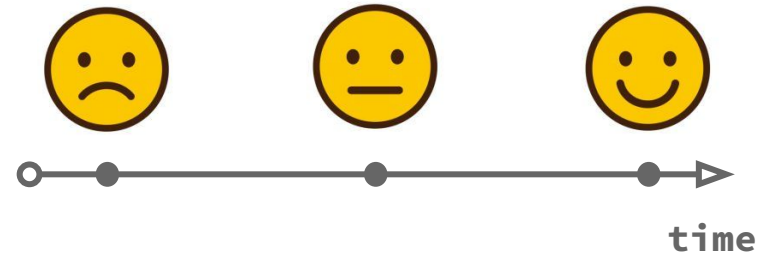


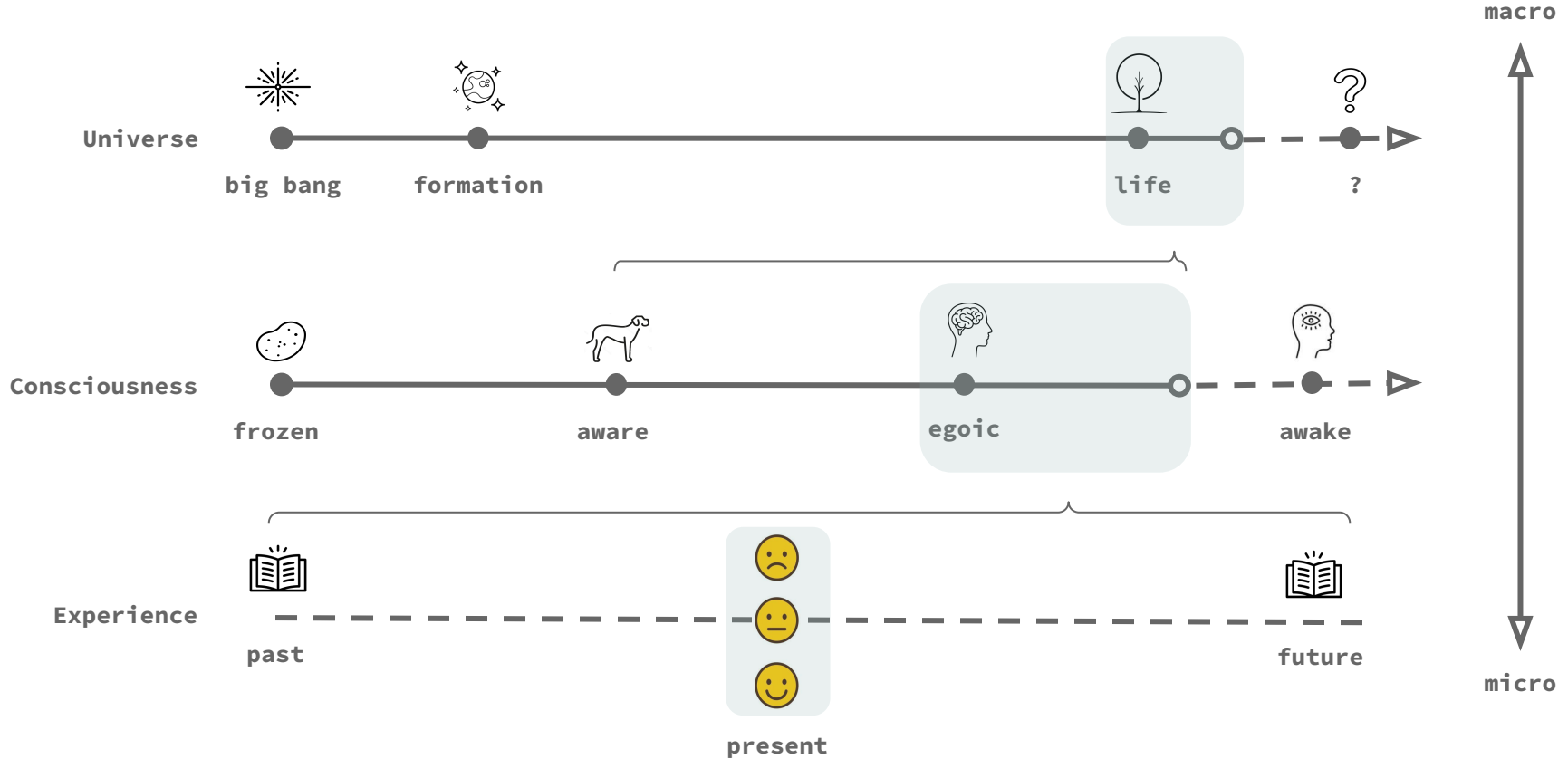
A Better Life



Jonathan Michelin

Frame

Regardless of our