inform recruitment-, retention-, and adherence-supporting strategies.

Current Study

Based on SST and temporal discounting theory, we evaluated seven different motivations for participation in aging research that relate to: (a) values/altruism; (b) personal growth/improvement; or (c) immediate gratification. We evaluated each individual motivation, as well as the ways in which more than one motivation may collectively influence research participation in older adults. The study sought to answer three primary research questions:

1. What factors predict identification of altruistic-, personal growth/improvement-, or immediate gratification-related motivations for potential participation in research?
    a. How does previous research participation status differentially shape identification of individual motivations?
2. How does selection of different types of motivations cluster together to identify types of potential older adult research participants?
    a. What factors differentiate research motivation clusters?
    b. How does previous research participation status differentially shape selection into particular clusters?

Research Design and Methods

Data and Sample

Data are drawn from a community-based sample of adults age 60+. Under the initiative of the Institute for Successful Longevity (ISL), older individuals in Leon County, Florida were initially contacted (through mailings, advertisements, and social media) and agreed to join a registry for potential participation in aging-related research. Individuals were invited to "help Florida State University researchers conduct studies on aging" and were told they would be contacted by researchers with the choice of volunteering or not for all studies, including a range of projects from surveys to longitudinal studies that might last as long as a year. They were told that some studies would provide payment and others would not. Registry was voluntary, and individuals were under no obligation to participate in any study. Registry participants were invited via e-mail to participate in a short survey which was administered using Qualtrics in May and June of 2020. Participants who completed the survey were compensated with entry into a $50 raffle drawing. At the time of the survey, some of individuals in the sample had participated in previous research related to their involvement in the registry and others had never participated in a research study through the registry. The survey consisted of questions asking participants about their motivations for participating in research, as well as questions related to their demographic characteristics. Participants were informed that the results they provided would help to inform the recruitment and retention of older adults in an upcoming cognitive intervention study, though the survey itself was framed in terms of general motivation to participate in ISL studies.

Measures

Motivation measures

Respondents were asked to identify all motivations from a list (i.e., choose all that apply) regarding their motivation to participate in research studies. If participants had previously completed a study through the registry, their motivations were in reference to past experiments. Specifically, they were asked: "Which of the following options best describes your motivation(s) to participate in your **most recent** ISL study?" If they had not yet participated in any studies through the registry, their motivations were in reference to future, hypothetical experiments. Specifically, they were asked: "Which of the following options would be your strongest motivation(s) to participate in a **future** ISL study?" In both questions, options provided included: (a) to improve my mind; (b) to improve my health; (c) to learn to use technology better; (d) for fun; (e) to aid research; (f) to try something new; and (g) for compensation. They were also given the option to fill in the blank with an option otherwise not provided. Potential motivations were developed through multiple meetings of researchers with expertise in psychology, sociology, medical research, and gerontology. As this study was conducted in preparation for a technology-based cognitive intervention study, choice of motivations was shaped by the parameters of that study.

All items were dichotomized indicating whether an individual identified a given option in relation to a hypothetical future study or a previous study. All fill-in-the-blank options

were excluded from this analysis. We conceptualized seven motivations across three primary motivation categories:

- *Values/Altruism*: (1) To aid research
- *Personal Growth/Improvement*: (2) Learning technology, (3) Mind, (4) Health
- *Immediate Gratification*: (5) Fun, (6) Novelty, (7) Compensation

For our clustering analysis, an additional category of "other" was included to account for those who included a fill-in-the-blank category of motivations. The number of individuals identifying an "other" category (n = 15) was too small to include in predictive models. This provides support for the presented options as being inclusive of most motivations.

Control measures

We included several statistical control measures related to demographic characteristics and health status. Regarding demographics, **Gender** was coded based on whether individuals identified as **female** (1 = female, 0 = male gender). **Age** was measured categorically as: (1) under age 65; (2) age 65–69; (3) age 70–74, and (4), age 75+. **Race/Ethnicity** was measured based on two questions. First, individuals were asked about their race, and second individuals were asked about their ethnicity. Those who indicated being White or Other Race (and not Hispanic) were coded "1" and Black individuals (and not Hispanic) were coded "2." Those who identified as Hispanic (regardless of racial category) were coded "3." **Employment** status was measured based on three categories: (1) Not Employed; (2) Working Part-Time; or (3) Working Full-Time. **Educational Attainment** was measured as "0" for those with a 4-year college degree or more, and "1" for those who did not complete a college degree. **Marital status** was coded "1" for those who were single and "0" for those married.

Regarding health status, **Cognitive Difficulties Score** (adapted from Strober et al., 2016) was based on the sum of responses to three questions in which individuals were asked how often during the previous 4 weeks they: (1) forgot what they did the night before; (2) had trouble concentrating on things like watching a television program or reading a book, or (3) forgot what they talked about after a telephone conversation. Responses included 1 = Never, 2 = Rarely, 3 = Sometimes, 4 = Often, or 5 = Almost always. The score ranged from 3 to 13 (SD = 1.97). Finally, **Subjective Health Status** was based on the question: "Overall, would you say that your health is excellent, very good, good, fair, or poor?" Subjective health in our analysis was measured categorically as: (1) good, fair, or poor health; (2) very good health, or (3) excellent health.

