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Threat or Boost? Social Comparison Affects Older People's Performance Differently Depending on Task Domain

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Objectives. In this research, we investigate whether social comparison with younger people can result in either a stereotype-based threat or boost in older people's performance.

Methods. Study 1 used nationally representative data to establish domains of performance in which older people are either stereotypically disadvantaged or advantaged relative to younger people. Study 2 was an experiment to test how a potentially threatening versus control versus enhancing comparison with younger people would affect performance in negatively and positively stereotyped task domains.

Results. As predicted, compared with the control condition, stereotype threat caused performance decrements in both task domains. This effect was partially mediated by anxiety. Moreover, the enhancing social comparison boosted performance, but only on a crossword task, a task on which older people's abilities are favorably stereotyped.

Discussion. The research demonstrates that a threatening comparison can result in underperformance by older people both in negatively and positively self-stereotyped task domains. It also demonstrates that social comparison with younger people can enhance older people's performance in a positively stereotyped task domain. The implications for creating circumstances likely to enable older people to achieve their full potential are discussed.

Key Words: Age—Social comparison—Stereotype boost—Stereotype threat—Test performance.

THIS research examines the impact of stereotypical expectations on older people's cognitive performance. Stereotypes that competence and cognitive ability decline with age are pervasive in Western society (Abrams, Vaclair, & Swift, 2011; Age UK, 2005; Cuddy, Norton, & Fiske, 2005; Kite & Johnson, 1988). These negative age stereotypes influence whether older people exhibit memory loss (Hess, Auman, Colcombe, & Rahhal, 2003; Hess, Hinson, & Statham, 2004; Levy & Langer, 1994; Rahhal, Hasher, & Colcombe, 2001) and their appraisal of memory loss (Erber, Szuchman, & Rothberg, 1990). However, positive stereotypical attributes such as wisdom, knowledge, and experience are also associated with old age (Baltes & Staudinger, 1993) and can have a positive influence (e.g., Levy & Langer, 1994).

This article builds on research investigating behavioral and social outcomes of age stereotypes (for review, see Meisner, 2012) and on research investigating stereotype threat and boost (Shih, Pittinsky, & Ambady, 1999) by testing whether social comparisons with younger people can enhance and not just damage older people's cognitive performance. We report two studies. The first establishes that older people believe they have a stereotypic advantage over younger people as crossword solvers. The second, an experiment, tests how a threatening or enhancing social comparison with younger people affects older people's cognitive performance.

Stereotype threat theory (Steele, 2010) and research on stereotype threat with older people (Abrams et al., 2008; Abrams, Eller, & Byrant, 2006) indicate that a negative age stereotypic contrast with younger people can cause a decrement in older people's performance. We contend that a positive age stereotypic contrast can enhance performance on a relevant task, an effect called stereotype boost (Shih, Ambady, Richardson, Fujita, & Gray, 2002; Shih et al., 1999).

Using stereotype activation paradigms (e.g., Banaji & Greenwald, 1994; Bargh, Chen, & Burrows, 1996), previous research has shown that older adults primed implicitly with negative age stereotypes subsequently assimilate behavior in line with the age stereotype, showing reduced walking speed (Hausdorff, Levy, & Wei, 1999), decrements in recall (Hess et al., 2003, 2004; Levy, 1996), and resistance to accept medical interventions (Levy, Ashman, & Dror, 1999–2000). More explicit, but still subtle techniques have shown that the language used to frame tasks influences people's ability to perform well. For instance, instructional language that places greater emphasis on memory ability can put older adults (mean age 69) at a disadvantage in a memory test compared with younger participants (Rahhal et al., 2001). One explanation for this is stereotype threat. This is a situational threat that places people at risk of confirming a negative societal stereotype (or expectation) regarding the performance of a group they belong to (Steele, 1997; Steele &

Aronson, 1995). Because older adults are characterized by negative stereotypes regarding mental competence (Cuddy & Fiske, 2002), they are susceptible to stereotype threat. Only a few studies have tested the effects of stereotype threat on older people. These show that stereotype threat worsens older adults' memory performance (Hess et al., 2003; Kang & Chasteen, 2009), general cognitive performance (Abrams et al., 2006), and math performance (Abrams et al., 2008).

