

The Effects of Stereotype Threat and Pacing on Older Adults' Learning Outcomes

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This study examined the effects of stereotype threat and pacing on older adult training outcomes. Older adults ($N = 51$; M age = 71 years) were randomly assigned to stereotype threat and pacing conditions and completed computerized library training. Contrary to expectations, stereotype threat was found to improve performance significantly on both training practice exercises and a post-training knowledge test. Self-pacing was not found to affect training performance, but did produce more positive reactions to the training course. Implications for training design and for stereotype threat research are discussed.

Despite legislation that bans age discrimination, negative age stereotyping (i.e., ageism) can lead older workers to experience access and treatment discrimination in the workplace. *Access discrimination* occurs when older workers are passed by for jobs, promotions, training, and other valued opportunities. *Treatment discrimination* occurs when opportunities are provided, but older workers are placed at a disadvantage through policies and procedures that favor younger workers (e.g., Sterns & Gray, 1999). Concern about ageism in the workplace is especially important because almost 22% of the U.S. population is expected to be older than 65 years by 2030 (as cited in Weaver, 1993), and many people currently work past the traditional retirement age of 65 years (e.g., Rosen & Jerdee, 1988).

By participating in training, older adults can remain competitive in the workplace. Yet, access discrimination and negative age-related stereotypes may interfere with older adults' training success. Some common stereotypes of older adults are that they are less creative, more accident-prone, less motivated, more demanding, less promotable, and less technologically savvy (Butler, 1975; Sterns & Doverspike, 1989). Another common stereotype is that older adults are untrainable. This stereotype is often referred to in the adage, "You can't teach an old dog new tricks." The stereotype that older adults cannot be trained is so pervasive that even older adults rate younger

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applicants as more trainable than older applicants (Rosen & Jerdee, 1976).

Stereotype threat is a mechanism through which negative stereotypes of older adults can lead to performance problems. According to Aronson, Quinn, and Spencer (1998), *stereotype threat* refers to “the discomfort targets feel when they are at risk of fulfilling a negative stereotype about their group” (p. 85). This discomfort can rob performance of cognitive resources that must instead be used to maintain self-esteem (Steele & Aronson, 1995).

Because stereotype threat can be invoked in almost any situation in which a stereotype exists, it is not gender-, age-, or even race-specific. Anyone can be the victim of stereotype threat (Aronson et al., 1999; Spencer, Steele, & Quinn, 1999). A stereotype threat effect can be caused by making people aware of a widely held stereotype about their group preceding a stereotype-relevant performance task. A self-threat occurs whereby victims feel that their performance on the task, if poor, would confirm the stereotype. The self-threat can interfere with intellectual functioning, thereby increasing the likelihood that victims will perform in a stereotype-consistent manner.

Stereotype threat research is not focused on identifying individual differences (i.e., genetic or socialized) in a performance domain, but instead is a situationally induced variable. Yet, with its persistence over time, it can lead individuals to redefine their self-concept so that the stereotyped domain is viewed as not important. Thus, their motivation and interest in the domain are reduced (Steele & Aronson, 1995). As Aronson (2002) noted, “stereotypes can spoil a person’s experience—in school or in many social situations—just by suggesting to the target of a stereotype that a negative label might apply to one’s self or one’s group” (p. 281).

Research has demonstrated that stereotype threat can negatively impact women’s, minorities’, and men’s test performance. In particular, stereotype threat has been found to reduce women’s scores on math tests (e.g., Brown & Josephs, 1999; Inzlicht & Ben-Zeev, 2000; Marx & Roman, 2002; Quinn & Spencer, 2001; Shih, Pittinsky, & Ambady, 1999; Spencer et al., 1999; Walsh, Hickey, & Duffy, 1999) and on tasks of negotiating ability (Kray, Galinsky, & Thompson, 2001); African Americans’ and Hispanic Americans’ cognitive ability test scores (e.g., Blascovich, Spencer, Quinn, & Steele, 2001; Gonzales, Blanton, & Williams, 2002; Steele & Aronson, 1995; Stone, Lynch, Sjomeling, & Darley, 1999); and men’s scores on tests of affective skills (Leyens, Désert, Croizet, & Darcis, 2000). For some groups, the effects of stereotype threat on test performance are so robust that stereotype threat has been found to reduce test performance despite high prior achievement in the domain (e.g., Quinn & Spencer, 2001; Spencer et al., 1999).