Analytic Strategy

To address our research questions, we started by evaluating the factors that relate to each individual research motivation using logistic regression models. Specifically, we conducted individual regression models for each individual motivation, calculating odds ratios (ORs) for each of our predictor measures.

Second, we conducted clustering analysis to identify how combinations of motivations differentially shape whether older adults are interested in volunteering as a research participant. To identify the distinct clusters of potential older adult volunteers, unsupervised grouping methods such as latent class analysis and k-means clustering (k-means) can be used. We used k-means clustering because it provides straight forward and intuitive results. K-means initializes k random centroids, allocates each individual to one of the k clusters with a nearest centroid, and optimizes the positions of the centroids and the allocation of individuals such that the sum of the squared distance between the individuals and the cluster's centroid is minimized. K-means clustering was implemented using the Python package of scikit-learn in this study. Each individual was represented by a vector of the motivation variables with binary values. The optimal number of clusters was determined using the Elbow method by running k-means clustering across 1–10 clusters. For each number of clusters, the Elbow method calculates the sum of square distances from each individual to the centroid of the assigned cluster. Informed by a line chart plot of the sums of square distances over different number, we identified the optimal number of clusters. The inflection point on the line, that is, the "elbow," indicates the number of clusters beyond which there is no significant improvement of the sum of squared distance.

Finally, we evaluated differences across the clusters. We evaluated differences across the clusters controlling for all factors using multinomial logistic regression models. We identified significant differences in the characteristics across the clusters by calculating relative risk ratios (RRRs). Finally, we conducted sensitivity tests to examine associations between previous participation status and selection into particular clusters.

Results

Descriptive Results

Clustering analyses were performed on data collected from 516 individuals; however, due to missing data related to our demographic control measures, the sample used for all other analyses included 472 individuals. For these individuals, motivations (located in Supplementary Table 1) indicated by respondents in order of most to least identified motivators included: research (88.1%), mind (44.5%), fun (43.2%), novelty (38.1%), health (25%), compensation (23.1%), and learning technology (18.9%). The number of motivators identified varied, with 32.8% indicating only one motivator, 16.5% identifying two, 17.8% identifying three, and 13.6% identifying four motivators.

Additional characteristics of our sample are provided in Supplementary Table 2. Nearly three-quarters (72.5%)

previously had participated in a research study. Our sample ranged in age from 59 to 95, with 14.8% between 59 and 64 years old, 31.6% ages 65–69, 30% ages 70–74, and 23.7% ages 75 and older. The majority of the sample was non-Hispanic White or Other Race (94.5%) with only 3.0% non-Hispanic Black and 2.5% Hispanic. The majority of the sample was not employed (79.4%), with 7.8% working part-time and 12.7% working full-time. Overall, our sample was very highly educated, with only 25.8% not holding at least a bachelor's degree. About two thirds of the sample was married, with 37.7% single (i.e., widowed, divorced, or never married). Regarding health, our sample reported a mean score of 5.1 for cognitive difficulties, and ranked their subjective health status highly. Only 35% ranked their health poor, fair, or good, with the majority ranking their health as very good (47.9%) or excellent (17.2%). The characteristics of the sample are provided in Supplementary Table 2.

Regression Results Evaluating Individual Research Motivations

Logistic regression models were used to predict each individual research motivation. We report significant factors related to each of the seven motivation models (see Table 1).

First, in evaluating factors that relate to *Values/Altruism*, we examined the factors predicting ***Research*** as a key motivator. ***Research*** was not associated with any specific characteristics. That is, although it is the most common motivation for people to mention, no specific characteristics make people more or less likely to identify research as a key motivator.

Regarding factors that relate to *Personal Growth/Improvement*, we evaluated ***Learning Technology***, ***Mind***, and ***Physical Health***. Regarding ***Learning Technology***, the primary factors related to previous participation status, age, education, and marital status. Specifically, those who previously participated in research were less likely to identify learning technology as a motivator (OR = 0.476; $p < .01$). In addition, those age 70–74 (OR = 2.654, $p < .01$) and those 75+ (OR = 2.310, $p < .05$) had higher odds relative to those 59–64. In addition, those without a college degree had more than double the odds (OR = 2.074, $p < .01$) relative to those who were college educated. Finally, those who are single had 1.67 times the odds ($p < .05$) relative to those married of selecting this motivator. Regarding ***Mind***, three factors were particularly predictive of engagement in research: previous participation, age, and cognitive health. Those who previously participated in research were less likely to identify mind as a motivator (OR = 0.394; $p < .001$). Individuals motivated in this area who were 70–74 and those 75+ had higher odds (OR = 1.803, $p < .05$ and OR = 1.789, $p < .05$, respectively) relative to those 59–64. In addition, each unit of increase in the cognitive challenge score was associated with 20% higher odds of identifying this motivator ($p < .001$). Regarding ***Physical Health***, only previous participation and marital status were key factors predictive of this motivator. Specifically, those who previously participated in research were less likely to identify physical health as a motivator (OR = 0.294; $p < .001$). In addition, those who are single had 1.65 times the odds ($p < .05$), relative to those who are married, of selecting this motivator.