timeline, experience occurs now.

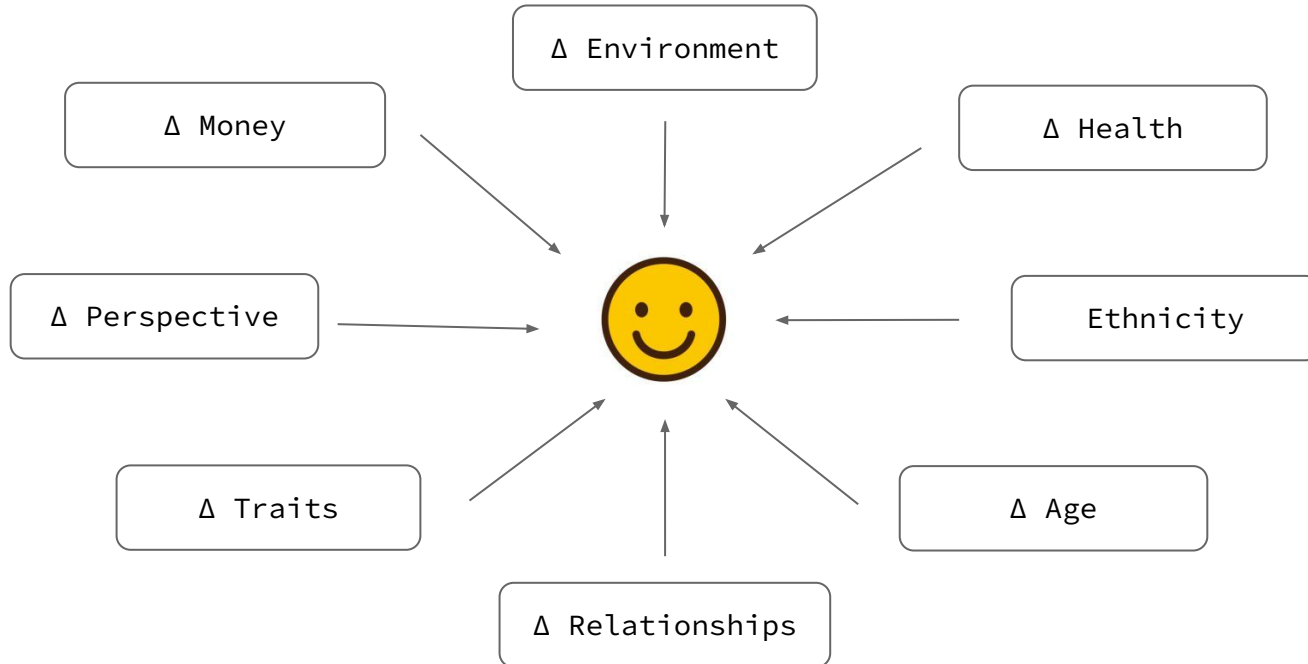


Life Satisfaction

We can evaluate experience through self-reported “life satisfaction”