Stereotype threat research has recently examined the stereotype that older adults experience greater memory deficits than do younger adults. In general,

these studies have found that stereotype threat reduces older adult performance on recall and recognition tasks (e.g., Chasteen, Bhattacharyya, Horhota, Tam, & Hasher, 2005; Hess, Auman, Colcombe, & Rahhal, 2003). In a similar vein, if older adults are threatened with the stereotype that they are untrainable, they are likely to perform less well in training than are older adults not experiencing this threat. In other words, we can expect that the stereotype threat the older adults experience will impede their performance during training tasks. Thus, we propose the following:

Hypothesis 1. Stereotype threat will result in poorer training performance for older adults.

In addition to the impact of negative age-related stereotypes on training performance, the design of training can impact older adults' training success. One of the most important design factors influencing training outcomes for older workers is whether training is timed or self-paced. A meta-analysis of training strategies for older adults (Callahan, Kiker, & Cross, 2003) revealed that out of three instructional methods (i.e., lecture, modeling, active participation) and four instructional factors (i.e., materials, feedback, pacing, group size), self-pacing explained the most variance in training performance. Likewise, Sterns (1987–1988) included time in his list of the seven most critical areas to consider when designing training programs for older workers.

Two reasons why self-pacing might be beneficial for older workers is that older adults often show attentional deficits on visual tasks—resulting in them having greater difficulty focusing on training material than do younger workers—and that their cognitive response time is slower than that of younger workers (e.g., Birren & Fisher, 1995; Maciokas & Crognale, 2003). As a result, training that allows older adults to allocate the amount of time spent on each training task will likely improve their learning outcomes. Therefore, we propose the following:

Hypothesis 2. Self-pacing will improve training performance for older adults.

We also expect the effects of stereotype threat and pacing to interact. In particular, when faced with training that is not age-friendly (i.e., the condition in which training is not self-paced and when stereotype threat is introduced), performance is expected to be extremely poor. We propose the following hypothesis:

Hypothesis 3. Stereotype threat and pacing will interact to affect training performance, such that older adults exposed to

stereotype threat and strict time constraints will perform less well during training than would be expected by the main effects of the two variables.

In addition to training performance, training reactions are likely to be impacted by both pacing and stereotype threat. Although intuition suggests that allowing learners to self-pace will improve satisfaction with training, we were surprised to find that few studies have actually examined this effect. Most studies tend to focus on the performance benefits of self-pacing without investigating learners' reactions to it. In reviewing the literature, however, we did find that students who participate in online courses generally find pacing to be one of the most important features that online learning offers (Roblyer, 1999). In other words, self-pacing is considered a valuable aspect of training. In addition, in a paper describing the advantages of e-learning over more traditional forms of learning, Kruse (2004) stated that "Self-pacing for slow or quick learners reduces stress and increases satisfaction." Although Kruse was referring to online courses, it is likely that self-pacing in any training context can reduce stress and increase satisfaction. Thus, we propose the following:

Hypothesis 4. Older adults who can self-pace during training will be more satisfied with the course than will those who are provided with strict time constraints.

To our knowledge, no research has yet examined the impact of stereotype threat on training reactions. However, it is logical to assume that when negative age-related stereotypes are discussed, older adults will show less positive reactions to training than when these stereotypes are not invoked. Negative stereotyping can have aversive psychological and affective consequences on targeted groups and can eventually lead individuals to experience psychological disengagement from a particular domain (Steele, 1997). Likewise, stereotype threat may cause individuals to experience negative emotional reactions and, as a result, reduce their satisfaction with the situation during which these reactions were generated. We propose the following hypothesis:

Hypothesis 5. Stereotype threat will reduce older adults' positive reactions to training.

Like our hypothesis for an interaction between stereotype threat and pacing on older adults' training performance, we expect that pacing and stereotype threat will have multiplicative effects on training reactions for older adults.

Hypothesis 6. Stereotype threat and pacing will interact to affect training reactions, such that older adults exposed to stereotype threat and strict time constraints will have extremely negative reactions to training.