Finally, regarding *Immediate Gratification*, we evaluated, ***Fun***, ***Novelty***, and ***Compensation***. For ***Fun***, not employed individuals (OR = 0.508; $p < .05$) and part-time workers had lower odds (OR = 0.33, $p < .05$) relative to full-time workers. No other factors were associated with this motivator. For ***Novelty***, no specific characteristics were associated with identifying this motivator. For ***Compensation***, previous participation, race, and educational attainment were associated with this motivator. Specifically, those who previously participated in research were less likely to identify compensation as a motivator (OR = 0.520; $p < .01$). Non-Hispanic Black individuals were more likely relative to those non-Hispanic and White/Other to identify compensation as a motivator. Finally, those without a college degree had double the odds (OR = 2.137, $p < .01$) relative to those who were college educated.

To better evaluate differences based on previous participation status for each motivation, we calculated marginal effects predictions related to selection of each motivation, provided in Figure 1.

Clustering Analysis

Rather than considering just individual motivators that may be related to participation, we considered combinations of motivators that may shape interest in participating in aging research. Based on the *k*-means clustering analysis, older adult research volunteers in the sample can be categorized into four clusters, namely "brain health advocates" (Cluster 1, $n = 91$), "research helpers" (Cluster 2, $n = 178$), "multiple enthusiasts" (Cluster 3, $n = 80$), and "fun seekers" (Cluster 4, $n = 123$), according to their selected motivations (see Supplementary Table 1).

The ***brain health advocates*** are characterized by their expectation of improving mind and health by participating in research. The majority of brain health advocates identified 2–5 motivations with all of them including mind improvement as a motivation. This group can be characterized by having the highest proportion non-White (7.7%), the highest proportion not employed, the highest cognitive difficulties score, and the highest proportion with low levels of subjective health.

The ***research helpers*** are motivated by their interest in aiding research. The majority of research helpers identified only one or two motivations with nearly all of them identifying aiding research as their only motivation. This group is characterized by having the highest proportion age 65–69, and the lowest proportion single (32.6%), and they also have the lowest cognitive difficulties score (4.781).

Table 1. Logistic Regression Models Predicting Individual Motivations for Research Participation ($N = 472$)

	Values/altruism	Personal growth/improvement			Immediate gratification		
	Research	Learning technology	Mind	Health	Fun	Novelty	Compensation
Variable	OR (robust *SE*)	OR (robust *SE*)	OR (robust *SE*)	OR (robust *SE*)	OR (robust *SE*)	OR (robust *SE*)	OR (robust *SE*)
Previous research participant	1.675 (0.540)	0.476** (0.126)	0.394*** (0.088)	0.294*** (0.069)	1.081 (0.232)	0.899 (0.198)	0.520** (0.129)
Female	1.001 (0.329)	1.104 (0.305)	1.12 (0.244)	0.875 (0.222)	1.079 (0.224)	1.287 (0.278)	1.229 (0.326)
Age group[a]							
65–69	1.823 (0.927)	0.632 (0.311)	0.846 (0.269)	0.862 (0.319)	0.824 (0.253)	1.06 (0.347)	1.258 (0.438)
70–74	0.916 (0.332)	2.654** (0.904)	1.803* (0.459)	1.524 (0.438)	1.253 (0.312)	1.539+ (0.388)	0.871 (0.260)
75+	1.502 (0.642)	2.310* (0.871)	1.789* (0.497)	0.941 (0.310)	1.446 (0.386)	1.511 (0.410)	0.624 (0.222)
Race/ethnicity[b]							
Black	0.361 (0.235)	0.787 (0.504)	1.245 (0.683)	0.722 (0.490)	0.675 (0.380)	0.495 (0.298)	3.687* (2.296)
Hispanic	0.801 (0.690)	1.1 (0.765)	1.027 (0.578)	1.704 (0.840)	0.648 (0.441)	0.687 (0.459)	1.585 (1.163)
Employment status[c]							
Not employed	0.832 (0.422)	0.503 (0.219)	1.144 (0.376)	0.784 (0.303)	0.508* (0.162)	1.475 (0.486)	0.717 (0.243)
Part-time worker	0.705 (0.466)	0.749 (0.407)	1.215 (0.512)	1.279 (0.611)	0.393* (0.174)	1.183 (0.531)	1.444 (0.672)
Not college educated	1.007 (0.353)	2.074** (0.546)	1.331 (0.299)	1.556+ (0.394)	0.964 (0.212)	1.224 (0.269)	2.137** (0.546)
Single	0.793 (0.251)	1.669* (0.435)	1.259 (0.266)	1.654* (0.395)	1.011 (0.207)	1.243 (0.258)	1.561+ (0.387)
Cognitive difficulties score	0.897 (0.078)	1.053 (0.069)	1.199*** (0.064)	1.042 (0.066)	0.985 (0.050)	1.011 (0.053)	1.03 (0.060)
Subjective health status[d]							
Very good health	1.929+ (0.658)	1.403 (0.416)	1.069 (0.236)	0.851 (0.218)	1.136 (0.244)	1.14 (0.252)	0.801 (0.208)
Excellent health	0.785 (0.312)	1.549 (0.606)	1.384 (0.428)	0.78 (0.276)	0.863 (0.252)	1.37 (0.416)	0.747 (0.264)
Constant	8.804** (6.556)	0.152** (0.096)	0.293* (0.145)	0.58 (0.331)	1.183 (0.550)	0.240** (0.116)	0.353* (0.180)
Model fit							
Chi-square	22.26	35.09	39.99	45.6	9.407	13.01	38.3
Log likelihood	−163.3	−210.1	−302.8	−243.9	−318.1	−307	−233.6

