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Research Foundation for Positive Intelligence Assessments

Positive Intelligence Whitepaper Series

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Research Foundation for Positive Intelligence Assessments

Purpose

This whitepaper provides updated research data regarding both the Saboteur Assessment and PQ Assessment. It includes an exploratory and confirmatory factor analysis to confirm the Saboteur Assessments' reliability and its underlying factors. It also includes analysis of factor validity and test score reliability for the PQ Assessment. Additionally, information is shared on age and gender trends related to both assessments.

Background

Positive Intelligence is based on the latest research in positive psychology, cognitive psychology, neuroscience, and performance science. The research endeavored to identify the core factors that are at the root of optimal performance and optimal mental wellbeing. A primary focus of this research was to identify how we self-sabotage both performance and wellbeing.

These modes of self-sabotage are called Saboteurs. Saboteurs are a set of automatic and habitual mind patterns, each with its own voice, beliefs, and assumptions. They represent each person's strategy for surviving physically and emotionally and getting one's needs met. They typically are formed through a combination of born predispositions and early life experiences.

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What distinguishes Saboteurs is their causing negative emotions such as stress, anxiety, disappointment, regret, shame, guilt, anger, frustration, etc. We use the pain analogy to explain why negative emotions indicate self-sabotage. Pain is a very useful experience if you accidentally put your hand on a hot stove. Pain alerts you to a problem so you can take corrective action and remove your hand from the hot stove. Similarly, negative emotions are extremely helpful as an alert signal. For example, if you don't feel any stress or upset once you discover mistakes in the middle of an important project, you'll not take any corrective action, and the project will fail. However, once you get alerted to the problem, if you stay upset, anxious, or disappointed, your brain is activated in regions that are not conducive to clear-headed, creative, or resourceful action. If you stay in negative emotions, your Saboteurs are essentially holding your hand on the hot stove and harming you. That's why we call them Saboteurs. They sabotage your wellbeing and performance through prolonging your negative emotion response.

Therefore, to identify the Saboteurs, we look at mental patterns which cause prolonged negative emotions, which are therefore unhelpful to our performance or wellbeing. It's important to note that "emotional numbness" is also considered a form of negative Saboteur emotion, as it is not conducive to optimal performance or wellbeing. Conversely appropriate grieving is not considered a Saboteur emotion as it is a healthy response which is conducive to healing and mental wellness.

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Methods

The Saboteur Assessment was originally comprised of 54 questions to identify the key factors. Once the key factors were identified, the assessment was pared down to 49 questions to make the assessment more time-efficient while maintaining validity and reliability. In the process, a few items were modified in the latest version of the assessment to accommodate this reduction of items.

The questions are rated using a 5-point Likert scale ranging from 0 (strongly disagree) to 4 (strongly agree). Each question represents a mode of self-sabotage. The dataset analyzed in this whitepaper consisted of 504,620 records for individuals who completed the Saboteur Assessment between March 2018 and July 2021. Because people could take the survey multiple times, the earliest record for each participant was used in the analysis, resulting in unique records for a total of 458,867 participants. Due to the large sample, a simple random sample was selected of 800 participants stratified by gender and age group (18-25, 26-35, 36-45, 46-55, 56-65, 65+).

Descriptive statistics for the survey's 45 questions are presented in Appendix 1. All items had means between 1.4 and 2.9 and standard deviations close to 1. They also had acceptable skewness and kurtosis (between -2 and +2) and were approximately normally distributed.

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Exploratory Factor Analysis

The responses to the 45-item questionnaire underwent exploratory factor analysis using squared multiple correlations as prior communality estimates. The unweighted least squares factor method was used to extract factors followed by an oblique bifactor rotation.

A scree test revealed a large break in the proportion of variance accounted for after the first and second factors, with no clear breaks between subsequent factors. Ultimately, a total of 13 factors were retained, which accounted for over 99% of the variance. The analysis erred on the side of over-factoring to ensure that all potential factors were accounted for (Cattell, 1958)1 including those with potentially problematic items that may need future revision.

These 13 factors were later consolidated into 10 factors by combining Judging-Self, Judging-Others, and Judging-Circumstances into the Judge factor, and combining Task-Avoider (procrastinator) and Conflict-Avoider into the Avoider factor.

