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Does Goal Orientation Modulate Satisfaction with Cognitive Performance in Different Age Groups?

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This study was not preregistered. Data, syntax, and study materials will be made available to other researchers upon request.

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## Abstract

**Objectives:** The current experiment tested the causal effect of goal orientation on subjective satisfaction with performance on a cognitive task.

**Methods:** A sample of  $N = 231$  young, middle-aged, and older adults (21 - 79 years) completed a dot-memory task in one of three goal-orientation conditions aiming for improvement, maintenance, or avoidance of decline in performance.

**Results:** Bayesian analyses showed that in all age groups goal orientation influenced actual performance, but did not affect perceived performance or performance satisfaction. Performance satisfaction was positively correlated with perceived performance, but not with actual performance.

**Discussion:** The findings suggest that whether goal orientation benefits older adults' subjective well-being might depend on (a) the goal content (previous research targeted personal goals) or (b) whether it enhances their perception of the status quo (and thus reduces the discrepancy between actual and desired states). This study contributes to a better understanding of the role of goal orientation in subjective well-being across adulthood.

*Keywords:* Gains, losses, maintenance, loss avoidance, performance satisfaction

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Although losses and decline in various functions tend to increase with age, subjective well-being, positive emotions, and life satisfaction typically remain stable or even improve in late adulthood (Braun et al., 2017; Kunzmann et al., 2000; Riediger et al., 2009) until the oldest ages when a terminal decline may occur (Jivraj et al., 2014). One possible mechanism that contributes to the maintenance of well-being into old age is that adults constantly adapt their goals to the potential they believe to have. Young adults typically expect to have ample room for gains and improvement in various life domains. In contrast, middle-aged and particularly older adults expect to operate in many functional domains at their personal asymptote and encounter more and more losses with increasing age (Heckhausen et al., 1989; Mustafić & Freund, 2012; Riediger et al., 2014). In line with these expectations, younger adults orient their goals primarily towards gains and improvement, while the goals of middle-aged and older adults are geared more strongly towards maintenance and loss avoidance (e.g., Ebner et al., 2006; Freund, 2006; Heckhausen, 1997; Ogilvie et al., 2001).

Changing goal orientation across adulthood from trying to achieve gains to maintaining functioning or avoiding losses, and, thereby, adapting goal standards might help older adults to maintain subjective well-being when pursuing their goals. This might be the case because the discrepancy between the actual and desired states causes psychological distress, and people tend to feel more satisfied, the smaller the discrepancy (Carver & Scheier, 1981; Diener et al., 1985; Locke et al., 1970; Michalos, 1985). In general, lower goal standards are easier to meet than higher standards in the same goal domain, which may reduce psychological distress arising from discrepancies between actual and desired states in older adults. The current experiment tested this hypothesis of a causal effect of goal orientation on satisfaction with the pursuit of a given goal in different age groups. More specifically, the current study examined whether and how the experimental manipulation of goal orientation affects satisfaction with the performance in a cognitive task tapping into working memory in young, middle-aged, and older adults, a functional domain in which older

adults typically experience losses (e.g., Oberauer, 2005). If a smaller actual-desired discrepancy leads to higher satisfaction with performance, adults of all ages should be more satisfied with their cognitive performance when pursuing maintenance or avoidance goals. If other age-related factors contribute to age-differential effects of goal orientation on subjective well-being, the current experiment should replicate the results of Ebner et al. (2006): Two studies found a negative association between goal orientation towards loss and general well-being (Study 1) as well as goal-specific satisfaction (Study 2) in younger adults but a positive relation between maintenance orientation and general well-being as well as goal-specific satisfaction in older adults.

