

[SUPPLEMENTARY INFORMATION] Are Older Individuals Predisposed to Habitual Control More Resilient?

Lotte P. Brinkhof*, K. Richard Ridderinkhof, Maik Bieleke, Jaap M.J. Murre, Harm J. Krugers, Sanne de Wit

*E-mail: l.p.brinkhof@uva.nl, Address: Nieuwe Achtergracht 129, 1001 NK Amsterdam, Netherlands.

Outlier removal

Rosner's test identifies potential outliers by (1) calculating Z-scores for each data point, (2) selecting the one with the highest absolute Z-score, and (3) computing a test-statistic R by taking the ratio of the difference between the potential outlier and the mean to the standard deviation. R is compared to critical value λ to determine if it is sufficiently large to be identified as outlier. This process is repeated iteratively, removing identified outliers until no more outliers are found. Table S1 summarizes the important statistics and values for each identified outlier.

Statistical analyses

To further elaborate on the intriguing negative relation between strategic planning and quality of life (QoL), two multiple regression analyses were performed. QoL and strategic planning were included as dependent variable in the first and second analysis, respectively. Other predictors that were included were conscientiousness, lifestyle regularity and prospective memory ability (PMA). An Analysis of Variance (ANOVA) table was constructed to determine the F-statistic and corresponding p-values. Here, a type II sum of squares (SS) approach was used if at least one interaction effect was observed. Otherwise, we continued with the analysis for main effects (type II SS approach) only (Langsrud, 2003). Interactions were plotted using the `plot_model` (type = 'int') function of the *sjPlot* R Package (Lüdtke, 2022), and evaluated using the *emmeans* function of the *emmeans* package (Lenth, 2021). The estimated marginal trends (i.e., trends based on the regression model, rather than the data itself) were determined for each subgroup and Bonferroni corrected. Subgroups were created based on the lower and upper bounds of each predictor (i.e., low and high scores of each predictor).

References

- Cohen, J. (2013). *Statistical Power Analysis for the Behavioral Sciences*. *Statistical Power Analysis for the Behavioral Sciences*. <https://doi.org/10.4324/9780203771587/STATISTICAL-POWER-ANALYSIS-BEHAVIORAL-SCIENCES-JACOB-COHEN>
- Fey, C. F., Hu, T., & Delios, A. (2023). The Measurement and Communication of Effect Sizes in Management Research. *Management and Organization Review*, *19*(1), 176–197. <https://doi.org/10.1017/mor.2022.2>
- Langsrud, Ø. (2003). ANOVA for unbalanced data: Use Type II instead of Type III sums of squares. *Statistics and Computing*, *13*(2), 163–167. <https://doi.org/10.1023/A:1023260610025>
- Lenth, R. V. (2021). *emmeans: Estimated Marginal Means, aka Least-Squares Means*. <https://cran.r-project.org/package=emmeans>
- Lüdtke, D. (2022). *sjPlot: Data visualisation for statistics in social science* (2.8.10.). <https://cran.r-project.org/package=sjPlot>

Table S1*Outliers Detected by Rosner's Test*

Variable	Observation	R	λ	Value
Prospective memory	264	5.22	4.07	19
	417	4.28	4.07	19
Strategic planning	963	4.66	4.07	8
	811	6.62	4.07	0
Lifestyle regularity	1090	4.22	4.07	4.33
	1068	4.57	4.07	21
Conscientiousness	419	4.44	4.07	22
	661	6.69	4.07	14
Mental well-being	264	5.22	4.07	48
	417	4.28	4.07	57

Note. R represents the test statistic, defined as the ratio of the difference between the potential outlier and the mean to the standard deviation. λ is the critical value used to determine if a potential outlier has a significantly ($\alpha = 0.05$) higher R. The R should be higher than the λ for the observation to be an outlier. The value corresponds to the actual raw data.