In interpreting the rotated factor pattern, an item was said to load on a given factor if the factor loading was .40 or greater for that factor, and was less than .40 for the other factors. Table 1 displays the items that loaded on each of the 13 factors.

[1] Cattell RB. Extracting the Correct Number of Factors in Factor Analysis. Educational and Psychological Measurement. 1958;18(4):791-838. doi:10.1177/001316445801800412

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		Factor												
Item	Final h2	1 Stickler	2 Hyper-Vigilant	3 Hyper-Achiever	4 Judge Self	5 Pleaser	6 Hyper-Rational	7 Avoider-1	8 Judge Others	9 Restless	10 Victim	11 Judge Circumstances	12 Avoider-2	13 Controller
12	.74	83	4	0	7	0	-1	9	2	9	-1	0	-2	-4
1	.72	80	6	-5	10	-1	6	6	4	0	-6	5	6	-7
33	.63	61	5	8	3	-9	13	-5	-13	2	15	3	-4	18
23	.83	-7	86	13	0	8	4	1	4	-2	4	-1	1	-6
3	.65	2	66	-1	11	0	-7	-2	-3	6	2	15	4	-6
15	.40	11	55	-6	-2	8	10	2	5	1	-1	4	-7	2
36	.61	10	50	2	19	-5	-14	-4	-5	-11	12	14	4	12
42	.61	-3	-4	72	14	-1	3	4	-8	4	6	0	-1	1
32	.47	4	13	61	-1	-7	4	-9	2	8	3	-15	3	4
8	.52	5	-2	59	15	0	5	-2	-1	14	1	8	-3	-11
22	.33	1	2	51	-9	8	-1	5	8	-1	-5	11	3	4
44*	.39	-5	1	31	16	10	1	6	2	-5	10	19	5	11
9	.65	7	0	-2	75	3	3	5	5	-1	1	3	-3	-7
24	.67	6	6	4	75	7	1	0	2	1	-1	-1	-7	2
39	.56	0	3	8	53	10	0	-1	-4	1	6	14	9	9
10	.63	3	0	-6	11	73	3	-5	2	4	6	-4	11	-11
31	.55	-4	11	-2	2	67	-7	6	-9	1	4	-4	5	9
20	.55	-5	2	19	9	57	-9	5	6	-5	-1	9	8	-9
43*	.39	8	9	2	1	39	4	6	-19	8	15	9	3	18
18	.55	1	2	0	5	-3	68	7	8	-7	7	2	-6	-3
30	.56	-8	2	-2	3	1	64	0	2	9	-2	6	-11	22
40	.52	6	5	0	9	-17	58	0	0	1	7	-11	21	10
6	.33	8	0	7	-5	4	54	-6	3	-2	-6	-2	2	-12
11	.74	10	2	-2	3	5	-2	85	5	-1	5	-3	-5	-3
35	.74	6	-5	8	5	2	1	75	4	-6	4	3	20	7
25*	.34	35	-3	10	1	9	0	-34	13	-4	2	-5	5	6
19	.59	4	-1	3	2	2	9	1	66	-5	8	10	1	4
34	.56	4	5	6	6	-7	2	9	60	-3	11	-4	7	11
4	.48	-4	9	-6	5	-13	13	3	54	10	6	12	-1	-1
5*	.44	17	-1	19	-1	8	1	-1	30	12	-4	-1	-28	15

Table 1. Rotated Factor Pattern From Bifactor Rotation, Thirteen-Factor Solution for Saboteur Assessment