## Methods

### Participants

A sample of  $N = 231$  participants residing in the USA recruited via Amazon Mechanical Turk (21 - 79 years,  $M = 48.4$ ,  $SD = 14.28$ ; 48.9% female; see Table 1 for more demographic information) completed the current online study. A priori power analysis using G\*Power (version 3.1.9.2; Faul et al., 2009) showed that  $N = 198$  participants would be enough to detect the three-way interaction (see the Design and Procedures section below) with a power of .80 at the level of  $\alpha = .05$ , assuming a small effect size ( $f = .13$ ). The current study was approved by the Ethics Board of the Faculty of Arts and Science at the University of Zurich (protocol number: PI-11-20-01-01).

### Measures and Tasks

**Demographics.** Participants reported their age, gender, ethnicity, marital status, employment status, educational level, and annual household income. They also rated their levels of life satisfaction (from *very dissatisfied* to *very satisfied*), subjective health (from *very bad* to *very good*), and current mood (from *very negative* to *very positive*) all on 7-point Likert scales (0 to 6).

**Cognitive function.** For the purpose of screening out participants with cognitive impairment, cognitive function was assessed using a vocabulary test (Lehrl et al., 1995) and a digit-symbol test (Wechsler, 1997). In the vocabulary test, 35 pairs of words, each containing a real word and a pseudoword, were presented, and participants indicated which was the actual word. In the digit-symbol substitution task, participants filled in numbers (0 to 9) corresponding to a series of symbols as quickly and accurately as possible in 90 seconds.

**Dot-memory task.** This task was adapted from Souza et al. (2021) to examine the relationship between goal orientation and satisfaction with performance (see Figure S1 in the supplementary materials for more details about this task). Goal-orientation was induced in the instruction before each block. After each block, participants rated their satisfaction with their performance (from 0 *very dissatisfied* to 6 *very satisfied*), the difficulty of the task (from 0 *very easy* to 6 *very difficult*), estimated their performance in terms of average accuracy per trial (0, 1/6, 2/6, 3/6, 4/6, 5/6, 1), and, as a manipulation check, indicated their goal orientation (aimed for better performance, maintenance of performance, or avoid performing worse compared with the previous block) during that block. Participants' accuracy rates were calculated to indicate their actual performance in the task.

### **Design and Procedure**

We adopted a 3 (age group: young, middle-aged, older; between-subject) × 3 (goal orientation: improvement, maintenance, loss avoidance; between-subject) × 5 (block: baseline block 0, block 1, block 2, block 3, block 4; within-subject) mixed design. Participants from each age group were randomly assigned to the three goal-orientation conditions. The final sample size was:  $n = 75$  in the improvement condition,  $n = 76$  in the maintenance condition, and  $n = 80$  in the loss-avoidance condition. There were no significant differences in demographics, life satisfaction, subjective health, mood, or cognitive function across the goal conditions ( $ps > .05$ ). Participants filled out the

demographic questionnaire, vocabulary and digit-symbol substitution tests, followed by the dot-memory task.

**Manipulation of goal orientation.** The instruction before each block (except for the baseline block 0, for which all participants were just told to do the task carefully) of the dot-memory test differed across experimental conditions: Participants were either instructed to aim to perform better (*improvement condition*), achieve the same performance level (*maintenance condition*), or not to perform worse (*loss-avoidance condition*) than in the previous block.

### Data Analysis

Data from block 1 were not included in the analysis, as a large proportion of participants in the maintenance condition (52.6%) and the loss-avoidance condition (70.4%) did not follow the task instruction during this block. Most of these participants reported that they aimed to perform better at block 1 than the baseline block (block 0). In the remaining blocks, participants reported that they followed the goal instructions in 69.2% of the total blocks (including 80.0% in the improvement condition, 67.5% in the maintenance condition, and 60.1% in the loss-avoidance condition; there was no age difference in the adherence to the goal-orientation instruction,  $\chi^2(2, 693) = 2.77, p = .25$ ). These data were submitted to data analysis. Specifically, a 3 (age group<sup>1</sup>: young, middle-aged, older; between-subject)  $\times$  3 (goal orientation: improvement, maintenance, loss avoidance; between-subject)  $\times$  3 (block: block 2, block 3, block 4; within-subject) mixed-factor Bayesian ANOVA on participants' ratings of performance satisfaction, with the satisfaction at the baseline block (block 0) being controlled as a covariate, was conducted using the package JASP (version 0.14.1). The default priors ( $r = 0.5$  for fixed effects, 1 for random effects, and 0.354 for covariates) were used.