Table S2*Path-indices of the serial (multiple) mediation models*

	<i>b</i>	SE <i>b</i>	<i>z</i>	95% CI	ES
CON ~ SP	0.23***	0.03	9.02	[0.18, 0.28]	0.29
SP ~ CON	0.36***	0.04	9.02	[0.28, 0.44]	0.29
LR ~ CON	0.04***	0.01	3.86	[0.02, 0.06]	0.12
CON ~ LR	0.37***	0.10	3.64	[0.17, 0.57]	0.11
LR ~ SP	-0.01	0.01	-0.89	[-0.02, 0.01]	-0.03
SP ~ LR	-0.11	0.12	-0.90	[-0.35, 0.13]	-0.03
PMA ~ SP	-0.01	0.02	-0.50	[-0.04, 0.02]	-0.01
PMA ~ CON	0.30***	0.02	14.4	[0.26, 0.34]	0.42
PMA ~ LR	0.02	0.07	0.28	[-0.11, 0.15]	0.01
QoL ~ SP	-0.13**	0.04	-3.22	[-0.20, -0.05]	-0.10
QoL ~ CON	0.70***	0.05	12.7	[0.59, 0.80]	0.43
QoL ~ LR	0.03	0.15	0.17	[-0.27, 0.33]	0.01
QoL ~ PMA	0.24**	0.07	3.24	[0.09, 0.38]	0.10
MWB ~ SP	-0.05	0.03	-1.73	[-0.10, 0.01]	-0.05
MWB ~ CON	0.49***	0.04	12.4	[0.41, 0.57]	0.44
MWB ~ LR	0.11	0.10	1.08	[-0.10, 0.32]	0.03
MWB ~ PMA	0.11*	0.05	2.06	[0.00, 0.21]	0.07

Note. *b* represents unstandardized partial regression weights (or *path regression coefficients*). Square brackets are used to enclose the lower and upper limits of a confidence interval (CI), and both the standard error (SE) and *z*-value are reported. The standardized slopes (or *path coefficients*) are included as effect size (ES) measure for each path (i.e., how many standard deviations (SDs) the outcome variable changes per 1 SD increase in the predictor), with effect sizes of 0.10 – 0.29, 0.30 – 0.49 and 0.50 or greater considered to be small, medium and large, respectively (Cohen, 2013; Fey et al., 2023). Effect sizes of significant paths are highlighted in bold.

* $p < .05$, ** $p < .01$, *** $p < .001$. CON: conscientiousness; LR: lifestyle regularity; PMA: prospective memory ability; SP: strategic planning; QoL: Quality of Life, MWB: Mental well-being,

Table S3

Moderation Effects of the Relationship between the Inclination to Engage in Strategic If-then Planning (SP) and Quality of Life.

<i>Predictor</i>	<i>b</i>	95% CI	SE	<i>t</i>	ES
<i>(Intercept)</i>	1627.0*		647.1	2.52	
SP	-39.86*	[-70.28, -9.45]	0.16	-2.57	
CON	-33.43*	[-63.36, -3.51]	0.15	-2.19	
LR	-125.82*	[-234.29, -17.35]	0.55	-2.28	
PMA	-50.52**	[-86.44, -14.59]	0.18	-2.76	
SP*CON*LR*PMA	0.00**	[0.00, 0.00]	0.001	2.68	
<i>Low PMA (n = 169)</i>					
Low LR, low CON (<i>n</i> = 19)	-2.66	[-5.87, 0.56]	1.17	-2.27	-0.30
Low LR, high CON (<i>n</i> = 9)	2.85	[-1.77, 7.46]	1.69	1.69	0.32
High LR, low CON (<i>n</i> = 94)	0.73	[-0.89, 2.36]	0.59	1.24	0.08
High LR, high CON (<i>n</i> = 47)	-0.18	[-2.22, 1.86]	0.75	-0.24	-0.02
<i>High PMA (n = 947)</i>					
Low LR, low CON (<i>n</i> = 52)	1.78*	[0.19, 3.36]	0.58	3.07	0.20
Low LR, high CON (<i>n</i> = 77)	-1.96***	[-3.31, -0.61]	0.49	-3.98	-0.22
High LR, low CON (<i>n</i> = 284)	-1.14**	[-1.97, -0.32]	0.30	-3.80	-0.13
High LR, high CON (<i>n</i> = 534)	0.49	[-0.11, 1.09]	0.22	2.24	0.06