The Present Study

Participants in the present study signed up for a library training session that provides instruction on how to use the university's online library catalog and databases. Although there is no single definition of what constitutes an *older adult* (Abeles et al., n.d.), researchers typically characterize older adults as individuals in their early/mid 60s and older (e.g., Kliegel, Martin, McDaniel, & Phillips, 2007; Newson & Kemp, 2007; Schneider, Daneman, & Murphy, 2005). Moreover, the two age-related stereotype threat studies previously mentioned used participants ranging from 62 to 84 years (Hess et al., 2003) and 61 to 88 years (Chasteen et al., 2005).

Thus, we specifically targeted individuals aged 60 and older to participate in our study. Pacing and stereotype threat were manipulated. Dependent variables included performance on practice exercises and a post-training test, as well as participant reactions to the training they received.

Method

Participants

We recruited 68 participants from an adult continuous learning program at a large southeastern university. After eliminating participants who did not pass the manipulation check, our sample size was 51 (31 females, 20 males). The mean age of participants in the final sample was 71.9 years (range = 61–91 years). In addition, 80% were Caucasian, and 16% reported working part-time. Job titles of our working participants included such varied positions as courier, customer service manager, personal assistant, registered nurse supervisor, and orthopedic consultant.

Design

We used a 2 (Threat) \times 2 (Pacing) factorial design for our study. Stereotype threat was manipulated by providing information to participants about research findings suggesting that there are age-related differences in computerized library training and by making age salient to participants.

The stereotype threat condition stated

We are interested in understanding how to best provide training to a wide range of library users at [this institution]. Previous research has shown that there are age-related differences in training outcomes. In this study, we are interested in understanding possible age-related differences on computerized library training. In order to accomplish this, we'll be comparing your performance with the performance of others from different age groups. Thus, it is important that we know your age. Please write your age here: _____ years.

The no-threat condition stated

We are interested in understanding how to best provide training to a wide range of library users at [this institution]. Previous research has shown that there are no age-related differences on computerized library training. That is, older adults tend to perform as well as younger adults on computerized library training.

This manipulation is very similar to others that have been used to initiate stereotype threat in participants (e.g., Blascovich et al., 2001; Shih et al., 1999; Spencer et al., 1999; Walsh et al., 1999). Although subtle, this manipulation raises the existence of age-related differences in training performance without directly mentioning the stereotype. In general, studies of stereotype threat do not manipulate stereotype threat by specifically stating the stereotype they are trying to induce; rather, they allow participants to infer the stereotype from information they have been given or from conditions that have been created to ignite the stereotype.

One successful strategy has been to mention previous research that has shown group differences on a particular test or subject matter (e.g., Spencer et al., 1999). Other strategies for initiating stereotype threat have included providing information to participants about what the test will measure (e.g., telling participants that a particular test will be diagnostic of their ability; Steele & Aronson, 1995), having participants complete demographics forms or questionnaires about their background and identity prior to taking a test (this serves to make certain components of their identities salient to them; e.g., Shih et al., 1999), having participants take tests in a group setting in which they are the minority (e.g., Inzlicht & Ben-Zeev, 2000), or using research assistants/test administrators whose sex or ethnicity make participants aware of their own sex/ethnicity and related stereotypes (e.g., Marx & Roman, 2002).

Pacing was manipulated in the present study by offering timed and self-paced practice exercises. Participants in the timed practice condition received 3 min of practice time for each of three topics. After the 3 min, they were told to move on to the next topic. The time limits for practice were chosen in consultation with the librarian about how long it generally took trainees to complete the practice exercises in her experience with teaching the course. The librarian recommended 3 min per topic area, as this time limit was adequate for completing the exercises, but would also be sufficiently challenging so as to prevent ceiling effects on performance.

Participants in the self-paced practice condition were allowed to spend as much time as they needed for each topic; however, they were still only allotted the total practice time of 9 min. We thought that it was important to keep the total amount of practice time consistent across conditions so that we would not confound amount of practice with the pacing of it.

Measures

Practice exercises. The practice exercises were designed to offer hands-on practice with the subject matter presented in the training; specifically, how to find books, journals, and journal articles using the library's online database system. An example exercise is "Find a book by Virginia Woolf and provide the following information: Title, call number. On what floor of the library will you find this book?" The exercises were scored as the number of correct responses given by each participant. The possible range of scores for the practice exercises was from 0 to 21.