As not all participants followed the goal instructions, we conducted the Bayesian ANOVA in two approaches to cross-validate the results. In the first approach, we grouped and compared participants according to the experimental assignment, no matter whether or not they followed the

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<sup>1</sup> Treating age as a continuous variable led to the same findings.



instruction. In the second approach, we removed all blocks in which participants failed to follow the task instructions according to their self-reported goal orientation. These two approaches led to similar results, and thus here we only report the results yielded using the first approach (the Bayesian ANOVA results using the second approach are displayed in Table S4 in the supplementary materials).

## Results

### Descriptive Results

Table S1 in the supplementary materials displays the demographics of the sample.

Figure 1 displays the correlations among various measures in different blocks of the dot-memory task (their respective mean values and standard deviations are displayed in Table S2 in the supplementary materials). Participants' self-rated performance satisfaction was negatively correlated with perceived task difficulty and positively correlated with perceived task performance. The actual performance was not significantly correlated with the other measures. Multiple regression analyses showed that these correlations were not moderated by age ( $ps > .1$ ). The results indicate that participants in all age groups did not have an accurate perception of their performance, and their satisfaction was not affected by actual performance.

### Bayesian ANOVA on Performance Satisfaction

Participants' self-rated satisfaction with their performance in the dot-memory task is displayed in Figure 2 (specific values are listed in Table S3 in the supplementary materials).

Controlling for satisfaction with performance at baseline (block 0), the age group  $\times$  goal  $\times$  block (block 2, block 3, block 4) mixed-factor Bayesian ANOVA on satisfaction with performance (block 1 was excluded due to a large proportion of invalid trials as described above) showed that the data were best presented by a model consisting of baseline satisfaction and block (Bayesian factor  $BF_{10} = 1.48e +52$ ). The inclusion and exclusion probabilities and Bayesian factors displayed in Table 1 also

indicate that baseline satisfaction ( $BF_{\text{inclusion}} = \infty$ ) and block ( $BF_{\text{inclusion}} = 1.84$ ) should be included while the other predictors should be excluded from the model. The results indicated significant effects of baseline satisfaction and block (block 2 > block 4, as revealed by posthoc tests) on subsequent performance satisfaction while pursuing the dot-memory task with the goal-orientation instruction, but no effect of age ( $BF_{\text{inclusion}} = 0.15$ ) or goal condition ( $BF_{\text{inclusion}} = 0.05$ ).

### Supplementary Analyses: Bayesian ANOVAs on Other Measures

The same Bayesian ANOVA was conducted to examine the effects of age group, goal, and block (block 2, block 3, block 4) on perceived task difficulty, perceived task performance, and actual performance, controlling for baseline values at block 0.

**Results for perceived task difficulty.** There was strong evidence for including baseline perceived task difficulty as a predictor ( $BF_{\text{inclusion}} = 4.50e +15$ ), but very weak evidence for including other factors ( $BF_{\text{inclusion}} \leq 0.78$ ).

**Results for perceived performance.** There was strong evidence for including baseline perceived performance ( $BF_{\text{inclusion}} = \infty$ ) and block ( $BF_{\text{inclusion}} = 25.10$ ) as predictors, but very weak evidence for including age group, goal, and any interactions ( $BF_{\text{inclusion}} \leq 0.05$ ).