Note. *b* represents unstandardized regression weights or estimated marginal trends (for the simple slopes, following on significant interaction terms). Square brackets are used to enclose the lower and upper limits of a confidence interval (CI), and both the standard error (SE) and *t*-value are reported. Only the highest significant interaction term is shown. $R^2 = .243^{**}$ 95% CI [0.19, 0.27]. The estimated marginal trends are Bonferroni corrected. The standardized estimated marginal trends are included as effect size (ES) measure for each slope (i.e., how many standard deviations (SDs) the outcome variable changes per 1 SD increase in the predictor), with effect sizes of 0.10 – 0.29, 0.30 – 0.49 and 0.50 or greater considered to be small, medium and large, respectively (Cohen, 2013; Fey et al., 2023). Significant estimated marginal trend are highlighted in bold. * $p < .05$, ** $p < .01$, *** $p < .001$. CON: conscientiousness; LR: lifestyle regularity; PMA: prospective memory ability.

Table S4

Moderation Effects of the Relationship between Quality of Life (QoL) and the Inclination to Engage in Strategic If-then Planning.

<i>Predictor</i>	<i>b</i>	95% CI	SE	<i>t</i>	ES
QoL	-24.64**	[-42.75, -6.53]	0.16	-2.57	
CON	-50.06**	[-87.19, -12.93]	0.15	-2.19	
LR	-179.74*	[-320.54, -38.95]	0.55	-2.28	
PMA	-72.72**	[-121.37, -24.06]	0.18	-2.76	
QoL*CON*LR*PMA	0.00**	[0.00, 0.00]	0.00	2.73	
<i>Low PMA (n = 169)</i>					
Low LR, low CON (<i>n</i> = 19)	-1.86	[-4.03, 0.31]	0.79	-2.35	-0.28
Low LR, high CON (<i>n</i> = 9)	1.68	[-0.58, 3.94]	0.83	2.04	0.25
High LR, low CON (<i>n</i> = 94)	0.29	[-0.68, 1.25]	0.35	0.81	0.04
High LR, high CON (<i>n</i> = 47)	0.001	[-0.96, 0.96]	0.35	0.00	0.00
<i>High PMA (n = 947)</i>					
Low LR, low CON (<i>n</i> = 52)	1.08*	[0.03, 2.14]	0.39	2.81	0.16
Low LR, high CON (<i>n</i> = 77)	-1.10***	[-1.86, -0.34]	0.28	-3.97	-0.16
High LR, low CON (<i>n</i> = 284)	-0.50	[-1.04, 0.04]	0.20	-2.54	-0.07
High LR, high CON (<i>n</i> = 534)	0.12	[-0.22, 0.46]	0.12	1.00	0.02

Note. *b* represents unstandardized regression weights or estimated marginal trends (for the simple slopes, following on significant interaction terms). Square brackets are used to enclose the lower and upper limits of a confidence interval (CI), and both the standard error (SE) and t-value are reported. Only the highest significant interaction term is shown. $R^2 = .108^{**}$ 95% CI [0.06, 0.13]. The estimated marginal trends are Bonferroni corrected. The standardized estimated marginal trends are included as effect size (ES) measure for each slope (i.e., how many standard deviations (SDs) the outcome variable changes per 1 SD increase in the predictor), with effect sizes of 0.10 – 0.29, 0.30 – 0.49 and 0.50 or greater considered to be small, medium and large, respectively (Cohen, 2013; Fey et al., 2023). Significant estimated marginal trend are highlighted in bold. * $p < .05$, ** $p < .01$, *** $p < .001$. CON: conscientiousness; LR: lifestyle regularity; PMA: prospective memory ability.