Notes: OR = odds ratio; *SE* = standard error.
[a]Reference is age < 65.
[b]Reference includes non-Hispanic White/Other.
[c]Reference is full-time workers.
[d]Reference is those with poor, fair, or good health.
***$p < .001$. **$p < .01$. *$p < .05$. +$p < .10$.

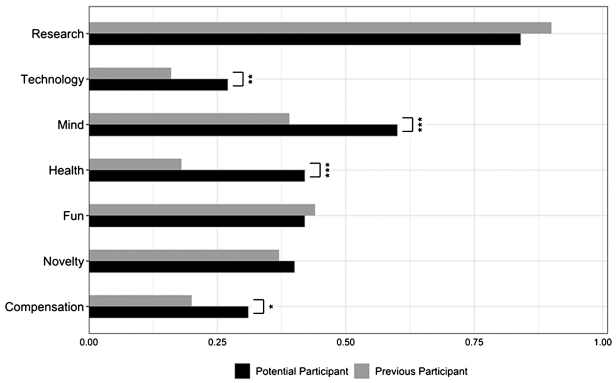

Figure 1. Differences in motivational factors by participation status group. *Notes*: Significance indicates significant differences in probability of selecting given motivational factor across participation status categories: ***$p < .001$, **$p < .01$, *$p < .05$.

The ***multiple enthusiasts*** have diverse motivations. The majority of multiple enthusiast volunteers identified 5–7 motivations. This group can be characterized by the highest proportion female (76.3%), the highest proportion in the oldest age groups, the lowest proportion not employed (75%), the highest proportion with no college degree (37.5%), the highest proportion single (47.5%), and the highest proportion with excellent subjective health (21.3%).

The ***fun seekers*** identified 2–4 motivations with all of them considering having fun as a motivation for participating in research. This group can be characterized by being the least diverse (only 3.2% Black or Hispanic), the highest proportion working full-time (16.3%), and the highest proportion college educated (80.5%).

The characteristics of the clusters are provided in Supplementary Table 2. Detailed motivation characteristics of different subgroups are shown in Supplementary Figures 1 and 2 and Supplementary Table 1.

Differences Across Clusters

To identify differences across the clusters, we conducted multinomial logistic regression models, predicting selection into the clusters based on our key variables of interest. The largest cluster served as the reference group (Cluster 2, "research helpers"). Previous research participation, age, work status, and cognitive difficulties score differentiated the classes. Specifically, relative to the "research helpers," being a previous research participant was associated with a lower risk of being in Cluster 1 ("brain health advocates," RRR = 0.331; $p < .001$) or Cluster 3 ("multiple enthusiasts," RRR = 0.414, $p < .01$). In addition, relative to the "research helpers," those age 70–74 (RRR = 2.122, $p < .05$) and those 75+ (RRR = 2.360; $p < .05$) of being in Cluster 3 ("multiple enthusiasts"). Working part-time was associated with lower probability of selecting into Cluster 4 ("fun seekers," RRR = 0.211; $p < .05$). Those not employed had a marginally significant negative association with being in Cluster 3 ("multiple enthusiasts," RRR = 0.421; $p < .10$). Finally, relative to Cluster 2, higher cognitive difficulties scores were associated with a higher risk of selecting into Cluster 1 ("brain health advocates," RRR = 1.252, $p < .01$) or Class 2 ("research helpers," RRR = 1.183; $p < .05$). To show differences based on previous participation status, Supplementary Figure 3 shows the probability of being in a given cluster among previous participants relative to their counterparts who have not yet participated in a research study.

We further explored whether the association between previous research participation and selection into clusters was moderated by specific characteristics. We examined the interaction between previous research participation and each of our key characteristics. We found that only gender (i.e., being female) significantly moderated the association between previous participation and selection into a given class. We calculated marginal effects for each cluster by gender based on Model 2 in Table 2. Figure 2 shows no differences between previous and potential participants among men except for the Cluster 4 ("fun seekers"), whereby the fun seeker cluster includes a higher proportion who are previous participants relative to potential participants. On the other hand, differences across the other three clusters is significant only among women. Specifically, women in Cluster 1 ("brain health advocates"; $p < .001$) and Cluster 3 ("multiple enthusiasts"; $p < .05$) include a higher proportion who are potential participants, and women in Cluster 2 ("research helpers") include a higher proportion who are previous participants ($p < .001$). That is, selection into motivation cluster by participation status is dependent on gender.