**Results for actual performance.** There was strong evidence for including block ( $BF_{\text{inclusion}} = 803.41$ ), goal ( $BF_{\text{inclusion}} = 3556.82$ ), and their interaction ( $BF_{\text{inclusion}} = 3987.60$ ) as predictors, but weak evidence for including other factors ( $BF_{\text{inclusion}} \leq 1.28$ ). Posthoc tests revealed that participants performed better in the improvement goal condition than in the maintenance goal condition (particularly at block 4), and improved their performance from block 2 and 3 to block 4 (particularly in the improvement condition). The results suggested that the actual performance improved significantly more as the task went on when participants were instructed to aim for performance improvement than when they were instructed to aim for performance maintenance or avoidance of performance decline.

## Discussion

The current study experimentally manipulated goal orientation when performing a cognitive task in a sample of young, middle-aged, and older adults to determine age-related effects on performance satisfaction. Bayesian analyses showed that goal orientation towards achieving better performance, as compared with goal orientation towards maintaining the initial performance level and avoiding performance decline, resulted in better actual performance (echoing the idea that older adults' cognitive performance is also influenced by motivation for engagement and cognitive effort; Ennis et al., 2013), but did not affect perceptions of performance, perceived task difficulty, or performance satisfaction. There was no significant difference in the effects across age groups.

These findings suggest that adopting a certain goal orientation for a performance task does not affect satisfaction with one's performance. We had predicted that the smaller discrepancy in the actual vs. desired state implied in maintenance or avoidance of loss goals leads to higher satisfaction with performance than the relatively larger discrepancy in improvement goals. However, the results of the current experiment do not suggest that this is the case. Goal orientation was unrelated to satisfaction with the performance on the cognitive task across the age groups.

What, then, drives the satisfaction with performance? It seems that perceived performance (but not actual performance) is related to satisfaction with performance in all age groups. This might suggest that whether goal orientation modulates satisfaction depends on whether it influences the subsequent perceived performance during goal pursuit. This result is in keeping with the literature suggesting that goal setting affects satisfaction by influencing the subsequent performance and the discrepancy between actual and desired states (e.g., Diener et al., 1985; Kaftan & Freund, 2018; Locke & Latham, 2019).

What role does goal orientation play in the well-being of adults? It has been hypothesized that adjusting goal orientation (from striving for gains to striving for maintenance and loss

avoidance) to the potential for gains and losses benefit older adults' subjective well-being, e.g., positive emotion and satisfaction (Mustafić & Freund, 2012; Riediger et al., 2014). The current study implies that this is not always the case; instead, it depends on whether goal orientation enhances older adults' perceptions of their actual states and reduces the discrepancies between the actual and desired states.

The implication of the current study contradicts the findings by Ebner et al. (2006; Studies 1 and 2), which reported that loss-avoidance orientation was negatively correlated with subjective well-being (including life satisfaction) and goal-specific satisfaction in younger adults, while maintenance orientation was positively correlated with subjective well-being and goal-specific satisfaction in older adults. If, as implied by the current study, it is the actual-desired discrepancy that drives the association of goal orientation and subjective well-being, one would have expected a positive correlation between maintenance/loss-avoidance orientation and subjective well-being in both age groups in Ebner et al.'s studies. Note, that the inconsistency in the results of the current and the Ebner et al. studies may be due to the difference in the scope of the well-being measures: The current study focused on satisfaction specifically related to task performance, while Ebner et al. (2006) emphasized the relationship between the orientation of self-generated personal goals and the general subjective well-being two weeks later (Study 1) or satisfaction with goal-specific attainment and progress aggregated across four personal goals (Study 2). General subjective well-being (assessed via positive and negative affect, general depressive affect, life satisfaction, and psychological well-being), as well as satisfaction with goal progress and attainment, may be more strongly influenced by the outlook on a variety of personally important goals than the perceived performance on one specific cognitive task. Most likely, performance on a relatively short cognitive task such as the dot memory task has little intuitive relation to everyday life cognitive functioning obvious to participants.