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		Factor												
Item	Final h2	1 Stickler	2 Hyper-Vigilant	3 Hyper-Achiever	4 Judge Self	5 Pleaser	6 Hyper-Rational	7 Avoider-1	8 Judge Others	9 Restless	10 Victim	11 Judge Circumstances	12 Avoider-2	13 Controller
16*	.42	19	2	6	-1	6	14	-8	23	-2	14	10	-20	19
13	.65	-2	-3	8	-2	4	1	7	-1	79	1	8	-11	-7
2	.52	13	-2	0	0	1	-2	-18	-4	67	-3	-1	7	0
38	.56	-10	10	6	5	-3	-3	14	22	49	3	-11	13	23
26*	.48	-3	24	10	13	-8	-3	7	-5	34	17	-1	11	12
17	.71	-4	5	-3	8	7	-1	1	12	-2	76	5	-3	-17
41	.55	2	0	3	-4	5	0	3	2	1	71	1	2	5
7*	.44	2	11	-2	19	-12	2	9	0	0	36	10	9	3
14	.75	5	16	-1	8	-3	-2	1	6	7	5	70	5	-7
29	.78	0	11	4	10	-5	-3	0	6	0	8	68	12	6
0	.50	7	-1	3	0	14	-2	4	4	1	1	5	61	-11
21	.52	-1	2	5	0	15	4	15	1	4	5	11	55	2
28*	.41	0	0	0	2	4	1	-4	1	-2	21	25	38	8
37	.61	-4	1	0	8	3	6	0	37	10	-9	1	-5	53
27	.41	10	-2	9	0	-10	9	2	11	0	5	6	-21	40

Note. N=800. h2 = communality estimate, which may be considered a measure of how well the model performs for the given variable. Values have been multiplied by 100 and rounded to the nearest integer to aid readability.

A total of 37 items loaded significantly on one of the thirteen factors and exhibited good simple structure, with a significant loading on one and only one factor. In particular, 3-4 items loaded on each of 6 factors that were subsequently labeled the Stickler (3 items), Hyper-vigilant (4 items), Achiever (4 items), Pleaser (3 items), Hyper-rational (4 items), and Restless (3) Saboteurs. In addition, the items for the two subscales of the Avoider loaded on the two separate factors, as did the three items for the Judge-of-Self and Judge-of-Others subscales of the Judge. The 8 newly-worded questions introduced in the latest version of the assessment did not load highly on any of the factors.

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Consequently, the Victim, Controller, and Judge-of-Circumstances factors each had two questions with significant loadings. These 8 items will be reworded for the next version of the assessment.

Scale Reliability

To assess the reliability of the existing survey, Cronbach's α was computed for each scale. The items for the Avoider and Judge were combined, thereby reducing the total number of scales from 13 to 10. The results, which are displayed in Table 2, indicate that all 10 Saboteur scales had acceptable reliability of .70 or higher (Nunnally, 1978)[2].

Table 2. Scale Reliability for the Saboteur Assessment (N=800 Respondents)

Scale	Cronbach's α
Judge	0.84
Hyper-Vigilant	0.83
Stickler	0.80
Pleaser	0.77
Victim	0.76
Achiever	0.75
Hyper-Rational	0.74
Restless	0.73
Controller	0.73
Avoider	0.71

[2] Nunnally, J. C. (1978). Psychometric theory. New York: McGraw-Hill.