Discussion and Implications

The successful development of interventions for older adults that have potential to bolster health and well-being is dependent upon recruiting large and diverse samples of older adult research volunteers. Although the field of aging has made advances in identifying strategies to recruit older adults, there are variations in the types of motivations that may lead to more effective recruitment of certain groups of older adults. The present study evaluated how altruistic, personal growth/improvement, and immediate gratification motivations are related to interest in participating in research studies among a sample of community-dwelling older adults. Based on a survey evaluating the factors that would motivate them to participate in research studies, we evaluated predictors of variations in motivation factors.

Specifically, our study was guided by three primary research questions: (1) What factors predict identification of altruistic-, personal growth/improvement-, or immediate gratification-related motivations for potential participation in research? (2) How does selection of different types of motivations cluster together to identify types of potential

Table 2. Multinomial Logistic Regression Models Predicting Selection Into Research Motivation Clusters ($N = 472$)

	Model 1: direct effects			Model 2: significant interaction effects		
	Brain health advocates (Cluster 1; $n = 91$)	Multiple enthusiasts (Cluster 3; $n = 80$)	Fun seekers (Cluster 4; $n = 123$)	Brain health advocates (Cluster 1; $n = 91$)	Multiple enthusiasts (Cluster 3; $n = 80$)	Fun seekers (Cluster 4; $n = 123$)
Variable	Relative risk ratio (robust *SE*)	Relative risk ratio (robust *SE*)	Relative risk ratio (robust *SE*)	Relative risk ratio (robust *SE*)	Relative risk ratio (robust *SE*)	Relative risk ratio (robust *SE*)
Previous research participant	0.331*** (0.097)	0.414** (0.129)	1.148 (0.346)	1.106 (0.507)	1.091 (0.660)	2.727* (1.380)
Female	0.815 (0.239)	1.664 (0.551)	1.088 (0.282)	3.317* (1.686)	5.257** (3.204)	3.418* (1.992)
Female × previous participant				0.131*** (0.080)	0.207* (0.148)	0.230* (0.148)
Age group[a]						
65–69	1.044 (0.438)	0.578 (0.303)	0.942 (0.359)	0.969 (0.426)	0.546 (0.283)	0.893 (0.345)
70–74	1.088 (0.380)	2.122* (0.789)	1.087 (0.341)	1.218 (0.433)	2.275* (0.850)	1.169 (0.372)
75+	1.208 (0.454)	2.360* (0.963)	1.404 (0.469)	1.263 (0.469)	2.402* (0.981)	1.441 (0.477)
Race/ethnicity[b]						
Black	1.213 (0.905)	0.981 (0.735)	0.55 (0.480)	1.111 (0.832)	0.922 (0.731)	0.521 (0.458)
Hispanic	0.964 (0.721)	0.694 (0.515)	0.559 (0.507)	0.879 (0.671)	0.643 (0.461)	0.519 (0.469)
Employment status[c]						
Not employed	1.362 (0.658)	0.447+ (0.215)	0.616 (0.237)	1.197 (0.584)	0.413+ (0.199)	0.569 (0.222)
Part-time worker	0.842 (0.512)	0.548 (0.322)	0.211* (0.139)	0.792 (0.500)	0.527 (0.304)	0.206* (0.134)
Not college educated	1.088 (0.347)	1.685+ (0.511)	0.715 (0.213)	1.018 (0.331)	1.602 (0.491)	0.688 (0.206)
Single	1.345 (0.393)	1.676+ (0.501)	1.149 (0.300)	1.305 (0.383)	1.650+ (0.497)	1.132 (0.295)
Cognitive difficulties score	1.252** (0.092)	1.183* (0.088)	1.075 (0.071)	1.260** (0.093)	1.188* (0.090)	1.079 (0.072)
Subjective health status[d]						
Very good health	0.798 (0.237)	1.604 (0.551)	1.098 (0.291)	0.746 (0.224)	1.521 (0.527)	1.05 (0.281)
Excellent health	0.894 (0.374)	2.079+ (0.909)	0.746 (0.288)	0.94 (0.390)	2.120+ (0.922)	0.758 (0.292)
Constant	0.280+ (0.193)	0.162* (0.117)	0.639 (0.376)	0.138** (0.103)	0.090** (0.069)	0.358 (0.225)
Model fit						
Chi-square	73.06	73.06	73.06	81.2	81.2	81.2
Log likelihood	−591.1	−591.1	−591.1	−584.4	−584.4	−584.4

Notes: Cluster #2 (research helpers) serves as the reference group ($n = 178$). *SE* = standard error.

[a]Reference is age < 65.

[b]Reference is White/Other race.

[c]Reference is full-time worker.

[d]Reference is poor, fair, or good health.

