Supplemental Information for

"Emotion Regulation Is Associated with Trait-Like and Future Well-Being Across Eight Years"

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1. Attrition Analysis

To assess whether and how participation attrition might have affected the results of our statistical models, we examined whether participants who dropped out of the study were systematically different from those who did not in terms of our key variables of interest, including well-being (i.e., cognitive, affective, and physical well-being), emotion regulation (i.e., reappraisal, suppression of positive emotions, and suppression of negative emotions), and demographic variables (i.e., age, gender, and income). First, we created a dummy variable indicating the missing status of each participant at the last wave (measured in 2020, missing = 1). Next, we conducted a mixed-effects logistic regression including the key variables of interest as predictors of the missing status while also accounting the random effects of household. All variables except for gender were standardized, and gender was dummy coded with male = 1. In terms of well-being, we found that participants with higher levels of cognitive well-being were less likely to drop out (b = -0.14, SE = 0.05, p < .01, odds ratio [OR] = 0.87), and there were no effects of affective (b = 0.02, SE = 0.09, p = .574, OR = 1.03) and physical (b = -0.04, SE = 0.04, p = .392, OR = 0.96) well-being. Additionally, we found that reappraisal (b = 0.01, SE = 0.04, p = .727, OR = 1.01), suppression of positive emotions (b = 0.03, SE = 0.04, p = .528, OR = 1.03), and suppression of negative emotions (b = 0.08, SE = 0.04, p = .057, OR = 1.08) were all not predictive of dropping out. Finally, we found that older participants (b = 0.22, SE = 0.05, p < .001, OR = 1.25), male participants (b = 0.26, SE = 0.08, p < .01, OR = 1.30), and participants

with less income (b = -0.21, SE = 0.05, p < .001, OR = 0.81) were more likely to drop out. As can be seen in this analysis, most variables were not associated with participants dropping out of the study. Furthermore, in cases where there are significant effects, the effect sizes (OR) were minimal, with the largest effect size being 0.81, equivalent to *Pearson's r* = -0.06. Still, we discussed the potential impacts of these results on our primary findings in the main text.

2. Items Used in the Present Research

Tables below show the items used in the present research. They were translated to English by the first author to help interpretation of non-Mandarin speaking readers.

Emotion Regulation

Mandarin	English
Reappraisal	
當您想要您自己覺得更開心的時候，您會去改變您對事情的想法	When you want to feel happier, you change the way you look at things.
當您不想要感受到悲傷或生氣的時候，您會去改變您對事情的想法	When you don't want to feel sad or angry, you change the way you look at things.
為了控制您的情緒，您會改變自己的想法	You change your thoughts to control your emotions.
Suppression	
當您覺得悲傷或生氣時，您會盡量不表現出來	When you feel sad or angry, you try to not show it.

當您感覺到開心的時候，您會盡量不表現出來	When you feel happy, you try to not show it.

Cognitive well-being

Mandarin	English
整個來說，您最近這陣子的生活過得快樂嗎？	Overall, how good have you been feeling about your life?
請問過去一年來，您的生活過得好不好？	How has your life been for the past year?

Affective well-being

Mandarin	English
Items in 2012 and 2020	
您覺得緊張且不安	You feel nervous and uneasy
您對自己感到滿意	You feel satisfied with yourself
您覺得安心	You feel at ease
您是穩重、沉重且忍靜的	You are steady, stable, and calm
您覺得困難一直增加無法解決	You feel that problems keep piling up and can't be solved
您太擔心一些無關緊要的事	You worry too much about trivial things
您是快樂的	You are happy
您有些煩惱	You have some troubles in your life