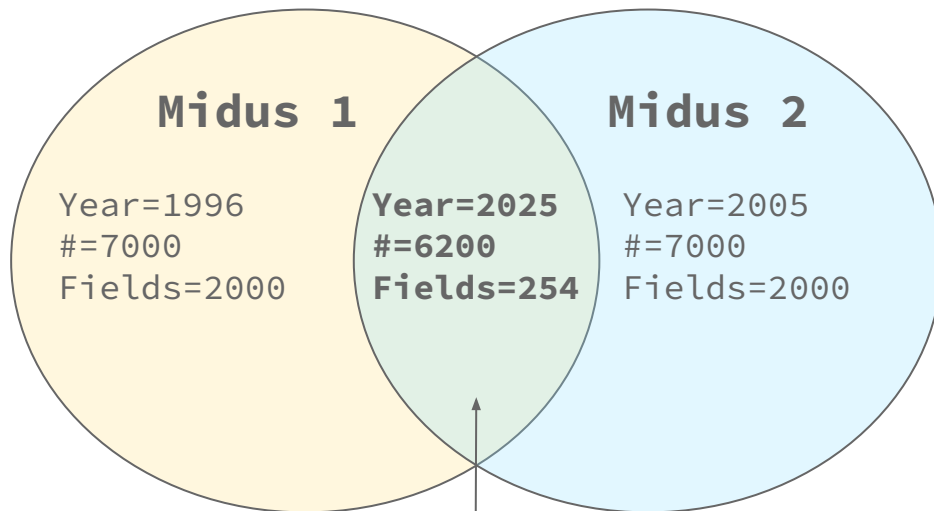
How we change may change our life satisfaction

Things we can't change may change our life satisfaction too



Data

MIDUS: a national longitudinal study on *health* and *well-being*.



Source:

<https://midus.colectica.org/>

Launched: 1995

people: 12,000+

variables: 2000+



Data Cleaning (pd.merge, fillna etc)

TL;DR

1

Research Question:

What factors influence life satisfaction the most?



Perspective/Personality: Feeling more creative, assertive, open-minded, and sympathetic

2

Data:

MIDUS longitudinal study on health and well-being



Agency + Gratitude: Feeling *in control* over life and feeling *grateful* to be alive

Model:

Logistic Regression



Interactions: Improved positive relationships, mastery of living environment*, productivity under stress

3

Results:

The following are associated with improved life satisfaction:

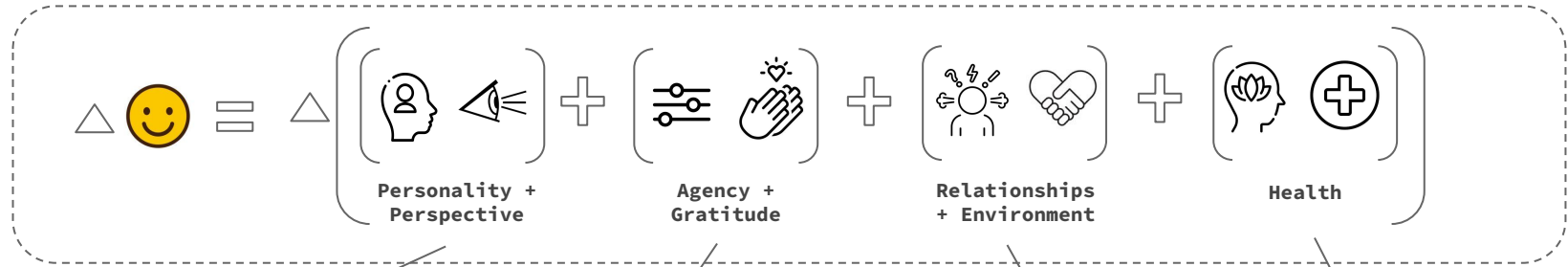


Health: Improved physical health, age, relief letting go of responsibilities



Practice being present (shift attention from mind)

Literature



[Creativity makes you happier](#)

[Assertiveness and Happiness](#)

[Sympathetic Joy](#)



[Relationships are the key to happiness](#)



[Non-Attachment](#)

[Better health = improved life satisfaction](#)

Actions

1. Foster your creativity
2. Feel okay being assertive
3. Stay open-minded and sympathetic
4. Cultivate gratitude
5. Invest effort into keeping and improving positive relationships
6. Maintain physical health

Journey



Scope

Step	Details
Exploratory Analysis	Correlation matrix, histograms, summary stats
Hypotheses	What may improve life satisfaction?
Models	Logit, Random Forest
Conclusion	What can we say?