Post-training test. The post-training test asked learners to perform several searches using the library's online database system to search for books, journals, and journal articles. The items that were included in the post-training test were similar to those in the practice exercises. A sample test question is "Does the [university] library general collection have the journal, *Psychology and Marketing*? What is the call number for the journal, if it is available in the general collection? Are the 2001 issues bound or on micro-film?" Similar to the practice exercises, the test was scored as the number of correct responses given by each participant. The possible range of scores for the post-training test was from 0 to 24.

Training reactions scale. The training reactions scale was adapted from Grove and Ostroff (1991). Sample items from this scale are "I think that I will use the knowledge gained from this training in the future," and "There was an appropriate balance between lecture, participant involvement, and exercises in the program." Each item assessed participants' reactions to various components of the training (e.g., program objectives, instructor,

instrumentality of program). Participants were asked to rate the extent to which they agreed or disagreed with each statement on a 5-point scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). The first eight items in the training reactions scale were summed to create an overall value of participants' satisfaction with the training program. Cronbach's alpha for these eight items was .78.

Overall training reactions were also measured via a one-item scale in which participants were asked to rate the program as a whole. Responses were rated on a 5-point scale ranging from 1 (*poor*) to 5 (*excellent*).

Demographics questionnaire. We collected demographic information, including age, sex, ethnic background, self-reported computer knowledge, whether participants were currently employed, whether participants had received any formal library training, how often they used the university library, and how they categorized themselves in terms of their age group (i.e., whether they considered themselves to be very young, young, middle age, elderly, or old). The demographic questionnaire also included items in which participants rated their knowledge of the library database system before and after the training course. Knowledge of the database system prior to training was rated on a 5-point scale ranging from 0 (*never used*) to 4 (*expert*), while post-training knowledge of the database system was rated on a 4-point scale ranging from 1 (*novice*) to 4 (*expert*).

Procedure

The older adults in our study were motivated to participate as a way to receive instruction on the university's library database system. As members of the adult continuous learning program, they were given library privileges at the university; in fact, over 25% reported having used the library for resources in the past. However, only about 12% reported having received any formal library training.

The setting for the study was a room in the university library that was equipped with 18 computer stations and a projector for the training demonstration. A reference librarian, who regularly teaches courses on the computerized library database search system, conducted the training. The librarian was partially blind to the experimental conditions in that she knew the timing condition of the participants, but she did not know whether the participants were assigned to the stereotype-threat or the no-stereotype-threat condition. Two student investigators assisted with the data collection and were also blind as to the stereotype threat condition of each of the participants.

Participants were given a packet that contained an instruction sheet, a training guide, training practice exercises, a post-training test, and a

demographic questionnaire. The investigator instructed participants to open the packet and to remove the instruction sheet. Participants were told to read the instructions carefully, because they would be asked about the instructions later on in the study. The instruction sheet contained the stereotype threat manipulation, information about the steps in the training, and what the participants could expect to learn from the training. After reading this material, the participants were asked to return the instruction sheet to the packet and to take out the training guide.

The librarian then began a 20-min lecture session during which she demonstrated how to use the library database system to search for books, journals, and journal articles. The lecture provided instruction on how to perform database searches using author names, book/journal titles, and keywords as search terms. She also provided demonstrations of searches for each type of search that she taught. After the lecture portion of the training was completed, participants completed practice exercises.

The practice exercises that were used during the present study have been used previously by the librarian for database training of university students. In these practice exercises, participants were asked to perform library database searches that were similar to those that were demonstrated during training. The searches required by the practice exercises also followed the same order of the searches demonstrated by the librarian during training (i.e., books searches were first, then journal searches, then journal article searches), and each search was slightly more complex than those before it. As a result, the types of searches participants were asked to perform in the practice exercises increased in difficulty as participants progressed through them.

Participants were given 9 min to complete the practice exercises in both the timed- and self-paced conditions. Next, participants completed a 10-min test on the material they had just learned. The participants then returned the post-training test to the packets and completed a demographic questionnaire. That questionnaire included a manipulation check designed to measure whether or not participants were aware of the stereotype threat manipulation. The manipulation check item was "Before you began the training here today, you were given instructions about the training. These instructions included information about previous research on training. Previous research has found . . .". Participants were asked to circle one of three choices: "age-related differences," "no age-related differences," or "do not remember."