您缺乏自信	You lack self-confidence
您覺得有安全感	You feel secure
您覺得自己沒有能力	You feel incapable
您很知足	You are content
您太在乎失望的事而無法拋諸腦後	You care too much about disappointments and can't let them go
您是很穩定的人	You are a very stable person
當您仔細思考自己的一些問題時，就緊張或慌亂	You become nervous or panicked when you think deeply about some of your own problems
Items used in 2016	
您覺得緊張且不安	You feel nervous and uneasy
您覺得非常沮喪，沒有任何事情可以讓您高興起來	You feel down and nothing can cheer you up
您覺得安心	You feel at ease
您覺得困難一直增加無法解決	You feel like there are more and more difficulties in your life
您太擔心一些無關緊要的事	You worry too much about trivial things
您是一個快樂的人	You feel happy
您覺得別人不喜歡您	You feel people don't like you
您覺得別人都不友善（不親切、冷淡）	You feel people are unfriendly and cold

您覺得很寂寞（孤單、沒伴）	You feel lonely
您睡不好覺（睡不入眠）	You can't sleep
您不太想吃東西，胃口很差	You lose your appetite
您覺得心情平靜	You feel calm
您覺得悶悶不樂和憂鬱	You feel unhappy and depressed
您是一個非常緊張的人	You are a very nervous person

Items highlighted in yellow are used for additional robustness checks (see section 3 below).

Physical well-being

Mandarin	English
請問您認為自己目前的健康狀況如何？	How do you view your health?

3. Construct validity of affective well-being and robustness check

As mentioned in the main text and can be seen from the table above, affective well-being was measured with different items across waves. Specifically, items used in 2012 and 2020 differed from those used in 2016. Moreover, the scales used in 2012 and 2020 (four points) also differed from that used in 2016 (six points). To ensure that the composite score captured the same construct, we examined the convergent construct validity of this score by probing its correlation with other well-being facets at each wave. Results showed that affective well-being was similarly correlated with both cognitive and physical well-being at each wave, providing evidence for construct validity. For the *Pearson's correlation* between affective well-being and cognitive and physical well-being: in 2012 it was .52 and .33, and in 2016, it was also .52 and .33, and finally, in 2020, it was .48 and .35, all ps < .001.

Additionally, despite differences in response scales across waves, we conducted supplementary tests of longitudinal measurement invariance using only the affective well-being items shared across all waves (marked in yellow in the tables above). To improve comparability, we first collapsed the 2016 6-point measure to a 4-point measure. We then tested configural invariance by estimating a longitudinal confirmatory factor model with one latent affective well-being factor at each wave. To account for repeated measurement, residuals of the same items were allowed to covary across waves. In addition, the residuals of the two positively keyed items ("happy" and "peace of mind") were allowed to covary within wave to account for shared positive valence not fully captured by the general affective well-being factor. The configural model showed good fit, RMSEA = .072, SRMR = .042, and CFI = .959, suggesting that a similar general factor structure could be identified across waves.

We next tested loading invariance by constraining corresponding factor loadings to equality across waves. This model also showed good fit, RMSEA = .063, SRMR = .045, and CFI = .964. However, comparison using the Mplus DIFFTEST procedure indicated that the equal-loading model fit significantly worse than the configural model, DIFFTEST $\chi 2(10) = 166.47$, $p < .001$. Thus, exact loading invariance was not supported. Given that the 2016 items originally used a different response scale, these results should be interpreted cautiously. Taken together, the findings suggest that the shared items exhibit only limited longitudinal comparability, and the affective well-being construct should not be treated as strictly invariant across waves.

Finally, to test the robustness of our results, we conducted another set of models with only the items used across all waves, and the results were consistent with the ones presented in the main text, see Table S1.

Table S1

The effects of emotion regulation on affective well-being using only items measured across three waves