***$p < .001$. **$p < .01$. *$p < .05$. +$p < .10$.

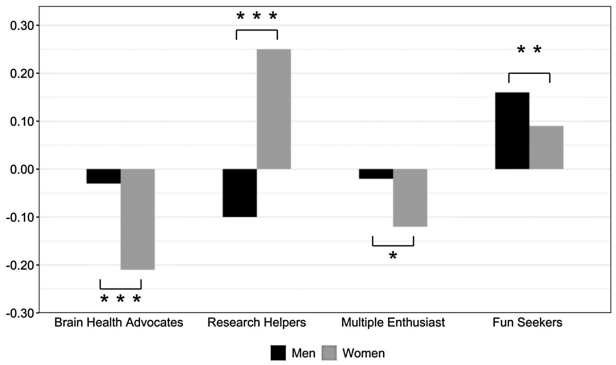

Figure 2. Predicted probability of cluster selection among previous participants relative to potential participants by gender. *Notes*: Significance indicates significant differences in probability of selecting into given motivational cluster among previous participants based on gender. Bars below zero indicate lower likelihood of selection into a given cluster among previous participants (i.e., higher likelihood among potential participants), and bars above 0 indicate higher likelihood of selecting into a given cluster among previous participants (i.e., lower likelihood among potential participants). Significance indicates: ***$p < .001$, **$p < .01$, *$p < .05$.

older adult research participants? Our sample included both individuals who already participated in aging research and a sample of older adults who had agreed to consider participating in research but had not yet participated. We addressed our research questions using both groups, and examined differences based on participation.

In terms of individual motivations, we describe key findings and their potential implications for future study. Our results show that altruistic volunteering is the most common type of motivation indicated by older adult volunteers, and no specific characteristics are uniquely associated with that motivation. That is, across the board, altruistic motivations are likely to be generally enticing to older research volunteers. The least common motivations identified are learning technology and compensation; however, both of these motivations are more likely to be identified by potential participants relative to previous participants. This suggests that although these factors are not as salient for the average older research participant who regularly participates in research studies, learning technology and compensation may be key factors that entice individuals who are open to research participation but have not yet decided to participate. In addition, those with less than a college degree are also motivated by these two factors. As a result, studies that offer technology training and adequate compensation may also entice older adults from lower socioeconomic status groups to participate. The remaining motivations are relatively common, and include a mix of personal growth and immediate gratification, with personal growth factors (i.e., mind and health) both significantly more likely to be identified by potential participants relative to previous participants. In addition to previous participation, those over age 70 are also more likely to indicate motivations to participate in studies that involve learning new technologies and enhancing cognitive function (i.e., "mind"). These findings suggest that certain groups of older adults may be more likely to see research as a useful way to improve their overall well-being. Interestingly, Ryan and Campbell (2021) surveyed cognitive aging researchers' perceptions of why older adults participate in research, and these perceptions appear to be relatively well calibrated—the most common motivations researchers endorsed were "Cognitive Health" and "Further Science," followed by "Curiosity," with relatively few researchers endorsing "Money" as a major motivator for older adults. Assuming their curiosity category is similar to our "novelty" category, in general, researchers' perceptions are similar to older adults' self-reported motivations in our study. Although "Cognitive Health" defined by Ryan and Campbell (2021) refers to the perception that older adults are motivated to gain a sense of their own cognitive functioning, both studies are aligned in that older adults have, and are perceived to have, an interest in their own cognition.

In evaluating combinations of motivations, four clusters were identified: brain health advocates, research helpers, multiple enthusiasts, and fun seekers. In evaluating these clusters, results suggest that age, work status, and the cognitive difficulties score were most predictive of cluster group. Overall, identification and evaluation of the four motivation clusters suggests that older adults are not singularly focused on altruism. In fact, there are different types of factors that are likely to draw older adult volunteers, and we should not assume that simply focusing on altruism alone will capture all groups. Many older adults are drawn to the immediate or delayed payoffs that research may provide to them personally, including longer-term benefits like improvements in brain health or to the potential for immediate enjoyment of participation. Analysis of the four clusters showed that previous participation status was a key feature of what motivated participation, but how previous participation shaped motivations differed by gender. Previous participation was generally not a key factor differentiating types of motivations for men, but was key to whether women selected into particular clusters, with potential female participants more likely to be drawn to the brain health motivation cluster or to a mix of factors, and previous participants having a primarily altruistic motivational profile.

These study results have important implications for those conducting aging-related research. Challenges to recruiting more diverse older adult research participants has long been documented in the literature. Most research exploring issues of recruitment have focused on the common barriers to participation and have suggested recruitment strategies for improving participation (Binda et al., 2018; McNeil et al., 2016; Mody et al., 2008). Research has shown that older adults are typically willing to participate in clinical research when approached. However, recruitment for and retention in psychosocial–behavioral research with older adults pose its own set of challenges such as the relatively

limited contact with study personnel in mediated behavioral intervention studies. Therefore, personal motivations play an important role in continued engagement in such studies. Our study shows that older adults are not a homogenous group in terms of what motivates them to participate in research and reveals interesting (and some unexpected) differences among groups. Insights gained from this study can provide specific guidance for the design of motivational messaging that can be included in recruitment materials as well as built into engagement strategies for improving adherence. For instance, in studies seeking to involve older women, it may make sense to emphasize any potential benefits to physical or cognitive health, studies seeking to identify respondents with lower socioeconomic status might emphasize the compensation they will receive by participating, and studies targeting older men who have not previously participated in research may emphasize how fun it will be to participate in a study.