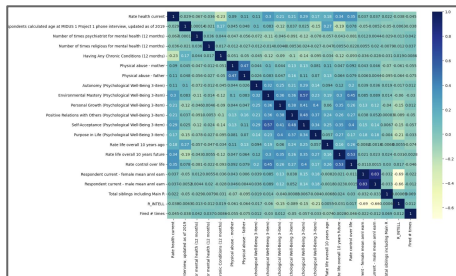
Exploratory Analysis: Control over life

“Control over life” changes with current health ($r=0.35$) and environmental mastery ($r=0.43$)

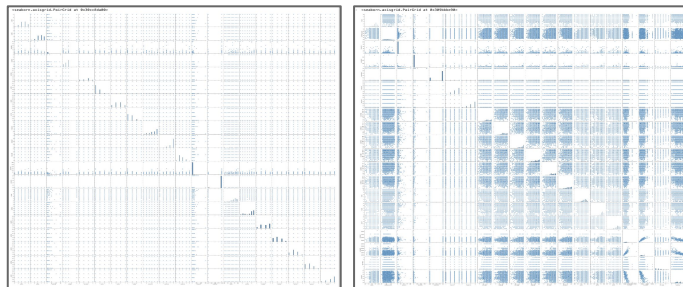
High positively correlated relationships (r) :

- (0.57) Self-acceptance ↔ Environmental Mastery
- (0.43) Control over life ↔ Environmental Mastery
- (0.35) Current health ↔ Control over life
- (0.83) Female income ↔ Male income (in same household)

`sns.heatmap(df.corr(numeric_only=True))`



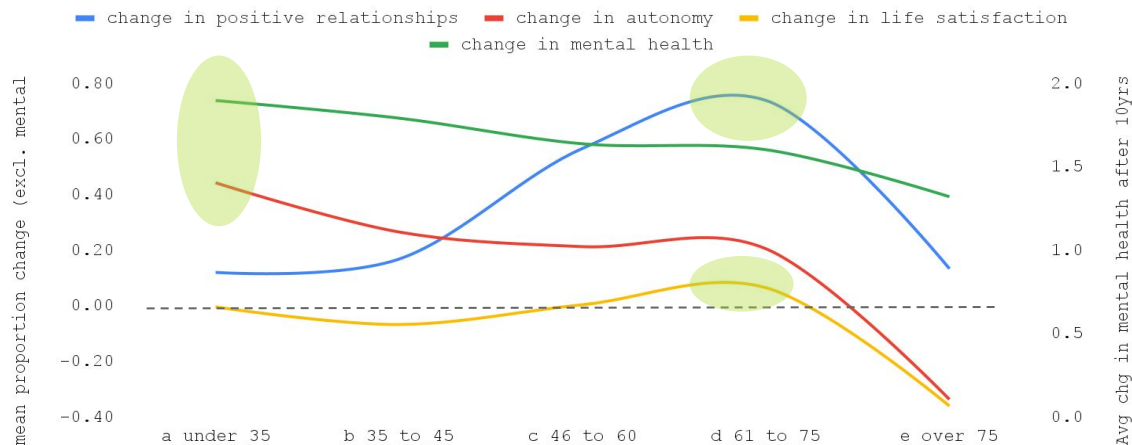
`sns.pairplot(df[[field_list]])`



Exploratory Analysis: Age & Life

- Positive relationships tends to improve over time until the age of 75
- Mental health growth remains positive at a decreasing rate
- After 35, average changes in autonomy decrease