Table S5*Path-indices of the serial (multiple) mediation models of the pre-retirement group*

	<i>b</i>	SE <i>b</i>	<i>z</i>	95% CI	ES
CON ~ SP	0.16**	0.05	3.07	[0.05, 0.26]	0.21
SP ~ CON	0.28**	0.09	2.96	[0.10, 0.47]	0.21
LR ~ CON	0.02	0.02	1.18	[-0.01, 0.06]	0.08
CON ~ LR	0.23	0.20	1.17	[-0.14, 0.63]	0.07
LR ~ SP	-0.01	0.02	-0.43	[-0.04, 0.02]	-0.03
SP ~ LR	-0.13	0.30	-0.43	[-0.70, 0.45]	-0.03
PMA ~ SP	0.02	0.03	0.58	[-0.04, 0.08]	0.03
PMA ~ CON	0.32***	0.05	7.14	[0.23, 0.41]	0.47
PMA ~ LR	-0.06	0.14	-0.45	[-0.34, 0.20]	-0.03
QoL ~ SP	-0.16	0.09	-1.84	[-0.32, 0.01]	-0.13
QoL ~ CON	0.54***	0.12	4.53	[0.31, 0.78]	0.33
QoL ~ LR	-0.18	0.35	-0.53	[-0.86, 0.50]	-0.03
QoL ~ PMA	0.35*	0.17	2.02	[0.00, 0.68]	0.15
MWB ~ SP	-0.05	0.06	-0.82	[-0.16, 0.06]	-0.06
MWB ~ CON	0.40***	0.07	5.42	[0.26, 0.55]	0.38
MWB ~ LR	0.12	0.19	0.60	[-0.26, 0.50]	0.03
MWB ~ PMA	0.11	0.13	0.84	[-0.15, 0.34]	0.07

Note. *b* represents unstandardized partial regression weights (or *path regression coefficients*). Square brackets are used to enclose the lower and upper limits of a confidence interval (CI), and both the standard error (SE) and *z*-value are reported. The standardized slopes (or *path coefficients*) are included as effect size (ES) measure for each path (i.e., how many standard deviations (SDs) the outcome variable changes per 1 SD increase in the predictor), with effect sizes of 0.10 – 0.29, 0.30 – 0.49 and 0.50 or greater considered to be small, medium and large, respectively (Cohen, 2013; Fey et al., 2023). Effect sizes of significant paths are highlighted in bold.

* $p < .05$, ** $p < .01$, *** $p < .001$. CON: conscientiousness; LR: lifestyle regularity; PMA: prospective memory ability; SP: strategic planning; QoL: Quality of Life, MWB: Mental well-being

Table S6*Path-indices of the serial (multiple) mediation models of the newly retired group*

	<i>b</i>	SE <i>b</i>	<i>z</i>	95% CI	ES
CON ~ SP	0.27***	0.04	6.55	[0.19, 0.36]	0.33
SP ~ CON	0.40***	0.06	6.63	[0.28, 0.52]	0.33
LR ~ CON	0.06***	0.01	4.58	[0.04, 0.09]	0.20
CON ~ LR	0.66***	0.15	4.46	[0.37, 0.94]	0.20
LR ~ SP	0.00	0.01	0.01	[-0.02, 0.02]	0.00
SP ~ LR	0.00	0.18	0.01	[-0.34, 0.35]	0.00
PMA ~ SP	-0.04	0.02	-1.58	[-0.08, 0.01]	-0.06
PMA ~ CON	0.30***	0.03	9.99	[0.24, 0.36]	0.44
PMA ~ LR	0.09	0.10	0.90	[-0.10, 0.29]	0.04
QoL ~ SP	-0.07	0.06	-1.11	[-0.19, 0.06]	-0.05
QoL ~ CON	0.66***	0.08	8.09	[0.50, 0.82]	0.40
QoL ~ LR	0.29	0.24	1.22	[-0.19, 0.76]	0.06
QoL ~ PMA	0.26*	0.11	2.30	[0.04, 0.48]	0.11
MWB ~ SP	-0.09*	0.04	-2.41	[-0.17, -0.02]	-0.10
MWB ~ CON	0.50***	0.06	8.75	[0.39, 0.62]	0.46
MWB ~ LR	0.08	0.17	0.50	[-0.24, 0.41]	0.02
MWB ~ PMA	0.17*	0.07	2.42	[0.03, 0.31]	0.11