Previous research has shown that stereotype threat can be reduced when an alternative, high status and positively stereotyped group identity is made salient (Rydell, McConnell, & Beilock, 2009). It can even lead to a "boost" in performance levels on tasks consistent with the positive stereotype and social identity (Armenta, 2010; Shih et al., 1999, 2002). For instance, Asian American women performed better on a math test when their (nonthreatened) Asian identity was salient but performed worse when their (threatened) gender identity was emphasized (Shih et al., 1999). Furthermore, nontargets (i.e., those who are in a testing domain but are not connected to the negative stereotype) show "stereotype lift" (also a rise in performance) when a comparison is made with a group that is stereotypically inferior in the performance domain, for example, among men who compare with women in tests of math ability (see Marx & Stapel, 2006; Marx, Stapel, & Muller, 2005; Walton & Cohen, 2003). Although stereotype lift and boost may follow different social comparisons, both effects suggest that a legitimate downwards social comparison can enhance performance. In a similar vein to stereotype threat, the legitimacy of the comparison comes from socially shared stereotypes that provide expectations surrounding the performance of group members. Thus far, the possibility that downwards social comparisons may enhance older people's performance has not been examined. Therefore, this research investigates the potential for stereotype boosting effects with older people.

Social Comparison, Stereotype Dimension, and Performance Domain

Few studies have examined the benefits of positive age stereotypes (e.g., Levy & Langer, 1994; Levy & Myers, 2004; Levy, Slade, Kunkel, & Kasl, 2002), even fewer have studied the possibility of boost effects. Both "boost" and "lift" research suggests that performance will only be enhanced if stereotypic comparisons are relevant to the specific performance domain. Furthermore, Levy and Leifheit-Limson (2009) found that positive age primes relating to physical and cognitive domains had stronger effects in performance domains that matched the stereotype content. Based on this, we predict that an enhancing (i.e., downward) social comparison might only boost performance on a specific task on which there is also a stereotypic advantage, compared with a control condition. Note that our hypothesis suggests that it is not the task itself that creates the basis of a threat or boost effect but rather the potential to confirm a socially legitimate stereotype. Therefore, we

would only expect boost to occur on a task that is relevant to the positively stereotyped dimension. Study 1 establishes potentially relevant task domains on which older people are positively stereotyped.

Conversely, stereotype threat might still be observed even on tasks that favor older people. There are three reasons why this might occur. First, the stereotype of incompetence undermines general abilities by serving as a reminder the groups' overall lower status. Secondly, negative age stereotypes are more salient. Meisner's (2012) meta-analysis revealed that effects of negative primes were three times larger than those of positive primes. Therefore, negative stereotypes are more likely to have a negative impact across performance domains whereas effects of positive age stereotypes may be limited to performance domains where there is a closer fit (Levy & Leifheit-Limson, 2009). Third, stereotype threat can disrupt performance on tasks that are not relevant to the stereotyped domain by eliciting anxiety in the testing situation (Ben-Seev, Fein, & Inzlicht, 2005), whereas there is no comparable evidence relating to anxiety levels following stereotype lift or boost.

Mechanisms for Threat and Boost

Anxiety is one important mediator of stereotype threat effects (Steele, 2010; Wheeler & Petty, 2001). Anxiety can affect working memory, leading to decrements in performance (Schmader & Johns, 2003). General support for the mediating role of anxiety has been mixed (e.g., Hess et al., 2003; Spencer, Steele, & Quinn, 1999; Steele & Aronson, 1995), but three previous studies found that anxiety partially mediates effects of threat on older people's cognitive performance (Abrams et al., 2006, 2008). However, previous research has not disambiguated whether such anxiety results from specific concerns about the performance domain or from the more general threat arising from a negative status comparison. If anxiety is specific, it would only mediate effects on the negatively stereotyped domain. If anxiety is a more general effect of a negative status comparison, it would affect performance in both the negative and positive domains.

With respect to boost effects, we do not expect that anxiety will act as a mediator. The absence of threat should remove threat-related anxiety, and it is unclear whether the presence of a boost will reduce anxiety further. If anxiety is lowered or nonexistent, it would not be possible for anxiety levels to mediate the boost effect on performance.