Changes in lifestyle and health by age



Age: <35 to 45

Highest growth in autonomy and mental health



Age: 45-60

Positive relationships incline



Age: 61-75

Highest life satisfaction & positive relationships



Age: 76+

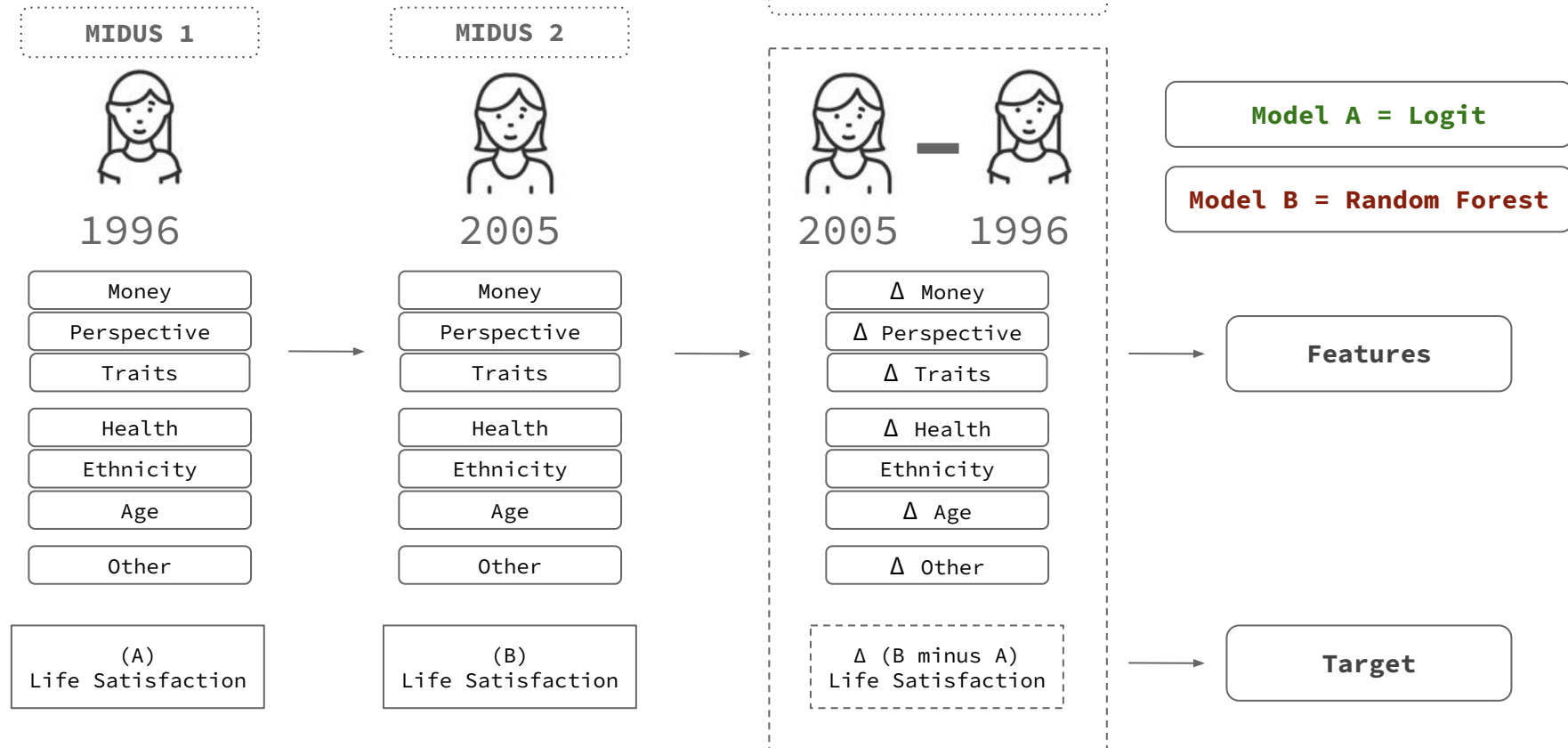
Largest decline in health, relationships, and autonomy

Hypotheses

#	Hypothesis
1	More income is positively associated with life satisfaction
2	Improved health (physical & mental) is positively associated with improved life satisfaction
3	Increased gratitude and agency is positively associated with improved life satisfaction
4	Increased assertiveness is positively associated with improved life satisfaction
5	Increased creativity is positively associated with improved life satisfaction
6	Improved open-mindedness is positively associated with improved life satisfaction
7	Improved calm is positively associated with improved life satisfaction



Model: Approach



Model

Target

Δ Life Satisfaction*

“How Satisfied are you with your life?”
10: very satisfied
1: not satisfied

*Has life satisfaction improved?
(if 2005 response minus 1996
response > 0 then 1 else 0)

Features: Δ = change
[2005 responses minus 1996 responses]

Δ Money

male/female income, became entrepreneur

Δ Perspective

gratitude, agency, willpower, goals, growth...