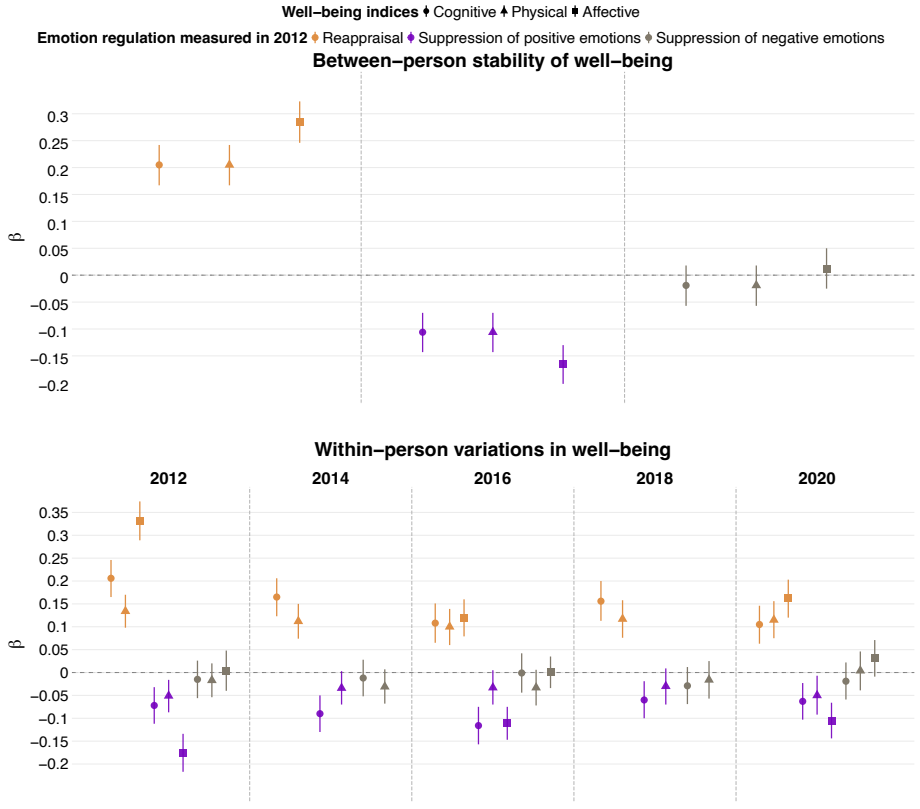
Variable	β	SE	*p*	95% CI
	Between-person model			
Reappraisal	.22	0.02	< .001	.18 – .26
Suppression of positive emotions	-.11	0.02	< .001	-.14 – -.07
Suppression of negative emotions	.01	0.01	.501	-.02 – .05
	Within-person model			
Wave 1 (2012)				
Reappraisal	.25	0.02	< .001	.20 – .29
Suppression of positive emotions	-.11	0.02	< .001	-.15– -.07
Suppression of negative emotions	-.01	0.03	.735	-.06 – .04
Wave 3 (2016)				
Reappraisal	.15	0.03	< .001	.10– .20
Suppression of positive emotions	-.08	0.02	< .001	-.13– -.04
Suppression of negative emotions	-.01	0.02	.806	-.05 – .04
Wave 5 (2020)				
Reappraisal	.12	0.03	< .001	.07– .17
Suppression of positive emotions	-.05	0.02	.026	-.10– -.01
Suppression of negative emotions	<.01	0.02	.245	-.05 – .05

4. Robustness Checks

To examine the *robustness* of the effects of emotion regulation, we re-ran all the models but controlling for the following covariates: participants' gender, age, and their average across-time income. As can be seen in Figure S1, the effects of emotion regulation were largely robust after the inclusion of these covariates. The only change was in the effects of suppression of positive emotions in the within-person model on physical well-being, which dropped to marginal significance in some waves. Specific effects can be found in the Mplus output files in our OSF link.

Figure S1

Effects of emotion regulation on well-being from RILPM model controlling for covariates



5. Generalizability Checks

To explore the generalizability of the effects, we re-ran all the models three times, each time examining the moderating role of a covariate. For gender, we conducted a multi-group RILPM and computed the differences (the "DIFF" parameter in the Mplus output files; δ) in the strength of the effects of emotion regulation across males and females (Mulder & Hamaker, 2021). The *p*-values of the simple slopes and the difference between parameter estimates were adjusted using the *Holm–Bonferroni* method. For age and income, we included interaction terms between each of them and all the emotion regulation strategies. If a significant interaction was found, we proceeded to decompose the interaction and examine the simple slopes at one SD above the mean (M), M, and one SD below the M levels of the covariate.