At the conclusion of the study, the participants were thoroughly debriefed by one of the student investigators as to the purposes of the study, the independent and dependent variables involved, the need for the subtle deception regarding the statement that previous research has shown that there are

no age-related differences on computerized library training, and how to reach the researcher or a complimentary counseling center should any concerns arise. Because the participants were likely to have contact with future participants, the debriefing was conducted orally. At this time, participants were also awarded raffle prizes and certificates of training completion for their participation in the study.

Results

The results are organized by the dependent variables tested, starting with training performance variables (i.e., practice exercise and post-training test scores) and then moving on to training reactions. All results were analyzed using SPSS Version 11.5 with an alpha level of .05, unless otherwise stated. Table 1 presents the means, standard deviations, and intercorrelations among the study variables.

Sample size was reduced to 51 because 17 participants did not pass the manipulation check. This was not terribly surprising, because our stereotype threat manipulation was subtle. A chi-square test reveals no significant differences in attrition across the study conditions, $\chi^2(1) = 1.04$, *ns*. Also, whether or not one passed the manipulation check was not found to relate significantly to the independent variables (i.e., stereotype threat, pacing) or dependent variables (i.e., practice exercise scores, post-training test scores, training reactions).

To ensure that participants conceived themselves as "older adults," we asked participants (through an item on the demographic form) to choose the age category that they believed described them best. The age category options included *very young*, *young*, *middle age*, *elderly*, and *old*. Over two thirds (specifically, 68.2%) of participants categorized themselves as *elderly*, suggesting that, in fact, our participants did classify themselves as older adults.

Training Performance

Age was negatively correlated with practice exercise performance ($r = -.53$, $p < .01$) and with post-training test performance ($r = -.40$, $p < .01$). In other words, the older participants in the study performed more poorly than did the younger participants on both the practice exercises and the post-training test. Thus, age was used as a covariate in the analysis of training performance. In addition, the practice exercise scores were found to be highly correlated with post-training test scores ($r = .54$, $p < .01$). Therefore, data were analyzed using a 2×2 MANCOVA in which the independent variables were stereotype threat and pacing, and the dependent variables were practice exercise and post-training test scores.

Table 1
Means and Intercorrelations Among Study Variables

Variable	<i>M</i>	<i>SD</i>	1	2	3	4	5
1. Age	71.94	7.32	—				
2. Practice exercise performance	4.86	3.51	-.531**	—			
3. Post-training test performance	8.37	5.16	-.403**	.537**	—		
4. Training reactions: single-item measure	3.00	0.80	-.049	.096	.011	—	
5. Training reactions: eight-item measure	29.60	4.33	-.092	.169	.318*	.388**	.78

Note. *Ns* range from 46 to 51.
p* < .05, two-tailed. *p* < .01, two-tailed.

Table 2

Estimated Marginal Mean Practice Exercise and Post-Training Test Scores by Stereotype Threat and Pacing Condition

	Self-paced		Timed	
	<i>M</i>	<i>SE</i>	<i>M</i>	<i>SE</i>
Practice exercise scores				
Stereotype threat	5.58	0.70	7.80	1.12
No stereotype threat	3.95	0.66	3.16	0.97
Post-training test scores				
Stereotype threat	9.28	1.13	12.45	1.81
No stereotype threat	7.37	1.06	7.75	1.58

Note. Means have been adjusted for the covariate of participant age.

Table 2 presents the training performance means and standard errors adjusted for the covariate (i.e., age) for participants in each condition. These means reflect the number of items that participants answered correctly during the practice exercises and the post-training tests. The overall MANCOVA results for stereotype threat were significant: Hotelling's trace = .318, $F(2, 43) = 6.83$, $p < .01$, partial $\eta^2 = .241$. Follow-up ANCOVAs reveal a significant effect of stereotype threat on both practice exercise and post-training test performance. Specifically, older adults in the stereotype threat condition performed significantly better on the practice exercises ($M = 5.48$, $SD = 3.55$), $F(1, 44) = 12.41$, $p < .01$, partial $\eta^2 = .220$; and on the post-training test ($M = 9.39$, $SD = 5.37$), $F(1, 44) = 5.22$, $p < .05$, partial $\eta^2 = .106$, than did older adults in the no-threat condition (practice exercises, $M = 4.31$, $SD = 3.44$; post-training test, $M = 8.12$, $SD = 4.61$). Surprisingly, these findings were opposite of predictions.