Summary

The present research makes age stereotypes salient through comparison with younger people, and either focuses on a negative (threatening) or positive (boosting) stereotype dimension. It then tests elderly participants' performance on tasks relevant to both dimensions, and measures test-related anxiety. We test three hypotheses. First, based on stereotype

Table 1. Percentage of Respondents Who Perceive Competencies to Be Greatest Among 25- or 75-Year Olds

	25-Year olds	No difference	75-Year olds	$\chi^2(2, n = 636)$	<i>p</i>
Being polite	3.30	28.93	67.77	402.01	<.001
Settling arguments	3.93	33.49	62.58	328.14	<.001
Understanding others' viewpoints	7.08	31.45	61.48	283.37	<.001
Solving crossword puzzles	9.59	31.13	59.28	236.9	<.001
Making financial decisions	13.84	31.45	54.72	160.4	<.001
Healthy diet	19.34	37.42	43.24	59.27	<.001
Managing staff	21.38	42.61	36.01	45.03	<.001
Taking direction from a supervisor	29.87	39.47	30.66	10.82	.004
Looking after children	35.69	37.11	27.20	10.95	.004
Driving	39.94	36.48	23.58	28.34	<.001
Being creative	43.55	42.30	14.15	105.46	<.001
Taking enough exercise	57.86	31.60	10.53	214.54	<.001
Learning new skills	72.48	21.70	5.82	462.75	<.001
Using the internet to buy something	84.75	14.31	0.94	773.61	<.001

Note. Participant sample aged 60 and over.

threat theory, threat should harm performance compared to a control (no comparison) or boost condition. Second, participants in the threat condition should experience elevated anxiety compared to the control condition. Anxiety should partially mediate the effect of threat on performance, but it is not expected to mediate boost effects. Third, based on stereotype boost and lift research, a favorable social comparison should boost performance when it highlights a positively stereotyped dimension that matches the task domain.

STUDY 1

Previous research on the impact of stereotypes on older people's performance has generally employed generic descriptive stereotypes (e.g., by priming with traits such as "enlightened" "wise," Levy, 1996). These trait-based stereotypes specify task domains or competencies that are stereotypical of older people. For example, mathematical, cognitive, and memory skills are domains in which older people are stereotypically assumed to be less competent than younger people (Abrams et al., 2006, 2008; Hess et al., 2004). A requirement for the present research was to identify a quantifiable task that would represent a positive stereotypical dimension for older rather than younger people. Therefore, Study 1 explored societal age stereotypes of various task domains to identify such a task.

Methods and Procedure

For stereotype threat to occur, the target must believe that stereotypes about the group are socially pervasive (Steele, 2010). To establish consensual stereotypes about older people, we asked questions in an omnibus survey of a nationally representative random stratified sample of 2,113 respondents aged 16–95 years in the UK. The survey was conducted by a major market research organization (TNS) using computer-aided personal interviews. Respondents were to consider the following domains of competence: having a healthy diet, solving a crossword, looking after children, managing

staff, driving, using the internet to buy something, taking direction from a supervisor, making financial decisions, taking enough exercise, being polite, learning new skills, settling arguments, being creative, and understanding other people's view points (Ray, Sharp, & Abrams, 2006). They were then asked to think about whether performance in each domain would be better by most 25 year olds, most 75 year olds, or both would perform equally well.

Results and Discussion

Because the focus of our experimental studies is the impact of societal stereotypes among people aged 60 years and above, we analyzed the responses of all participants aged 60 years and above ($n = 636$, $M_{\text{age}} = 72.15$, $SD = 7.1$). In all domains, chi-square tests revealed clear and significant differences in stereotypes of age-related competence. As shown in Table 1, a typical 25-year old was judged to be significantly better at looking after children, driving, being creative, taking enough exercise, learning new skills, and using the internet. Age groups were reported to be equally as good at taking directions from a supervisor. Respondents judged that a typical 75-year old would be more likely to be polite, to be able to settle arguments, to understand other people, be good at managing staff, to make good financial decisions, and to have a healthy diet.

Importantly for the present research, a typical 75-year old was much more likely to be judged to be better at solving crossword puzzles, $\chi^2(2, n = 636) = 236.90$, $p < .001$. Fifty-nine percent judged that people more than 75 years would perform better on crossword puzzles, whereas only 9% judged that a 25-year old would be better. This indicates a strong stereotypical advantage and almost no disadvantage for older people in this domain. Analysis using the entire sample showed this perception was widespread. Fifty-nine percent judged that a typical 75-year old would be superior at solving crossword puzzles compared with 25-year olds, $\chi^2(2, n = 2,113) = 795.1$, $p < .001$.