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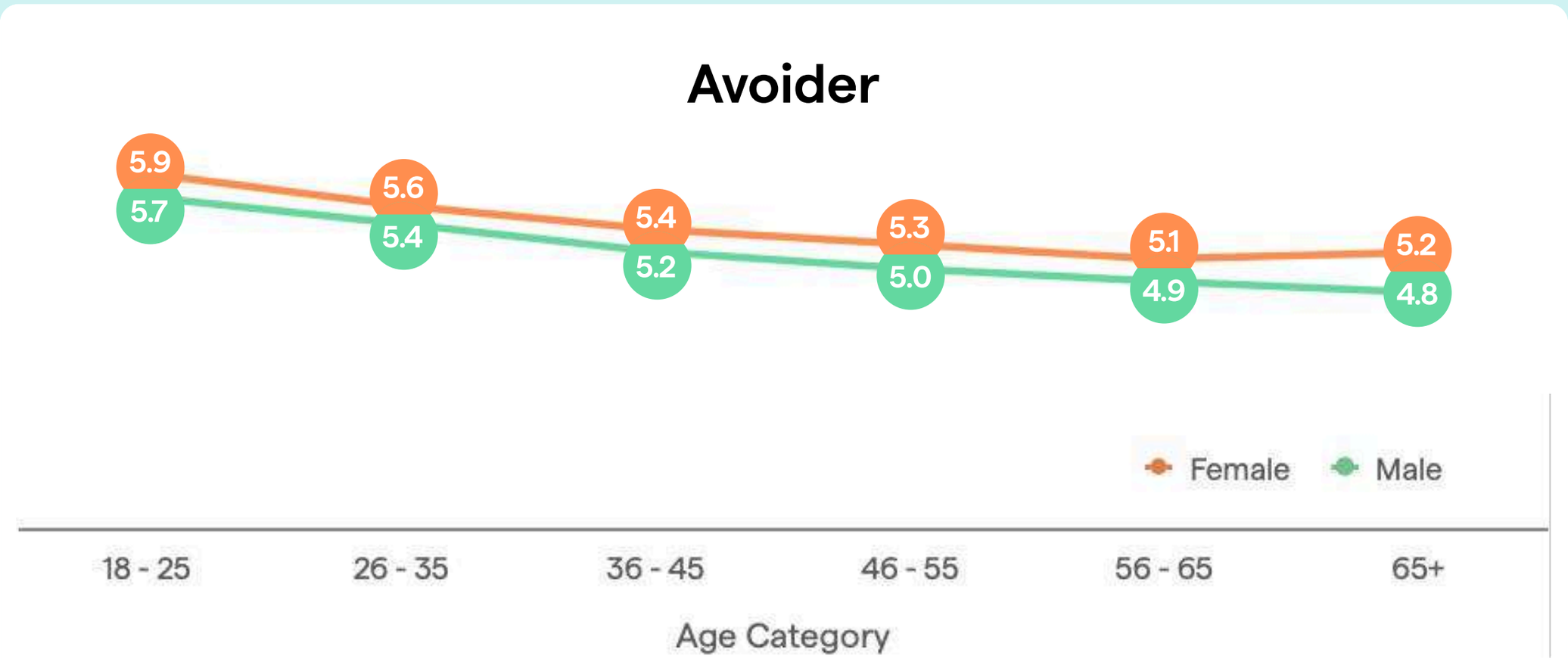
Additional Findings

An additional analysis was undertaken of the Saboteur Assessment to assess age- and gender-related trends in the Saboteur scores. Multiple regression analysis was conducted to predict the average scores from age and gender and the interaction of age and gender for the scales of the assessment. The simple effects of age and gender are shown in the following graphs. The simple effects of age and gender are shown in the following graphs, indicating average Saboteur scores.