An investigation of the errors made during the practice exercises reveals that the most common errors involved errors of omission. Because of the time constraints given for practice, participants were often unable to complete all of the practice items in the time allotted. A 2×2 ANCOVA was conducted to test whether the study groups differed in the number of omission errors. Threat and timing were the independent variables, the number of unanswered practice exercises was the dependent variable, and age was the covariate. Age was used as a covariate because it was highly correlated ($r = .50$, $p < .01$) with the number of unanswered practice exercise items. The results indicate a significant effect of stereotype threat on omission errors,

$F(1, 44) = 7.73$, $p < .01$, partial $\eta^2 = .149$. Specifically, older adults in the no-threat condition left significantly more practice exercises unanswered ($M = 15.38$, $SD = 3.81$) than did older adults in the stereotype threat condition ($M = 14.39$, $SD = 3.91$).

Of the items that the participants did complete, the primary errors involved book searches using the library's online database system. In these searches, participants tended to miss items that required them to search by a particular author and book title. Specifically, when participants were expected to enter the author's name and a book title into the search fields in order to determine whether the library owned the book, participants responded incorrectly 18.4% of the time. Moreover, when asked to record the book's call number, they often wrote down an incorrect or incomplete call number, causing them to miss the item. Errors in recording the book's call number occurred approximately one third (32.7%) of the time. Errors were also made during the practice exercises when participants were asked to search for books using an author's name only. The primary error made during these searches involved finding the library floor on which a book written by this author might be found. To determine the book's location, participants had to use the library database system to find the call number of the book and a library handout listing the call numbers to be found on each floor. Errors in deducing a book's location in the library from this information occurred 16.3% of the time. Chi-square tests did not reveal significant differences across the four study groups for any of these errors.

No other differences were found with regard to pacing and its interaction with stereotype threat on practice exercise and post-training test performance. Thus, no support was found for Hypotheses 1, 2, or 3.

Training Reactions

As the two measures of training reactions completed by participants were highly correlated ($r = .39$, $p < .01$), these dependent measures were analyzed together in a 2 (Threat) \times 2 (Pacing) MANOVA. Overall MANOVA results for pacing were significant: Hotelling's trace = .104, $F(2, 41) = 3.35$, $p < .05$, partial $\eta^2 = .140$. An examination of the individual follow-up ANOVAs for the single- and eight-item measures reveals a significant effect of pacing on training reactions for the single-item measure only, $F(1, 42) = 4.31$, $p < .05$, partial $\eta^2 = .093$. Specifically, for this measure, participants in the self-paced condition ($M = 3.16$, $SD = 0.77$) rated the overall training program more favorably than did participants in the timed practice condition ($M = 2.64$, $SD = 0.74$). This result was not found, however, when training reactions were analyzed via the eight-item composite measure, $F(1, 42) = 0.24$, *ns*. Thus, hypothesis 4 was only partially supported.

No differences were found with regard to stereotype threat or its interaction with pacing on either the single- or eight-item measure of training reactions. As a result, Hypotheses 5 and 6 were not supported.

Although not directly hypothesized, we also found that training reactions were positively related to post-training test scores ($r = .32, p < .01$). In other words, the better the participants did on the post-training test, the more satisfied they were with the training course. This finding is consistent with past research that has shown a positive correlation between student grades and student evaluations of educational courses (e.g., Blackhart, Peruche, DeWall, & Joiner, 2006; Howard & Maxwell, 1980, 1982).

Discussion

The present study explored how stereotype threat and pacing impact the training outcomes (i.e., performance, reactions) of older adults. Although we hypothesized that stereotype threat would reduce older adult performance, our study reveals that stereotype threat actually improved the scores of older adults on both the practice exercises and the post-training test. These results are surprising, given that previous studies have reported significant reductions in the task performance of stereotype-threatened groups (e.g., Blascovich et al., 2001; Inzlicht & Ben-Zeev, 2000; Spencer et al., 1999; Steele & Aronson, 1995).

An important difference between our study and prior stereotype threat studies is that a training intervention occurred between the introduction of the stereotype threat and the measurement of test performance. In prior studies, stereotype threat was manipulated, and testing occurred immediately following the manipulation. In the present study, the training may have given older adults in the stereotype threat condition the necessary task efficacy that enabled them to disconfirm the stereotype and overcome the threat. Future research should further examine this idea, as we did not have a no-training control group.