Despite the novel contributions that this study offers, there are several important limitations of this research study that should be acknowledged in interpreting the results. First, all individuals included in our study were already listed on a registry, so these older adults may be different from the larger population of older adults who may not otherwise be willing to have their name on such a list. In addition to the way our sample was selected, the sample was also highly educated, ranked their health very highly, and lacked racial diversity, which may not be reflective of some populations of older adults who might be targeted for health-related intervention studies. In addition, we used a small incentive of only a chance of receiving a $50 gift card to entice respondents to participate in our survey. This may have biased our sample away from participants for whom compensation is a major motivator. Future studies like ours might manipulate compensation for participation to examine how this affects the distribution of motivations expressed. Given our observations, and previous research (Sparrow et al., 2021) regarding access to resources among those likely to be motivated by compensation, a careful analysis should consider differences based on available resources to account for socioeconomic status differences that may explain whether and how much compensation may affect participation. Many older adults have access to more resources than do younger adults, and this could be a key factor explaining differences in altruistic tendencies based on age/life stage. Next, the set of motivations we selected was based on predetermined factors and informed our research needs rather than by older adult participants themselves. A qualitative study might reveal different factors not included on our list. Similarly, the language that should be used to activate particular motivations was not addressed in this study and may play an important role in the success of recruitment and retention efforts. Future studies will be needed to evaluate the effectiveness of different motivational messaging for participants who select into particular motivational clusters to participate in a research study. Finally, based on SST, we assume that the motivations that we identify in this study are relevant to older adults specifically given their shorter time horizons. However, we do not include comparison groups who are younger or middle-aged adults. As a result, it is not possible to know whether our findings may also hold true in other age groups. Future research should consider comparing research motivations across multiple age groups to determine how older adults' motivations differ from others, and whether the findings we present here are unique to this age group. Regardless of whether or not our findings are specific to older adults, we believe that our results provide valuable information for researchers trying to recruit older adults in particular, consistent with principles of equity, inclusivity, and the recent priorities of funding agencies.

In conclusion, it is important to recognize that in addition to acknowledging the more salient altruistic tendencies of older research participants relative to their younger counterparts, there are a variety of other important motivations for participation in research that are important to older adults. Understanding these motivations, and targeting specific motivations, may prove useful in terms of recruiting large, diverse samples, and developing motivational messages to promote study adherence and reduce dropout after the recruitment process.

Supplementary Material

Supplementary data are available at *The Gerontologist* online.

Funding

This research was supported by the National Institute on Aging (R01AG064529; The Adherence Promotion with Person-centered Technology Project: Promoting Adherence to Enhance the Early Detection and Treatment of Cognitive Decline; and R21AG061431: Systematic Analysis of Clinical Study Generalizability Assessment Methods with Informatics), and University of Florida–Florida State University Clinical and Translational Science Award funded by the National Center for Advancing Translational Sciences (UL1TR001427).

Conflict of Interest

None declared.

References

Binda, J., Wang, X., & Carroll, J. M. (2018, May). Recruiting older adults in the wild: Reflections on challenges and lessons learned from research experience. In Proceedings of the 12th EAI International Conference on Pervasive Computing Technologies for Healthcare (pp. 290–293). doi:10.1145/3240925.3240947

Blanchard-Fields, F. (2007). Everyday problem solving and emotion: An adult developmental perspective. *Current Directions in Psychological Science*, **16**(1), 26–31. doi:10.1111/j.1467-8721.2007.00469.x

Carstensen, L. L. (1992a). Social and emotional patterns in adulthood: Support for socioemotional selectivity theory. *Psychology and Aging*, **7**(3), 331–338. doi:10.1037//0882-7974.7.3.331

Carstensen, L. L. (1992b). Motivation for social contact across the life span: A theory of socioemotional selectivity. *Nebraska Symposium on Motivation. Nebraska Symposium on Motivation*, **40**, 209–254.

Carstensen, L. L. (1993). *Motivation for social contact across the life span: A theory of socioemotional selectivity*. In Jacobs, J. E. (Ed.) Nebraska Symposium on Motivation, 1992: Vol. 40. Developmental perspectives on motivation (pp. 209–254). University of Nebraska Press.

Carstensen, L. L., & Hershfield, H. E. (2021). Beyond stereotypes: Using socioemotional selectivity theory to improve messaging to older adults. *Current Directions in Psychological Science*, **30**(4), 327–34. doi:10.1177/09637214211011468

Carstensen, L. L., Isaacowitz, D. M., & Charles, S. T. (1999). Taking time seriously: A theory of socioemotional selectivity. *American Psychologist*, **54**(3), 165–181. doi:10.1037/0003-066X.54.3.165

Carstensen, L. L., & Mikels, J. A. (2005). At the intersection of emotion and cognition: Aging and the positivity effect. *Current Directions in Psychological Science*, **14**(3), 117–121. doi:10.1111/j.0963-7214.2005.00348.x

Encouraging Older Adults to Participate in Research. (2014). National Institute on Aging. https://www.nia.nih.gov/research/blog/2014/04/encouraging-older-adults-participate-research