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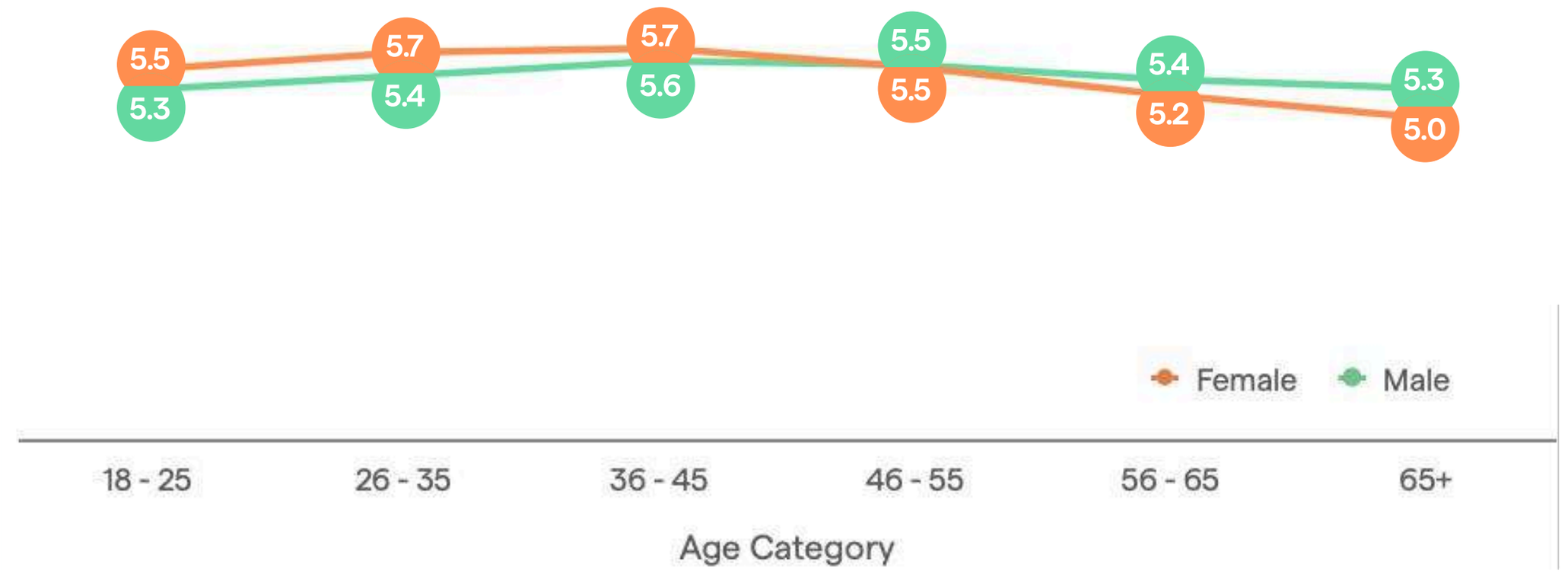