Δ Traits

creativity, assertiveness, calm, sympathy...

Δ Health

physical health, mental health

Ethnicity

ethnicity

Δ Age

age bucket

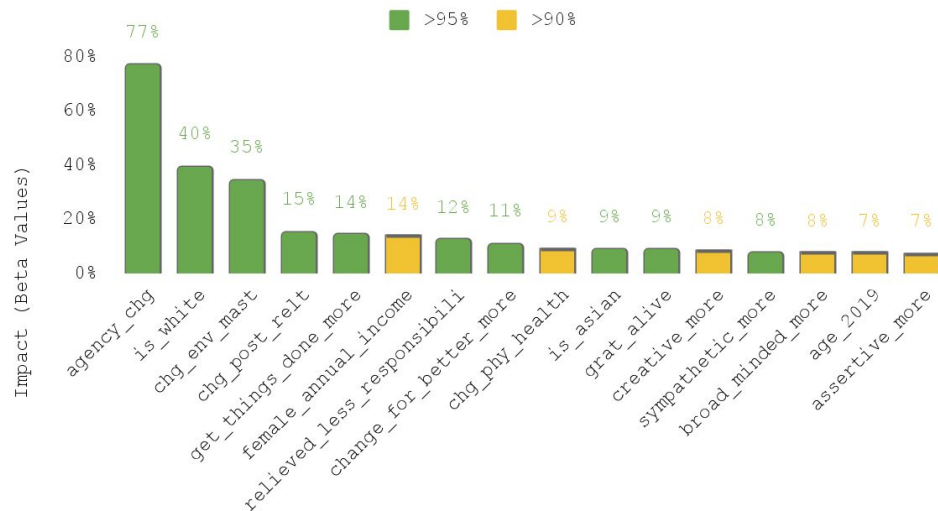
Δ Other

relationships, env. mastery, productivity...



Model: Output

Impacts



Evaluation

Type: logistic regression

Package: sklearn

Eval: accuracy, recall, f1, p-value, pseudo R^2

Accuracy: 71%

Recall: 45%

F1-Score: 53%

ROC-AUC Score: 0.7505

Confusion Matrix:

[815 141]

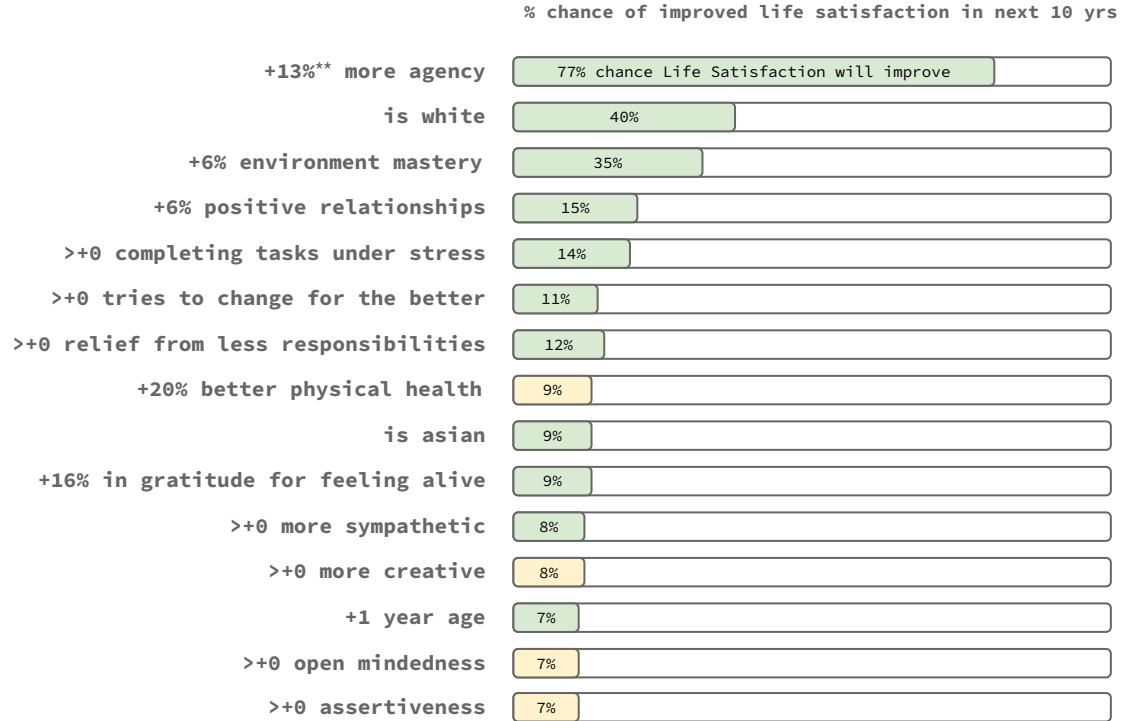
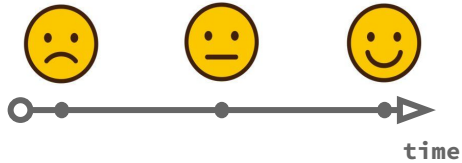
[292 241]