Younger adults are in a phase in their lives that generally requires them to improve functioning (e.g., learning new skills) and acquire gains (e.g., financial means). Thus, focusing on goals oriented towards loss avoidance is not consistent with the growth orientation that is needed for sustaining personal development in this age group. This may explain why Ebner et al. (2006) found a negative correlation between loss avoidance and subjective well-being among young adults. For this reason, caution should be taken when generalizing the findings of the current study to general well-being and to personally important goals people pursue in their everyday lives.

Another limitation of the study is that some participants did not follow the goal instruction during the dot-memory task. There could be several reasons for this: First, the goal orientation for the cognitive task was assigned to the participants rather than chosen by them, and they might not have wanted to adopt a goal orientation that did not match their personal preference. Second, it might have been difficult for participants to monitor their performance in each block of the dot-memory task, rendering it difficult to monitor if performance is maintained or has declined in the next block. It could also be difficult for some participants to distinguish between the maintenance goal and the loss-avoidance goal: They are highly correlated and often coexist despite of their essential differences (Ebner et al., 2006; Gong & Freund, 2020; Ogilvie et al., 2001). The instruction to attempt improving performance is probably easier to follow, as participants simply needed to put more effort into the task. This might explain that more participants in the maintenance and loss-avoidance conditions did not follow the instruction than in the improvement condition.

Despite these limitations, we maintain that this experiment contributes to a better understanding of motivational development and well-being across adulthood by showing that the subjective performance during goal pursuit is central to satisfaction regardless of age. The role of goal orientation for subjective performance across adulthood needs to be further explored.

## References

- Braun, T., Schmukle, S. C., & Kunzmann, U. (2017). Stability and change in subjective well-being: The role of performance-based and self-rated cognition. *Psychology and Aging, 32*(2), 105–117. <https://doi.org/10.1037/pag0000153>
- Carver, C. S., & Scheier, M. F. (1981). *Attention and self-regulation: A control-theory approach to human behavior*. Springer-Verlag.
- Diener, E. D., Emmons, R. A., Larsen, R. J., & Griffin, S. (1985). The satisfaction with life scale. *Journal of Personality Assessment, 49*(1), 71–75. [https://doi.org/10.1207/s15327752jpa4901\\_13](https://doi.org/10.1207/s15327752jpa4901_13)
- Ebner, N. C., Freund, A. M., & Baltes, P. B. (2006). Developmental changes in personal goal orientation from young to late adulthood: from striving for gains to maintenance and prevention of losses. *Psychology and Aging, 21*(4), 664–678. <https://doi.org/10.1037/0882-7974.21.4.664>
- Ennis, G. E., Hess, T. M., & Smith, B. T. (2013). The impact of age and motivation on cognitive effort: implications for cognitive engagement in older adulthood. *Psychology and Aging, 28*(2), 495–504. <https://doi.org/10.1037/a0031255>
- Faul, F., Erdfelder, E., Buchner, A., & Lang, A.-G. (2009). Statistical power analyses using G\*Power 3.1: Tests for correlation and regression analyses. *Behavior Research Methods, 41*, 1149–1160. <https://doi.org/10.3758/BRM.41.4.1149>
- Freund, A. M. (2006). Age-differential motivational consequences of optimization versus compensation focus in younger and older adults. *Psychology and Aging, 21*(2), 240–252. <https://doi.org/10.1037/0882-7974.21.2.240>
- Gong, X., & Freund, A. M. (2020). It is what you have, not what you lose: Effects of perceived gains and losses on goal orientation across adulthood. *Journals of Gerontology Series B: Psychological*

*Sciences and Social Sciences*, 75(10), 2106-2111. <https://doi.org/10.1093/geronb/gbz163>

Heckhausen, J. (1997). Developmental regulation across adulthood: Primary and secondary control of age-related challenges. *Developmental Psychology*, 33(1), 176–187.