Study 1 established that the public stereotypes are highly consistent with previous experimental research revealing low expectations of older people's performance on general cognitive tasks (Prohaska, Parham, & Teitelman, 1984; Singer, 1986) and that older people have a particular competence in more social domains such as interpersonal problem solving (Blanchard-Fields, 2007). Importantly, we established a nonsocial problem solving task in which there is a clear societal consensus that older people have "greater" competence than younger people, which is also relevant to the positive age stereotype denoting experience, wisdom, and knowledge increase with age. Hambrick, Salthouse, and Meinz (1999) suggest that solving crossword puzzles require both knowledge and reasoning abilities similar to those used in other "real-world" activities that require experience, wisdom, and knowledge to complete.

STUDY 2

Study 2 tested the impact of a potentially threatening social comparison and a potentially enhancing social comparison on older people's performance in task domains in which they are stereotypically inferior or superior to younger people. The inferior tasks were chosen to enable direct comparison with previous studies showing that cognitive performance is affected by stereotype threat (Abrams et al., 2006, 2008, though we note comparable effects have been obtained with memory performance (e.g., Hess et al., 2003)). The crossword puzzle was chosen as a superior performance domain because Study 1 demonstrated that there is a consensually positive stereotype of older people's ability to perform well on this task, therefore it should match the positive stereotype being activated. As well as differentiating the impact of threat and enhancement (boost) in these two task domains, the experiment also investigated anxiety as a potential mediator.

Design and Participants

One hundred and twenty-five participants were recruited from various Age UK day centers in the South East of England. Five participants were excluded from the analysis due to incomplete data. The remaining 120 participants ranged in age from 61 to 95 years, averaging 76.16. Forty-nine were men (40.8%) and the remaining 71 were women (59.2%). The majority of participants were retired (90%) and lived independently in their own home (80%). All were in good mental and physical health, and the average age participants left full-time education was 15 years ($SD = 1.4$).

Participants were assigned randomly to one of three conditions (control, threat, and boost) in a between-subjects design. Their performance was measured in both a positive task domain (crossword) and a negative task domain (mathematical and cognitive). Additional measures were a manipulation check of threat concern, and a measure of self-reported test-related anxiety.

Procedure

Participants were invited to take part in the research project described as a lifestyles survey that would involve some everyday problem solving and answering some questions about their feelings, attitudes, and beliefs. They were tested in a private location individually by a 23-year-old female experimenter who informed participants that their responses were confidential and that they were free to withdraw from the study at any time. To ensure consistency, further instructions were given via audio recording.

In the "threat condition," a negative comparison with younger people was made salient (as in Abrams et al., 2006, 2008). Participants were informed that "It is widely assumed that intellectual performance such as math performance and spatial skills decline with age, so the purpose of this study is to see whether older people do perform more poorly on intellectual tasks than younger people. Both older and younger people will be taking part in this research."

In the "control condition," in line with previous research, there was no reference to younger or older people and participants were merely informed that "The purpose of this study is to see how people differ in their responses on different tasks. Different types of people will be taking part in this research."

In the "boost condition," there was a positive social comparison that favored older people "It is widely assumed that experience and wisdom increases with age so that people become better at solving all kinds of everyday practical problems. The purpose of this study is to see whether older people do solve problems more effectively than younger people. Both older and younger people will be taking part in this research."

After completing the dependent measures and manipulation check, participants were asked if they had any suspicions or questions and were fully debriefed verbally and in writing.

Measures

Manipulation check.—Following Marx and Stapel (2006), two items were used to measure threat concern, that is, the accessibility of thoughts that participants would be judged in terms of their age. These were "Were you worried that your ability to perform well on the test was affected by your age?" and "Were you worried that if you performed poorly on the test, the researcher would attribute your poor performance to your age?" The response scale ranged from 1, *not at all* to 7, *very much*. We computed a mean score (Cronbach's $\alpha = .82$), higher numbers reflecting more threat concern.

Crossword performance.—The crossword was selected from a national newspaper and was of moderate difficulty. All clues were definitions, anagrams, or clues to factual

Table 2. Means, Standard Deviations, and Correlations Among Variables

Variable	2.	3.	4.	5.	<i>M</i>	<i>SD</i>
1. Age	-.443***	-.411***	.149	.068	76.16	8.3
2. Crossword		.405***	-.390***	-.313**	13.43	8.29
3. Cognitive (standardized)			-.384***	-.325***	0.00	1.00
4. Anxiety				.532***	2.69	1.19
5. Threat concern					2.91	1.84

Note. ** $p < .01$. *** $p < .001$.

answers. There were no cryptic clues. Participants were given 3 min to complete as much of a crossword as they could. A 3-min time limit was imposed to ensure variability in task performance without impinging on time required for subsequent tasks. Scores could range from 0 to 29 correct answers.