Table S2 summarizes the results of our moderation analyses. The results are mixed across well-being indices and emotion regulation strategies. Before we delved into the details, we first noted two consistent findings. First, suppression of negative emotions remained null across models. Second, in cases where there were moderation effects, the main effects were still present. In many cases the simple main effects remained evident across levels of the moderator, but there were some exceptions in which simple slopes were weak or non-significant, especially for within-person physical and affective well-being models.

Specific effect sizes can be found in our OSF page (https://osf.io/w96nt/).

Table S2

Summary of the heterogeneity of the effects of emotion regulation

			Reappraisal	Suppression of positive emotions
Cognitive well-being	Between-person component	Gender	Female > Male	
		Age		
		Income		
	Within-person component	Gender		
		Age	For 1st wave: Younger > Mid > Older	
		Income		
Affective well-being	Between-person component	Gender	Female > Male	
		Age		
		Income		
	Within-person component	Gender	For the 1st wave: Female > Male	
		Age		
		Income		
Physical well-being	Between-person component	Gender		Female > Male
		Age		Old > Mid > Young
		Income	$ > $$ > $$$	
	Within-person component	Gender		For the first three waves: Females > Males
		Age		For the 1st wave: Older > Mid > Younger
		Income	For the 1st and 2nd waves: $ >$$ > $$$	For the 2nd wave: $ > $$ > $$$

Cognitive Well-being

For the between-person model, there was a significant difference between the effects of reappraisal across genders, $\delta = .06$, $p < .05$, such that reappraisal was more strongly associated with cognitive well-being for females ($\beta = .19$, $p < .001$) than males ($\beta = .12$, $p < .001$). No other gender moderation effects were found.

For the within-person model, the effects of reappraisal and suppression of positive emotions generalized across income (interaction $|\beta|$s $< .03$, ps $> .05$) and genders ($|\delta|$s $< .08$, ps $> .05$). With age, while reappraisal was generally beneficial, its effect was stronger among younger ($\beta = .24$, $p < .001$) compared to middle-aged ($\beta = .19$, $p < .001$) and older adults ($\beta = .15$, $p < .001$). Yet, this pattern only existed in the first wave.

Affective Well-being

For the between-person model, the effects of reappraisal and suppression of positive emotions generalized across age (interaction $|\beta|$s $< .02$, ps $> .05$) and income (interaction $|\beta|$s $< .02$, ps $> .05$). Additionally, the association between reappraisal and affective well-being was stronger for females ($\beta = .32$, $p < .001$) than for males ($\beta = .18$, $p < .001$), $\delta = .06$, $p < .001$. No gender moderation effects were found for suppression of positive emotions.

For the within-person model, the effects of reappraisal and suppression of positive emotions generalized across age (interaction $|\beta|$s $< .05$, ps $> .05$), and income (interaction $|\beta|$s $< .04$, ps $> .05$). Additionally, reappraisal was more beneficial for females across all three waves (βs = .40, .17, .18, respectively, all ps $< .001$), compared to males ($\beta = .25$, $p < .001$; $\beta = .04$, $p = .102$; $\beta = .08$, $p < .05$, for three waves respectively), $\delta = .05$, .07, and .04, all ps $< .05$. No gender moderation effects were found for suppression of positive emotions.

Physical Well-being

For the between-person model, the associations between suppression of positive emotions and physical health differed across all the demographic variables. Specifically, its association with physical health was stronger for older (β = -.07, $p < .01$), compared to middle-aged (β = -.03, $p < .05$) and younger adults (β = .01, $p = .709$), interaction β = .05, $p < .01$. Additionally, the association was stronger for females (β = -.13, $p < .001$) compared to males (β = -.04, $p < .01$), δ = -.07, $p < .01$. Finally, we also found that the association between reappraisal and physical health was stronger for people with lower income (β = .14, $p < .001$), compared to those with average (β = .11, $p < .001$) and with higher income (β = .08, $p < .001$), interaction β = -.05, $p < .001$.