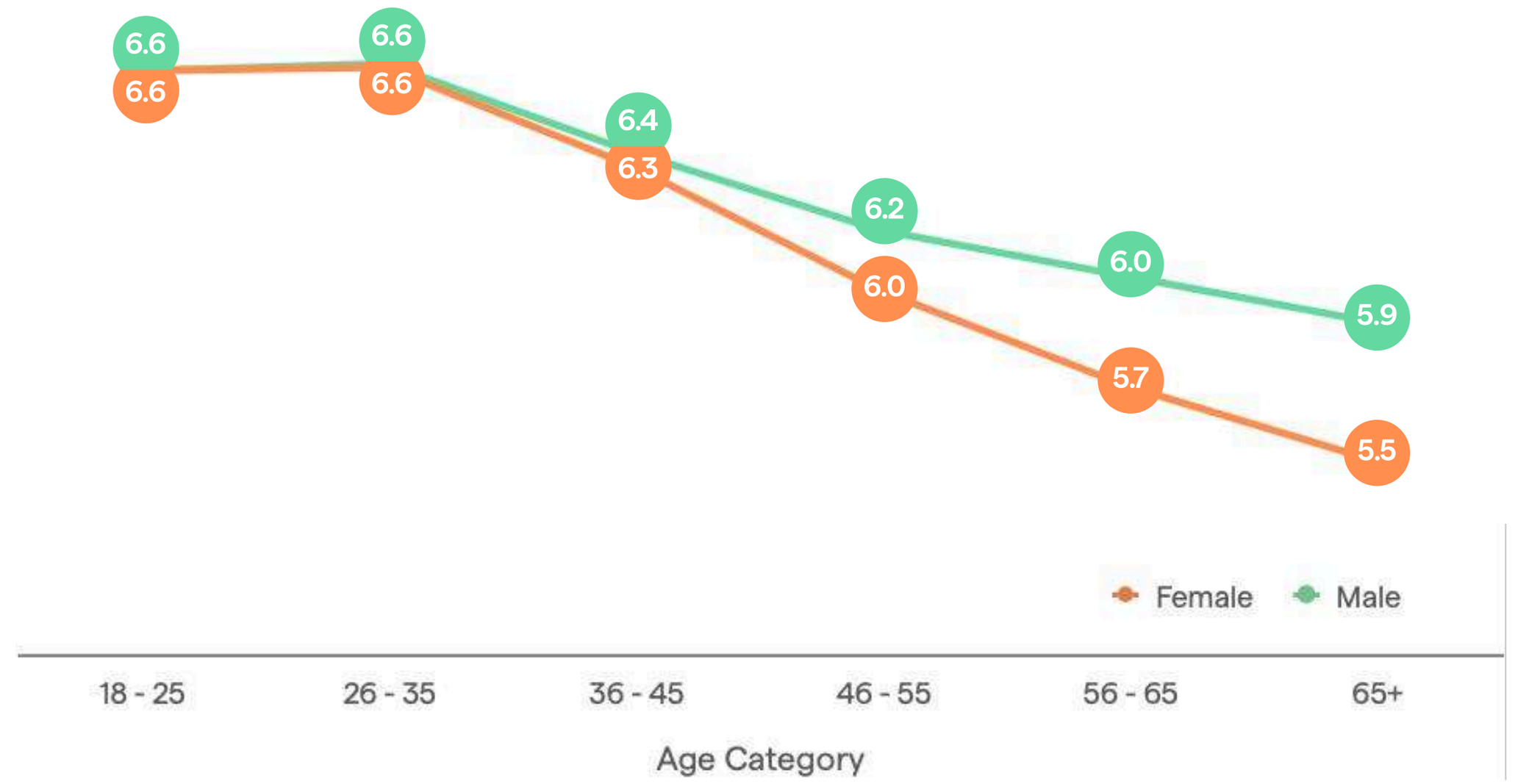
Controller