Cognitive performance.—Cognitive performance was measured using problem tasks derived from previous research (Abrams et al., 2006) and included four tasks, each of which required working memory. A logic puzzle required participants to work out the number of family members present at a family reunion. A second task asked participants “if, without writing them down, you were to spell out the numbers in full (one, two, three etc), how far would you have to go until you found the letter ‘A’?” A third task required participants to match two shapes, among a number of other similar rotated shapes. Finally, participants completed a number sequence task. Factor analysis confirmed that performance on these four measures formed a single factor, explaining 42% of the variance, with an eigenvalue = 1.68. All communalities were greater than 0.31 and factor loadings were all greater than 0.56. Factor scores were used as the dependent measure.

Anxiety.—Participants completed measure of test-related anxiety by Abrams and colleagues (2006, 2008), in which they rated the extent that they felt under-pressure, tense, nervous, jittery, confident, uneasy, calm, afraid of not doing well, and uncomfortable while solving the tasks on a 7-point scale (1 = not at all to 7 = very much). After reverse scoring the calm and confidence items, this forms a reliable scale (Cronbach's $\alpha = .87$).

RESULTS

Preliminary analyses revealed that participants' age did not vary significantly by condition $F(2, 117) = .812, p = .446, \eta^2 = .014$ ($M_{\text{threat}} = 77.5, SD = 8.9; M_{\text{control}} = 75.5, SD = 7.8; M_{\text{boost}} = 75.4, SD = 8.2$). Participants' education level and gender also did not vary as a function of condition. Bivariate relationships among the variables are shown in Table 2. Age was significantly negatively related to the performance measures and therefore it was treated as a covariate in all subsequent analyses in line with procedures in previous research (cf. Levy & Leifheit-Limson, 2009).

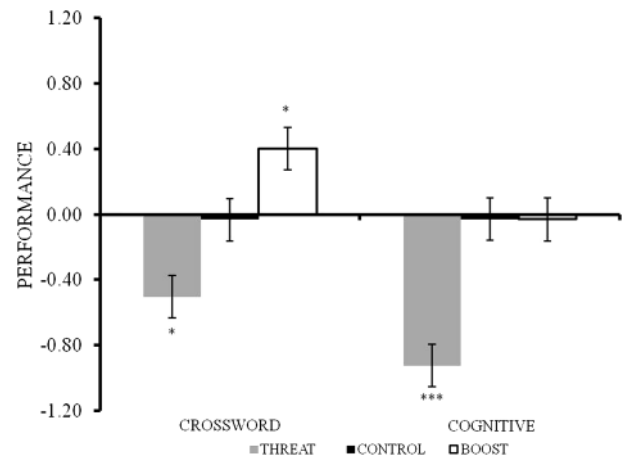


Figure 1. The effect of condition on cognitive and crossword performance measures (standardized). Note. Significant differences with control condition are indicated by * $p < .05$. *** $p < .001$.

Manipulation Check

Analysis of covariance (ANCOVA) revealed a significant effect of condition $F(2, 116) = 3.39, p = .037, \eta^2 = .055$. As expected threat concern was greatest in the threat condition ($M = 3.46, SD = 1.9$), followed by the control condition ($M = 2.86, SD = 1.89$), and lowest in the boost condition ($M = 2.40, SD = 1.59$). Pairwise comparisons revealed that the threat and boost condition differed significantly, $t(116) = 2.60, p = .011, d = .48$. Age was not a significant covariate ($p = .638$).

Test Performance

There were significant effects of condition both on crossword performance, $F(2, 116) = 11.79, p < .001, \eta^2 = .169$, and on cognitive performance, $F(2, 116) = 15.72, p < .001, \eta^2 = .213$. Age was a significant covariate for crossword performance $F(1, 116) = 27.98, p < .001, \eta^2 = .194$, and for cognitive performance $F(1, 116) = 22.89, p < .001, \eta^2 = .165$ (separate ANCOVAs on the four constituent measures revealed a significant effect of condition on all).