Logit Regression Results

Dep. Variable:	life_satisfaction_more	No. Observations:	3474
Model:	Logit	Df Residuals:	3439
Method:	MLE	Df Model:	34
Date:	Wed, 22 Jan 2025	Pseudo R-squ.:	0.1717
Time:	21:51:28	Log-Likelihood:	-1871.6
converged:	True	LL-Null:	-2259.6
Covariance Type:	nonrobust	LLR p-value:	3.940e-141

Model: Impacts

Improved Life Satisfaction



95% confidence

90% confidence

**Improvements based 1 unit improvement in mean (1/improvement % = mean)

Conclusion: Insights

The following is associated with improved life satisfaction:

Perspective: Feeling more creative, assertive, open-minded, and sympathetic

Agency + Gratitude: Feeling *in control* over life and feeling *grateful* to be alive

Interactions: Improved positive relationships, mastery of living environment*, productivity under stress

Health: Improved physical health, mental health: relief from letting go of responsibilities

Perspective/Personality

1. Creative
2. Assertive
3. Open Minded
4. Sympathetic

Agency + Gratitude

1. Grateful for life
2. Control over life

Interactions (with self + others)

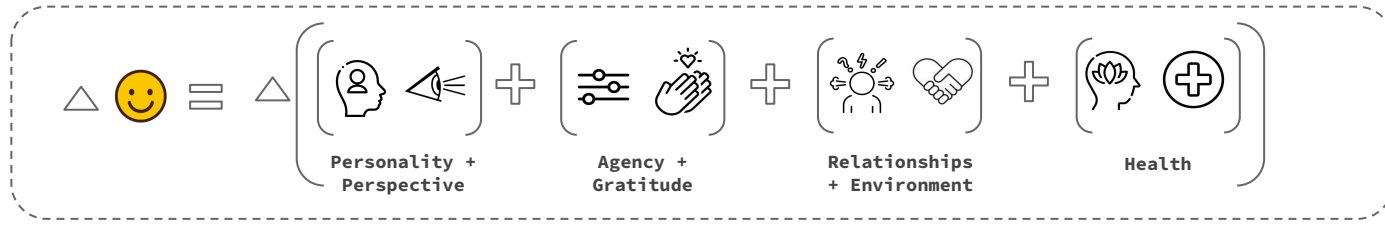
1. Positive relationships
2. Environmental Mastery
3. Productive under stress

Health

1. Physically healthy
2. Relief from less responsibilities

*b. "In general, I feel I am in charge of the situation in which I live." (R) h. "The demands of everyday life often get me down." t. "I am quite good at managing the many responsibilities of my daily life." (R)

Conclusion: What can we say?