Hyper-Achiever



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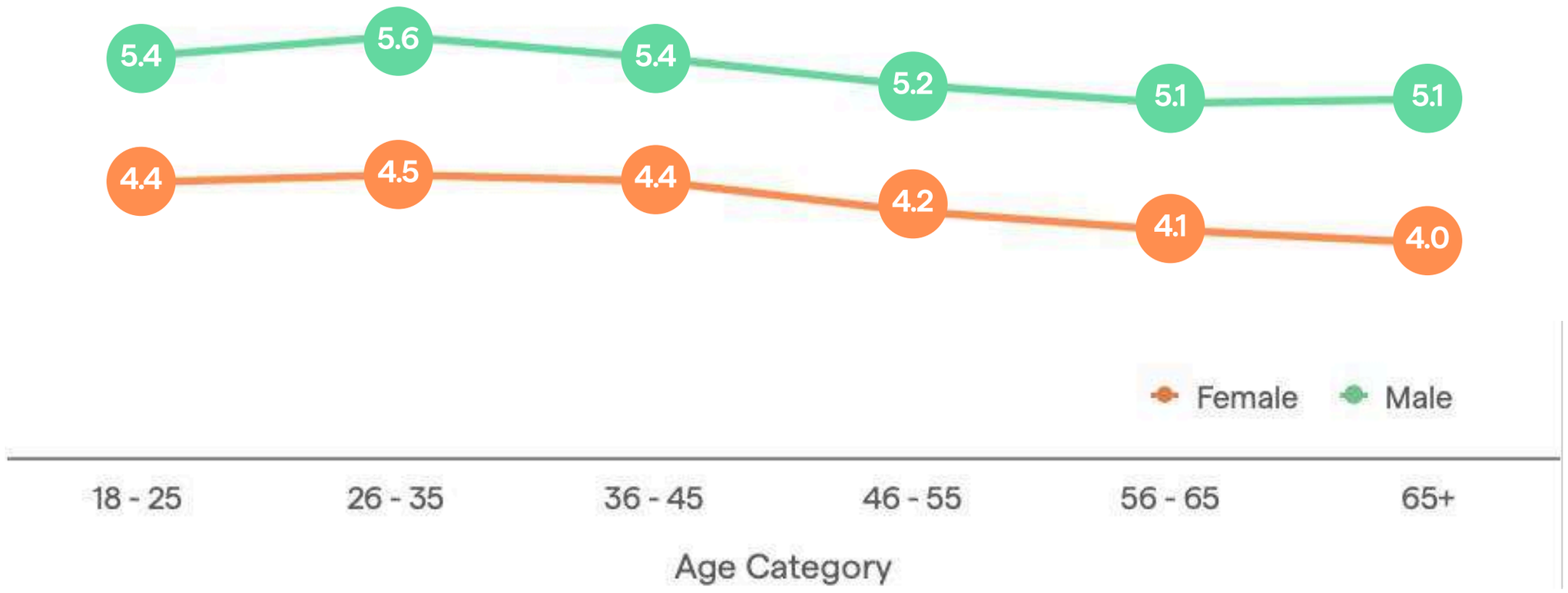
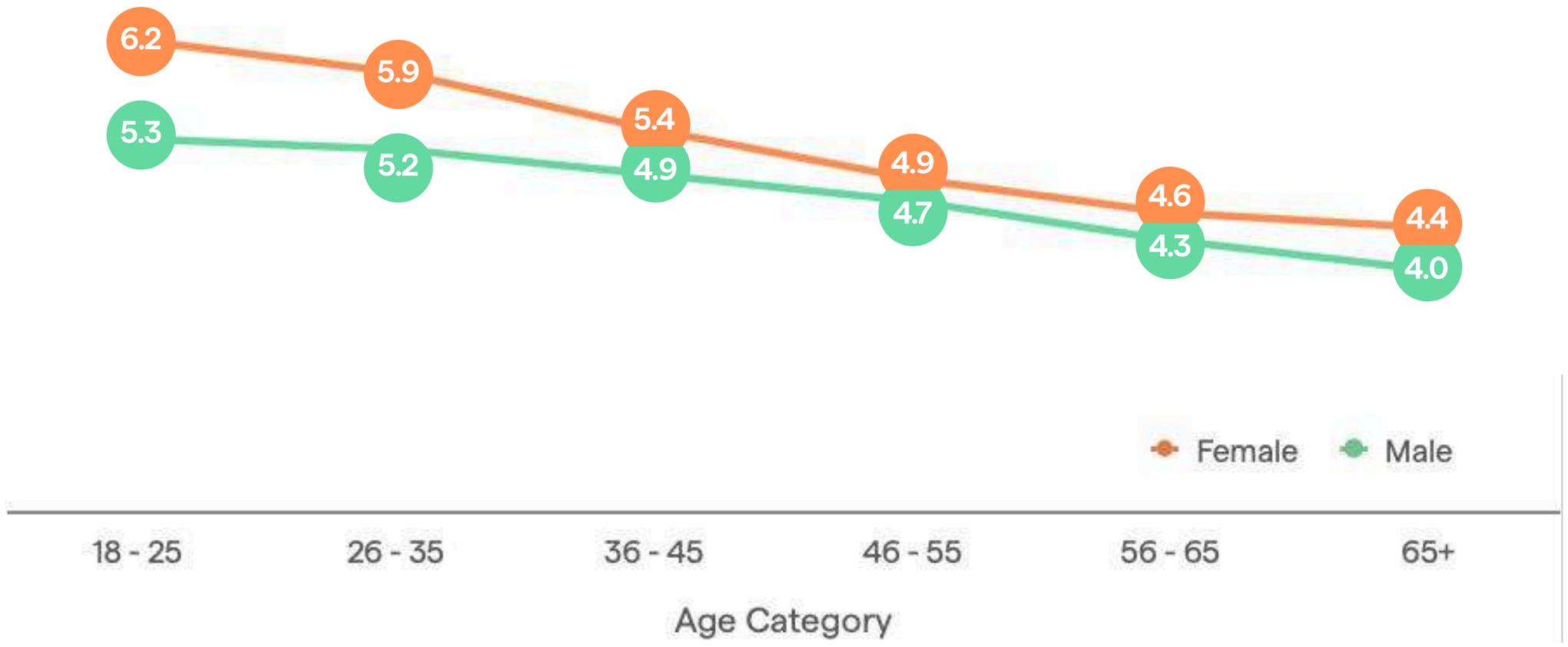
Hyper-Rational