For both tasks, we hypothesized that threat should impair performance significantly relative to the control condition. Pairwise comparisons revealed that participants in the threat condition underperformed compared with the control condition on both the crossword ($M_{\text{threat}} = -0.50, SD = 0.88; M_{\text{control}} = -0.03, SD = 0.91; t(116) = -2.53, p = .013, d = -.47$) and cognitive task performance ($M_{\text{threat}} = -0.93, SD = 0.92; M_{\text{control}} = -0.03, SD = 0.91; t(116) = -4.88, p < .001, d = -.91$). Performance also differed between the threat and boost conditions for the crossword ($M_{\text{boost}} = 0.40, SD = 0.96; t(116) = -4.85, p < .001, d = -.90$) and cognitive tasks ($M_{\text{boost}} = -0.03, SD = 0.84; t(116) = -4.86, p < .001, d = -.90$).

We hypothesized that boost should only arise if the task domain is associated with a stereotypic advantage. Participants in the boost condition performed better on the crossword task than did those in the control condition $t(116) = -2.33, p = .021, d = -.43$. However, as shown in Figure 1, there

was no significant difference in the cognitive performance of participants in the boost and control conditions.

It might be the case that appraisal of performance on the first task influences performance on the subsequent tasks (Inzlicht & Kang, 2010). Therefore, the following analyses were conducted to ensure that the effects of condition in the two task domains are distinct. ANCOVAs were performed on each performance measure with the other as an additional covariate (along with age). Crossword performance was significantly affected by condition, $F(2, 115) = 7.67, p < .001, \eta^2 = .118$, and the control and boost conditions still differed significantly, $t(115) = -2.35, p = .021, d = -.44$. Cognitive performance was also significantly affected by condition, $F(2, 115) = 11.34, p < .001, \eta^2 = .165$, and the control and threat conditions still differed significantly, $t(115) = -4.44, p < .001, d = -.81$. These analyses demonstrate that the threat and boost conditions had distinctive effects depending on the performance domain, resulting in a significant boost effect for the crossword performance and significant threat effect on the cognitive performance.

Anxiety

An ANCOVA revealed a significant effect of condition on anxiety, $F(2, 116) = 11.41, p < .001, \eta^2 = .164$. As expected, significantly more anxiety was experienced in the threat condition ($M = 3.36, SD = 1.35$) than in the control ($M = 2.42, SD = .88; t(116) = 3.85, p < .001, d = .72$) and boost conditions ($M = 2.28, SD = .99; t(116) = 4.39, p < .001, d = .82$). There was no significant difference between the control and boost condition ($p = .586$). Age was not a significant covariate in this analysis ($p = .232$).

Mediation Analyses

Given that more anxiety was experienced in the threat compared with the control condition and that anxiety is significantly negatively related to both performance measures, it was appropriate to test for mediation. We followed the bootstrapping procedure outlined by Preacher and Hayes (2008) to test the mediating role of anxiety on both performance measures using threat versus control as the independent variable. Age was entered as a covariate. The procedure specified 5,000 bootstrap resamples and 95% confidence intervals. Anxiety was not tested as mediator of the boost effect because, as expected, there was no significant difference between the levels of anxiety experienced in the control and boost conditions.

The total effect of threat on crossword performance was significant, $\beta = .24, t(77) = 2.6, p = .011$. The effect of anxiety on performance, controlling for threat, was significant, $\beta = -.23, t(76) = 3.02, p = .003$. Finally, the total effect of threat on performance was reduced to nonsignificance after the effect of anxiety was accounted for, $\beta = .13, t(76) = 1.37, p = .175$. Consistent with a mediation effect, the lower and upper confidence intervals were 0.036 and

0.229, respectively, and the Sobel test was significant ($Z = 2.38, p = .017$).

The total effect of threat on cognitive performance was also significant, $\beta = .46, t(77) = 4.66, p < .001$. The effect of anxiety controlling for threat was significant, $\beta = -.20, t(76) = 2.31, p = .024$, and the total effect of threat was reduced but remained significant after anxiety was accounted for, $\beta = .36, t(76) = 3.55, p < .001$. Consistent with a mediation effect, the lower and upper confidence intervals were 0.017 and 0.202, respectively, and the Sobel test was significant ($Z = 2.01, p = .044$). Thus, the mediation tests show that anxiety mediates the effect of threat on performance partially in the cognitive and wholly in the crossword domains.

DISCUSSION

Negative stereotypes of old age can significantly impair older people's cognitive performance (Levy, 1996, 2000). However, relatively little is known about the role of age-based social comparisons and stereotypes in relation to the improvement of older peoples' performance. This research investigated the impact not only of potentially threatening but also of potentially enhancing social comparisons on older people's performance in two types of task domain within the same testing session.