<https://doi.org/10.1037/0012-1649.33.1.176>

Heckhausen, J., Dixon, R. A., & Baltes, P. B. (1989). Gains and losses in development throughout adulthood as perceived by different adult age groups. *Developmental Psychology*, 25(1), 109–121. <https://doi.org/10.1037/0012-1649.25.1.109>

Jivraj, S., Nazroo, J., Vanhoutte, B., & Chandola, T. (2014). Aging and subjective well-being in later life. *Journals of Gerontology Series B: Psychological Sciences and Social Sciences*, 69(6), 930–941. <https://doi.org/10.1093/geronb/gbu006>

Kaftan, O. J., & Freund, A. M. (2018). The way is the goal: The role of goal focus for successful goal pursuit and subjective well-being. In E. Diener, S. Oishi, & L. Tay (Eds.), *Handbook of well-being*. DEF publishers. <https://doi.org/10.5167/uzh-147437>

Kunzmann, U., Little, T. D., & Smith, J. (2000). Is age-related stability of subjective well-being a paradox? Cross-sectional and longitudinal evidence from the Berlin Aging Study. *Psychology and Aging*, 15(3), 511–526. <https://doi.org/10.1037/0882-7974.15.3.511>

Lehrl, S., Triebig, G., & Fischer, B. (1995). Multiple choice vocabulary test MWT as a valid and short test to estimate premorbid intelligence. *Acta Neurologica Scandinavica*, 91(5), 335–345. <https://doi.org/10.1111/j.1600-0404.1995.tb07018.x>

Locke, E. A., Cartledge, N., & Knerr, C. S. (1970). Studies of the relationship between satisfaction, goal-setting, and performance. *Organizational Behavior and Human Performance*, 5(2), 135–158. [https://doi.org/10.1016/0030-5073\(70\)90011-5](https://doi.org/10.1016/0030-5073(70)90011-5)

Locke, E. A., & Latham, G. P. (2019). The development of goal setting theory: A half century

- retrospective. *Motivation Science*, 5(2), 93–105. <https://doi.org/10.1037/mot0000127>
- Michalos, A. C. (1985). Multiple discrepancies theory (MDT). *Social Indicators Research*, 16(4), 347–413. <https://doi.org/10.1007/bf00333288>
- Mustafić, M., & Freund, A. M. (2012). Multidimensionality in developmental conceptions across adulthood. *GeroPsych*, 25, 57–72. <https://doi.org/10.1024/1662-9647/a000055>.
- Oberauer, K. (2005). Binding and Inhibition in Working Memory: Individual and Age Differences in Short-Term Recognition. *Journal of Experimental Psychology: General*, 134(3), 368–387. <https://doi.org/10.1037/0096-3445.134.3.368>
- Ogilvie, D. M., Rose, K. M., & Heppen, J. B. (2001). A comparison of personal project motives in three age groups. *Basic and Applied Social Psychology*, 23(3), 207–215.
- Riediger, M., Schmiedek, F., Wagner, G. G., & Lindenberger, U. (2009). Seeking pleasure and seeking pain: Differences in prohedonic and contra-hedonic motivation from adolescence to old age. *Psychological Science*, 20(12), 1529–1535. <https://doi.org/10.1111/j.1467-9280.2009.02473.x>
- Riediger, M., Voelkle, M. C., Schaefer, S., & Lindenberger, U. (2014). Charting the life course: Age differences and validity of beliefs about lifespan development. *Psychology and Aging*, 29(3), 503–520. <https://doi.org/http://dx.doi.org/10.1037/a0036228>
- Souza, A. S., Thaler, T., Liesefeld, H. R., Santos, F. H., Peixoto, D. S., & Albuquerque, P. B. (2021). No evidence that self-rated negative emotion boosts visual working memory precision. *Journal of Experimental Psychology: Human Perception and Performance*, 47(2), 282–307. <https://doi.org/xhp0000891>
- Wechsler, D. (1997). *Wechsler Adult Intelligence Scale - Third edition (WAIS - III)*. Psychological Corporation.