For the within-person model, there was some evidence for short-term moderation. Specifically, for age, the effect of suppression of positive emotions only existed for older (β = -.08, $p < .01$), but only marginally so among middle-aged (β = -.04, $p = .056$) and non-existent among younger adults (β = .01, $p = .632$) in the first wave. No other age moderation effects were found for the rest of the waves. As for income, the effect of reappraisal was stronger for people with lower (β = .17, $p < .001$), compared to those with average (β = .14, $p < .001$) and high income (β = .10, $p < .001$) in the first wave. We also found that the effect of suppression of positive emotions was stronger for people with lower (β = -.09, $p < .001$), compared to those with average income (β = -.05, $p < .001$) and non-existent among those with higher income (β = -.01, $p = .764$) in the second wave. No other income moderations were found. Finally, for gender, the effects of suppression of positive emotions were stronger for females at the first three waves (βs = -.15, -.11, -.12, respectively, all ps $< .001$) compared to males (β = -.05, $p < .05$ for the first wave, and βs = -.03, ps $> .05$ for the second and third waves).

6. Contextualizing the Effects of Emotion Regulation and Well-being

One possible explanation for the prospective associations between baseline emotion regulation and later well-being is that baseline emotion regulation may be related to the overall trajectory of well-being across time. If so, the prospective associations observed in the RILPM might partly reflect a broader linear change in well-being over time.

To examine this possibility, we conducted supplementary conditional latent growth models (LGMs) for each well-being facet. In these models, we estimated a latent intercept and a latent linear slope for well-being and regressed both factors on baseline emotion regulation. This approach allowed us to test whether emotion regulation was associated with individuals' initial levels of well-being and with their rate of change in well-being over time.

Before presenting these results, it is important to clarify how this approach differs from the RILPM. Although both models include an intercept term, the intercept in an LGM represents the expected level of the outcome at the reference time point (here, baseline), whereas the random intercept in the RILPM represents stable between-person differences across repeated assessments. Additionally, the slope in the LGM captures systematic linear change over time, whereas the RILPM is designed to estimate time-specific associations net of stable between-person differences. Thus, the effect of baseline emotion regulation on the LGM intercept addresses whether emotion regulation is associated with baseline well-being, and the effect on the slope addresses whether emotion regulation is associated with the rate of change in well-being over time. These questions are distinct from the RILPM questions concerning stable, trait-like well-being and future time-specific well-being.

Because our primary interest was in whether emotion regulation was associated with both stable between-person differences in well-being and later time-specific well-being, we presented

the RILPM as our primary analytic framework. At the same time, we used the conditional LGM as a supplementary analysis to assess whether the RILPM findings might be partly attributable to a more general growth process in well-being[1].

These models were first evaluated using the same fit criteria presented in the main text: Root Mean Square Error of Approximation (RMSEA) ≤ .08, Standardized Root Mean Squared Residual (SRMR) ≤ .08, and Comparative Fit Index (CFI) ≥ .90 (Hu & Bentler, 1999). We then examined the effects of baseline emotion regulation on both the intercept and slope of well-being. In each model, the intercept and slope were allowed to covary, and the baseline emotion-regulation predictors were also allowed to covary. All model syntax and output are available on the project OSF page.

Cognitive Well-being

The model fit well, RMSEA = .026, SRMR = .024, and CFI = .987. First, we found that participants had relatively high cognitive well-being at baseline, I (estimated intercept) = 4.158, *SE* = 0.101, $p < .001$, and people's cognitive well-being showed a positive linear increase over time, S (estimated slope) = 0.087, *SE* = 0.032, $p = .007$. I and S covaried negatively, $b = -0.053$, *SE* = 0.009, $p < .001$, indicating that people with higher cognitive well-being at baseline experienced a slower growth over time, consistent with a possible ceiling effect.

Next, we examined the effects of emotion regulation on I (baseline well-being). We found that reappraisal was positively associated with baseline cognitive well-being ($b = 0.199$, *SE* = 0.018, $p < .001$), suppression of positive emotions was negatively associated with baseline cognitive well-being ($b = -0.065$, *SE* = 0.011, $p < .001$), and suppression of negative emotions showed a null effect ($b = -0.006$, *SE* = 0.012, $p = .626$).