In line with stereotype threat theory and findings by Abrams and colleagues (2006, 2008), a threatening social comparison led to decrements in cognitive performance, and this effect was partially mediated by anxiety. When facing a negative comparison that invokes a threatening stereotype of older people, older people underperform. This underperformance is partially attributable to anxiety experienced during the testing phase in the threat situation. This suggests that when older people face the prospect of being judged negatively in terms of their age, they become anxious, which in turn interferes with performance.

Consistent with evidence that showed that arousal and anxiety can disrupt performance in nonstereotyped domains (Ben-Zeev et al., 2005; Schmader & Johns, 2003), in the present research stereotype threat impaired performance even on a task that potentially offered a stereotypical advantage to older people. It seems that a negative social comparison that highlights a group's overall lower status is sufficient to produce anxiety related underperformance among older people even when the task domain favors them. This shows that the harmful scope of negative age stereotypes extends beyond just the dimension that is directly related to the stereotypes (cf. Meisner, 2012).

Based on stereotype boost and lift research, we proposed that an enhancing social comparison could have a boosting effect, but only if the task related to a specific domain in which a stereotype confers a psychological advantage. The evidence confirms these predictions showing that the same testing situation can reveal distinct effects of threat and boost, depending on which domain is tested. Specifically,

although participants were susceptible to threat on both tasks, this research demonstrates that positive stereotypes in the context of an enhancing social comparison can boost performance of older adults. Moreover, in line with Levy and Leifheit-Limson (2009), we showed that this is a circumscribed effect. Study 1 established the existence of a strong societal stereotype that older people are better at crosswords. Consistent with our reasoning, the boost manipulation makes salient a positive age stereotype and improved performance but only on the positively stereotyped task. It seems then that positive social comparisons may not have a boosting effect in general, but instead this depends on there being a match between a stereotypically favorable dimension and a status enhancing social comparison.

Limitations

The finding that the boost manipulation did not affect performance on the cognitive tasks could be attributed to an order effect. The boost manipulation could simply have influenced the crossword task but worn off prior to cognitive tasks. However, for this explanation to be persuasive, we would have observed the reverse pattern in the threat condition, namely that the effect of threat would have been weaker on the cognitive tasks. However, the threat effect was actually stronger on the cognitive tasks even though these followed the crossword. Moreover, even after controlling for crossword performance, there was still a significant effect of threat on cognitive performance, demonstrating unique effects of threat and boost.

In line with Shih and colleagues (2002) who demonstrated that targets of positive stereotypes only benefit from performance boosts when the stereotype is activated subtly, the boost manipulation did not refer to the crossword task explicitly. However, this more subtle boost manipulation was enough to produce a performance boost and, therefore, strengthens confidence in the boost effect.

Whereas stereotype threat effects were partially mediated by anxiety (Steele & Aronson, 1995), it remains to be established what may mediate a performance boost. One possibility is that boost effects only arise when anxiety is at a resting or baseline level. In that case, other type of emotional and motivational variables such as self-efficacy and confidence may become important (e.g., Rahhal et al., 2001).

CONCLUSION

As well as showing that stereotype threat harms older people's task performance, an effect partially mediated by anxiety, this research also shows that in the same context, positive aging stereotypes can be a vehicle for performance boost. As far as we are aware, this is the first research to demonstrate both threat and boost effects within the same test situation with older people. For stereotype threat research, the findings suggest a new theoretical avenue is to explore how threat, stereotypic dimension, and task

domains may combine to produce threat or boost effects. An intriguing problem is to discover mediators of boost effects. For example, positive social comparison may positively affect self-perception (Wills, 1981) and evaluation of the group (Abrams & Hogg, 1988), which may increase self-esteem and self-efficacy, which could then improve performance (cf. Dijkstra, Kuyper, van der Werf, Buunk, & van der Zee, 2008).

An important implication for older people is that there may be two routes for optimizing their performance in test situations or situations involving comparisons with younger people. One is to directly tackle the anxiety that arises from threat so that there is less interference with performance. The other is to identify positive expectations in conjunction with stereotypically positive task domains. Over time, and across situations, these two approaches might produce a virtuous cycle, a positive feedback loop that enables older people to reach and show their full potential rather than underperforming in the face of threat.

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