Consistent with predictions, we found that self-pacing produced positive reactions to the training. This finding suggests that the pacing condition may actually have been effective in offering the benefits of self-pacing to participants, even though pacing was not found to improve practice exercise or post-training test performance significantly. In addition, as most research on self-pacing tends to focus on the performance benefits of self-pacing without looking at its impact on training reactions, the finding that self-pacing can also enhance training satisfaction lends even greater support to its use in training.

Study Limitations

Our participants were members of an adult continuous learning program. Thus, they may be more highly motivated to learn and to continue with their education than the general population. Because of their high appreciation for lifelong learning, they may have viewed the stereotype threat as a challenge. They might not agree with traditional stereotypes about people their age and, as a result, work harder to contradict negative stereotypes when stereotype threat is activated. Approximately one sixth of our participants indicated that they work part-time. Thus, our participants may be similar to other older adults who continue to work into their 60s, 70s, and 80s. Therefore, although generalizability to all older adults is unwarranted, our results may apply to many older adults who work past the traditional retirement age of 65 years.

The operationalization of our self-paced practice variable is another limitation to our study. We allowed trainees in the self-pacing condition to allocate time as needed to each of the practice exercises, but we limited practice to 9 min total. We thought that this would allow participants to receive some of the benefits of self-pacing (i.e., choosing which practice problems to spend time on and which to progress through quickly), while still keeping the amount of time available for practice controlled so that we did not confound pacing with amount of practice. However, because we controlled the total amount of time available for practice, it may explain why we did not find a strong positive effect for self-pacing on training performance.

Finally, because of our relatively small size, it is possible that individual differences that can affect training performance (e.g., ability, experience) were not equally distributed across the conditions. Thus, it is critical that the results are replicated in future research. Replication is also critical because we found results that are inconsistent with a relatively large amount of research that has demonstrated the negative effects of stereotype threat.

Practical Implications

In this study, we found that making age salient to participants by a simple change in the instructions given to them significantly impacted their performance during training. This finding has implications for the design of training for all types of workers, in addition to older adults. One such implication is that making a small change to a set of instructions provided prior to a training course (e.g., adding a short demographic form to collect information about the types of people attending the training) could serve to significantly impact the training performance of certain groups.

Our results also imply that allowing older adults to allocate the amount of time they spend on each set of practice exercises is not enough to increase their training performance. Although previous research (Sterns, 1987–1988) has suggested that self-pacing is beneficial for older adults during training, this may require giving participants an unrestricted amount of time to complete training tasks. In our study, participants were only given as much total time as the timed practice group in order to control for the amount of training practice.

Directions for Future Research

To our knowledge, the present study is one of the first to examine stereotype threat in a training context. If the findings of our study are reliable, then they suggest that the negative effects of stereotype threat may be short lived and possibly only demonstrable when testing occurs immediately following the threat. Perhaps the opportunity to train prior to testing gave participants enough self-efficacy to rise to the challenge and debunk the stereotype. Future research should examine how threat operates through training to influence task performance.

Future research would also benefit from a more comprehensive theory of how stereotype threat operates to impact the performance of various groups. This theory should include potential moderators (e.g., training interventions provided after the stereotype threat manipulation but before the performance test; level of task difficulty; type of participant) and mediators of the stereotype-threat/performance relationship (e.g., anxiety, task withdrawal).

This study extended the concept of stereotype threat to the training of older adults. Although, by and large, research has found that stereotype threat decreases performance in stereotyped domains, our study found that quite the opposite can be true. In this study, older adults who were given instructions stating that research has found age-related differences in task performance and who were explicitly asked to record their age actually performed better on practice exercises and a post-training test than did older adults who were told that research has found no age-related differences in training performance. This finding suggests that stereotype threat, generally a negative force on individual performance, can actually increase task performance under certain prescribed conditions.

We hope that this study will encourage researchers to begin studying stereotype threat as it applies to the training of older adults. Because older adults constitute a growing segment of our workforce, it is important that we now turn our focus to the way in which our training techniques (e.g., pacing)

and stereotypes of older adults might impact their performance on training tasks. Further research in this area will provide us with a stronger understanding of how and when stereotype threat acts to impede or, as our study suggests, to improve the training performance of older adults.

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