[1] We thank the editor for suggesting this possibility

Finally, we examined the effects of emotion regulation on S (change in well-being). We found that reappraisal was negatively associated with the change in cognitive well-being (b = -0.015, SE = 0.006, p = .007), and both suppression of positive emotions (b = 0.001, SE = 0.004, p = .757), and suppression of negative emotions (b = -0.002, SE = 0.004, p = .535) showed null effects. The negative association might be because of a ceiling effect as a result of the high baseline correlation between reappraisal and cognitive well-being.

Affective Well-being

Affective well-being was standardized prior to modeling. Because the affective well-being measure cannot be treated as strictly invariant across time (see Section 3), the growth-model results should be interpreted only as a supplementary check rather than as definitive evidence about longitudinal change. The model showed good fit, RMSEA = .019, SRMR = .008, and CFI = .998. However, estimation of the slope factor was problematic because its variance was negative, indicating an inadmissible solution. This suggests that the linear growth component for affective well-being was not estimated reliably in this model. We also estimated a second-order latent growth model using the subset of common items to define latent affective well-being at each wave, and the same problem persisted. Accordingly, we do not interpret coefficients involving the slope factor. At the same time, the intercept portion of the model was consistent with the main analyses. We found that reappraisal was positively associated with affective well-being at baseline, b = 0.198, SE = 0.016, p < .001, suppression of positive emotions was negatively associated with baseline affective well-being, b = -0.061, SE = 0.010, p < .001, and suppression of negative emotions was not significantly associated with baseline affective well-being, b = 0.003, SE = 0.010, p = .737.

Physical Well-being

The model fit well, RMSEA = .016, SRMR = .011, and CFI = .995. First, we found that participants had relatively high physical well-being at baseline, I = 2.948, *SE* = 0.067, $p < .001$, and physical well-being did not show evidence of a significant linear trend over time, S (estimated slope) = -0.026, *SE* = 0.020, $p = .203$. I and S covaried negatively, $b = -0.029$, *SE* = 0.004, $p < .001$.

Next, we examined the effects of emotion regulation on I. We found that reappraisal was positively associated with baseline physical well-being ($b = 0.118$, *SE* = 0.012, $p < .001$), suppression of positive emotions was negatively associated with baseline physical well-being ($b = -0.040$, *SE* = 0.008, $p < .001$), whereas suppression of negative emotions showed a null effect ($b = 0.008$, *SE* = 0.008, $p = .349$).

Finally, we examined the effects of emotion regulation on S (change in well-being). We found that emotion regulation was not significantly associated with the change in physical well-being (reappraisal: $b = -0.005$, *SE* = 0.004, $p = .178$; suppression of positive emotions: $b = -0.003$, *SE* = 0.002, $p = .207$; suppression of negative emotions: $b < |0.005|$, *SE* = 0.003, $p = .923$)

Conclusion

Taken together, these supplementary LGMs provided little evidence that the prospective associations observed in the RILPM were primarily driven by a general linear growth process in well-being. For cognitive well-being, baseline reappraisal was associated with the slope, but this pattern appeared alongside a strong association with baseline well-being and a negative intercept-slope covariance, suggesting that higher initial well-being may leave less room for subsequent increase. For physical well-being, none of the emotion regulation strategies was significantly associated with well-being change over time. For affective well-being, the slope factor could not be estimated reliably, precluding firm conclusions about longitudinal change.

Overall, these results suggest that the prospective associations identified in the RILPM are not readily reducible to a simple linear growth process and therefore likely capture dynamics that are conceptually distinct from general linear change over time.

References:

Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal*, *6*(1), 1–55.

Mulder, J. D., & Hamaker, E. L. (2021). Three extensions of the random intercept cross-lagged panel model. *Structural Equation Modeling: A Multidisciplinary Journal*, *28*(4), 638–648. https://doi.org/10.1080/10705511.2020.1784738