Fogel, D. B. (2018). Factors associated with clinical trials that fail and opportunities for improving the likelihood of success: A review. *Contemporary Clinical Trials Communications*, **11**, 156–164. doi:10.1016/j.conctc.2018.08.001

Grady, C., Bedarida, G., Sinaii, N., Gregorio, M. A., & Emanuel, E. J. (2017). Motivations, enrollment decisions, and socio-demographic characteristics of healthy volunteers in phase 1 research. *Clinical Trials*, **14**(5), 526–536. doi:10.1177/1740774517722130

Gross, J. J., Carstensen, L. L., Pasupathi, M., Tsai, J., Götestam Skorpen, C., & Hsu, A. Y. (1997). Emotion and aging: Experience, expression, and control. *Psychology and Aging*. **12**(4), 590–599. doi:10.1037/0882-7974.12.4.590

Harrell, E. R., Kmetz, B., & Boot, W. R. (2019). Is cognitive training worth it? Exploring individuals' willingness to engage in cognitive training. *Journal of Cognitive Enhancement*, **3**(4), 405–415. doi:10.1007/s41465-019-00129-4

Löckenhoff, C. E., & Carstensen, L. L. (2004). Socioemotional selectivity theory, aging, and health: The increasingly delicate balance between regulating emotions and making tough choices. *Journal of Personality*, **72**(6), 1395–1424. doi:10.1111/j.1467-6494.2004.00301.x

McNeil, H., Elliott, J., Huson, K., Ashbourne, J., Heckman, G., Walker, J., & Stolee, P. (2016). Engaging older adults in healthcare research and planning: A realist synthesis. *Research Involvement and Engagement*, **2**(1), 1–18. doi:10.1186/s40900-016-0022-2

Mody, L., Miller, D. K., McGloin, J. M., Freeman, M., Marcantonio, E. R., Magaziner, J., & Studenski, S. (2008). Recruitment and retention of older adults in aging research: (See editorial comments by Dr. Stephanie Studenski, pp 2351–2352). *Journal of the American Geriatrics Society*, **56**(12), 2340–2348. doi:10.1111/j.1532-5415.2008.02015.x

Newburg, S. M., Holland, A. E., & Pearce, L. A. (1992). Motivation of subjects to participate in a research trial. *Applied Nursing Research*, **5**(2), 89–93. doi:10.1016/S0897-1897(05)80020-5

Revision: NIH Policy and Guidelines on the Inclusion of Individuals Across the Lifespan as Participants in Research Involving Human Subjects. (2017). National Institutes of Health. NOT-OD-18-116.

Recruiting Older Adults into Research (ROAR) Toolkit. (n.d.). National Institute on Aging. https://www.nia.nih.gov/health/recruiting-older-adults-research-roar-toolkit

Robiner, W. N. (2005). Enhancing adherence in clinical research. *Contemporary Clinical Trials*, **26**(1), 59–77. doi:10.1016/j.cct.2004.11.015

Ryan, A. D., & Campbell, K. L. (2021). The ironic effect of older adults' increased task motivation: Implications for neurocognitive aging. *Psychonomic Bulletin & Review*, **28**(6), 1743–1754. doi:10.3758/s13423-021-01963-4

Souder, J. E. (1992). The consumer approach to recruitment of elder subjects. *Nursing Research*, **41**(5), 314–316. doi:10.1097/00006199-199209000-00013

Sparrow, E. P., Swirsky, L. T., Kudus, F., & Spaniol, J. (2021). Aging and altruism: A meta-analysis. *Psychology and Aging*, **36**(1), 49–56. doi:10.1037/pag0000447

Strober, L. B., Binder, A., Nikelshpur, O. M., Chiaravalloti, N., & DeLuca, J. (2016). The perceived deficits questionnaire: Perception, deficit, or distress? *International Journal of MS Care*, **18**(4), 183–190. doi:10.7224/1537-2073.2015-028

Stunkel, L., & Grady, C. (2011). More than the money: A review of the literature examining healthy volunteer motivations. *Contemporary Clinical Trials*, **32**(3), 342–352. doi:10.1016/j.cct.2010.12.003

Tolmie, E. P., Mungall, M. M., Louden, G., Lindsay, G. M., & Gaw, A. (2004). Understanding why older people participate in clinical trials: The experience of the Scottish PROSPER participants. *Age and Ageing*, **33**(4), 374–378. doi:10.1093/ageing/afh109

Toril, P., Reales, J. M., & Ballesteros, S. (2014). Video game training enhances cognition of older adults: A meta-analytic study. *Psychology and Aging*, **29**(3), 706–716. doi:10.1037/a0037507

Urry, H. L., & Gross, J. J. (2010). Emotion regulation in older age. *Current Directions in Psychological Science*, **19**(6), 352–357. doi:10.1177/0963721410388395

Yamashita, T., Keen, J., Lu, C. J., & Carr, D. C. (2019). Underlying motivations of volunteering across life stages: A study of volunteers in non-profit organizations in Nevada. *Journal of Applied Gerontology*, **38**(2), 207–231. doi:10.1177/0733464817701202