Note. *b* represents unstandardized partial regression weights (or *path regression coefficients*). Square brackets are used to enclose the lower and upper limits of a confidence interval (CI), and both the standard error (SE) and *z*-value are reported. The standardized slopes (or *path coefficients*) are included as effect size (ES) measure for each path (i.e., how many standard deviations (SDs) the outcome variable changes per 1 SD increase in the predictor), with effect sizes of 0.10 – 0.29, 0.30 – 0.49 and 0.50 or greater considered to be small, medium and large, respectively (Cohen, 2013; Fey et al., 2023). Effect sizes of significant paths are highlighted in bold.

* $p < .05$, ** $p < .01$, *** $p < .001$. CON: conscientiousness; LR: lifestyle regularity; PMA: prospective memory ability; SP: strategic planning; QoL: Quality of Life, MWB: Mental well-being

Table S7*Path-indices of the serial (multiple) mediation models of the retired group*

	<i>b</i>	SE <i>b</i>	<i>z</i>	95% CI	ES
CON ~ SP	0.25***	0.04	5.85	[0.17, 0.34]	0.31
SP ~ CON	0.39***	0.06	6.11	[0.26, 0.51]	0.32
LR ~ CON	0.04*	0.02	2.15	[0.01, 0.07]	0.13
CON ~ LR	0.26	0.20	1.32	[-0.13, 0.65]	0.08
LR ~ SP	-0.04**	0.01	-2.96	[-0.06, -0.01]	-0.15
SP ~ LR	-0.57**	0.19	-3.01	[-0.93, -0.20]	-0.14
PMA ~ SP	0.02	0.03	0.57	[-0.04, 0.08]	0.03
PMA ~ CON	0.26***	0.04	6.91	[0.18, 0.33]	0.35
PMA ~ LR	0.03	0.13	0.25	[-0.21, 0.29]	0.01
QoL ~ SP	-0.16**	0.06	-2.60	[-0.28, -0.04]	-0.12
QoL ~ CON	0.77***	0.09	8.27	[0.60, 0.96]	0.49
QoL ~ LR	0.03	0.24	0.14	[-0.41, 0.51]	0.01
QoL ~ PMA	0.16	0.13	1.23	[-0.10, 0.40]	0.07
MWB ~ SP	-0.01*	0.05	-0.19	[-0.11, 0.09]	-0.01
MWB ~ CON	0.57***	0.08	7.40	[0.42, 0.72]	0.47
MWB ~ LR	-0.03	0.18	-0.18	[-0.39, 0.33]	-0.01
MWB ~ PMA	0.06	0.09	0.60	[-0.13, 0.24]	0.03

Note. *b* represents unstandardized partial regression weights (or *path regression coefficients*). Square brackets are used to enclose the lower and upper limits of a confidence interval (CI), and both the standard error (SE) and *z*-value are reported. The standardized slopes (or *path coefficients*) are included as effect size (ES) measure for each path (i.e., how many standard deviations (SDs) the outcome variable changes per 1 SD increase in the predictor), with effect sizes of 0.10 – 0.29, 0.30 – 0.49 and 0.50 or greater considered to be small, medium and large, respectively (Cohen, 2013; Fey et al., 2023). Effect sizes of significant paths are highlighted in bold.

* $p < .05$, ** $p < .01$, *** $p < .001$. CON: conscientiousness; LR: lifestyle regularity; PMA: prospective memory ability; SP: strategic planning; QoL: Quality of Life, MWB: Mental well-being