#	Hypothesis	Conclusion
1	More income is positively associated with life satisfaction	Failed to detect
2	Improved health (physical & mental) is positively associated with life satisfaction	Physical health was statistically significant
3	Increased gratitude and agency is positively associated with life satisfaction	Correct
4	Increased assertiveness is positively associated with life satisfaction	Correct
5	Increased creativity is positively associated with life satisfaction	Correct
6	Improved open-mindedness is positively associated with life satisfaction	Correct
7	Improved calm is positively associated with life satisfaction	Failed to detect



Appendix

Github

Python notebooks and cleaned data available on github:

https://github.com/jonathanmichelin1/projects/tree/main/research/life_satisfaction

Model Output

Optimization terminated successfully.
Current function value: 0.538742
Iterations 6

Logit Regression Results

Dep. Variable:	life_satisfaction_more	No. Observations:	3474
Model:	Logit	Df Residuals:	3439
Method:	MLE	Df Model:	34
Date:	Thu, 23 Jan 2025	Pseudo R-squ.:	0.1717
Time:	14:48:22	Log-Likelihood:	-1871.6
converged:	True	LL-Null:	-2259.6
Covariance Type:	nonrobust	LLR p-value:	3.940e-141

	coef	std err	z	P> z	[0.025	0.975]
Intercept	-0.7132	0.041	-17.300	0.000	-0.794	-0.632
Unnamed: 0	0.0428	0.040	1.059	0.290	-0.036	0.122
creative_more	0.0822	0.042	1.946	0.052	-0.001	0.165
assertive_more	0.0730	0.040	1.806	0.071	-0.006	0.152
imaginative_more	0.0656	0.041	1.606	0.108	-0.014	0.146
calm_more	0.0318	0.041	0.781	0.435	-0.048	0.112
careless_more	0.0463	0.040	1.153	0.249	-0.032	0.125
broad_minded_more	0.0755	0.041	1.864	0.062	-0.004	0.155
sympathetic_more	0.0783	0.039	1.990	0.047	0.001	0.155
willpower_more	0.0339	0.041	0.820	0.412	-0.047	0.115
change_for_better_more	0.1099	0.042	2.627	0.009	0.028	0.192
lower_expectations_more	0.0327	0.041	0.793	0.428	-0.048	0.114
avoid_disappointments_low_goals_more	0.0451	0.042	1.086	0.278	-0.036	0.127
learn_from_difficulties_more	0.0481	0.041	1.181	0.237	-0.032	0.128
relieved_less_responsibilities_more	0.1243	0.041	3.059	0.002	0.045	0.204
get_things_done_more	0.1429	0.041	3.508	0.000	0.063	0.223
new_perspective_more	0.0541	0.041	1.333	0.182	-0.025	0.134
problem_solving_more	0.0511	0.043	1.193	0.233	-0.033	0.135
persevere_tough_times_more	0.0352	0.043	0.820	0.412	-0.049	0.119
chg_phy_health	0.0910	0.053	1.722	0.085	-0.013	0.195
chg_ment_health	-0.0237	0.052	-0.460	0.646	-0.125	0.077
chg_post_relt	0.1546	0.043	3.602	0.000	0.070	0.239
chg_autonomy	-0.0261	0.042	-0.619	0.536	-0.109	0.056
chg_env_mast	0.3466	0.046	7.476	0.000	0.256	0.437
chg_pers_grwt	-0.0640	0.044	-1.460	0.144	-0.150	0.022
is_white	0.3951	0.067	5.853	0.000	0.263	0.527
is_black	0.0695	0.058	1.207	0.228	-0.043	0.182
is_native	0.0420	0.043	0.968	0.333	-0.043	0.127
is_asian	0.0908	0.046	1.964	0.050	0.000	0.181
agency_chg	0.7716	0.052	14.733	0.000	0.669	0.874
age_2019	0.0747	0.043	1.734	0.083	-0.010	0.159
female_annual_income	0.1371	0.122	1.127	0.260	-0.101	0.375
male_annual_income	-0.0943	0.123	-0.769	0.442	-0.335	0.146
grat_alive	0.0893	0.045	1.992	0.046	0.001	0.177
is_entrepreneur	0.0559	0.041	1.358	0.174	-0.025	0.137