Table 1. Probabilities and Bayesian Factors for Including and Excluding Predictors of Performance Satisfaction in the Dot-memory Task ( $N = 231$ )

Effects	$P(\text{inclusion})$	$P(\text{exclusion})$	$BF(\text{inclusion})$
Baseline satisfaction	1	0	$\infty$
Age group	.29	.71	0.15
Block	.84	.16	1.84
Goal	.12	.88	0.05
Age*Block	.004	.996	0.008
Age*Goal	.003	.997	0.006
Block*Goal	.001	.999	0.003
Age*Block*Goal	1.25e -9	1	2.25e -8

*Note.*  $P(\text{inclusion})$  indicates the probability for including an effect,  $P(\text{exclusion})$  indicates the probability for excluding an effect, and  $BF(\text{inclusion})$  indicates the Bayesian factor for including an effect. Young: < 40 years; middle-aged: 40 ~ 60 years; older:  $\geq 60$  years.

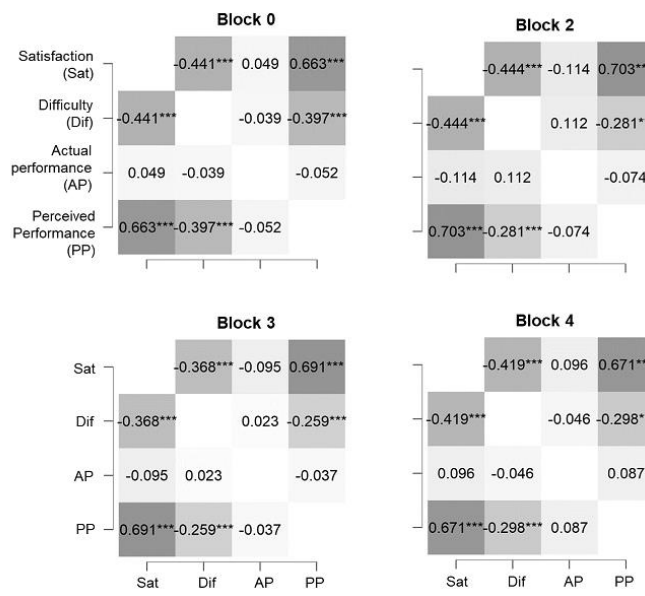
## Figure captions

*Figure 1.* Correlation matrices showing the relationships among performance satisfaction (Sat), perceived task difficulty (Dif), perceived performance (PP), and actual performance (AP) at different blocks of the dot-memory task. Block 1 was not included because of a large proportion of invalid trials, in which participants did not follow the task instruction.

*Figure 2.* Participants' self-rated performance satisfaction in the dot-memory task by age group  $\times$  goal  $\times$  block. The error bars denote 95% confidence intervals. Block 1 was excluded from data analyses because of a large proportion of invalid trials, in which participants did not follow the task instruction.

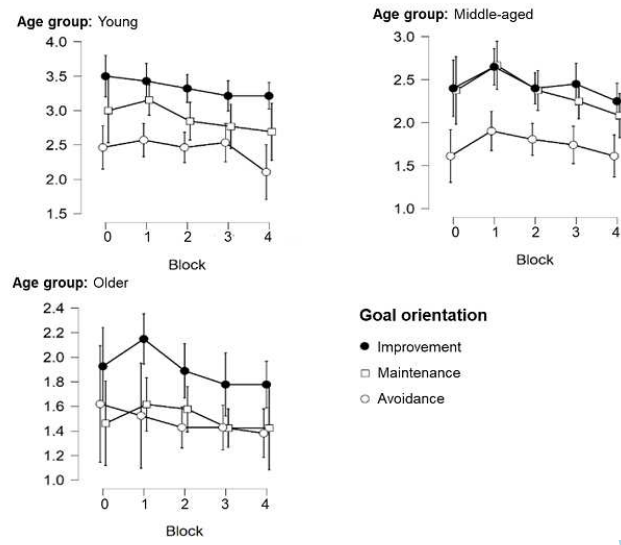
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Figure 1



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Figure 2



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