Hyper-Vigilant



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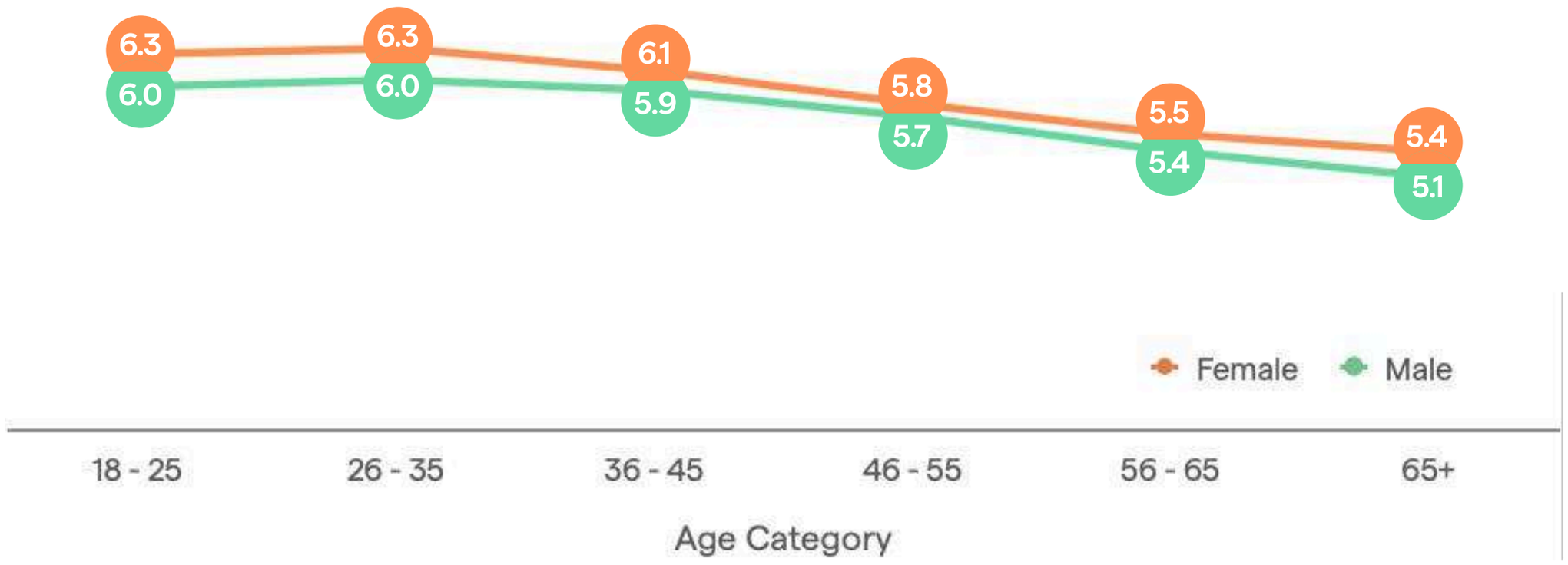
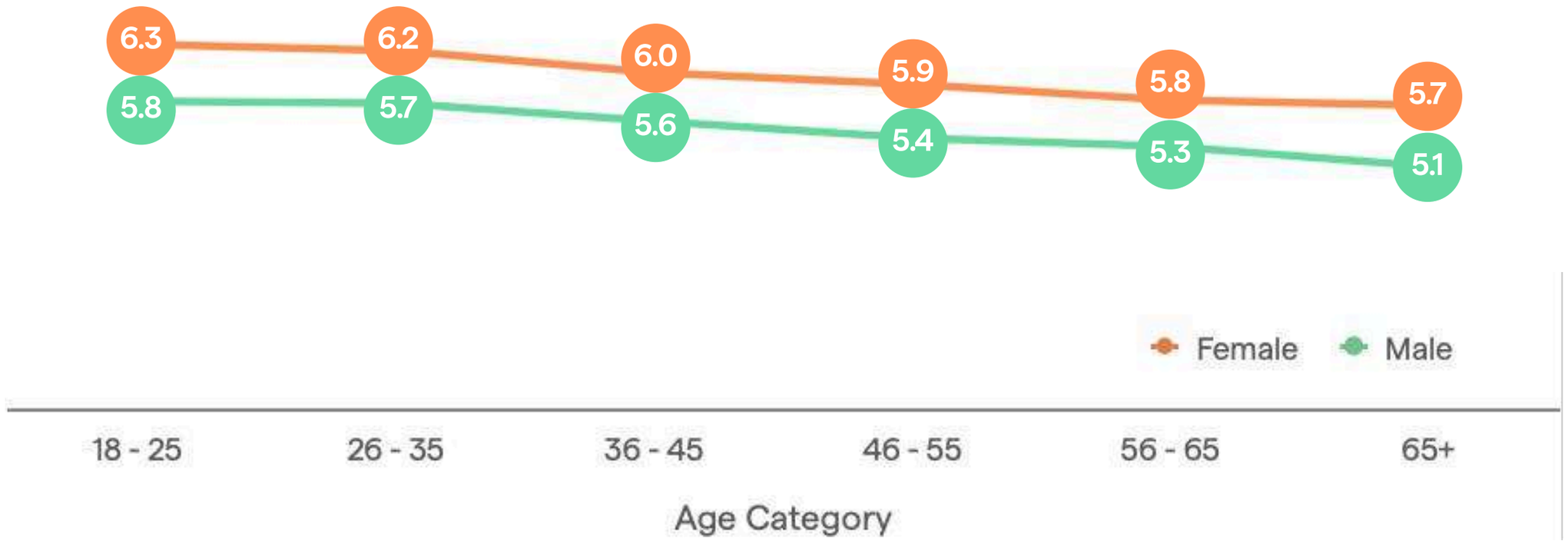
Judge



Pleaser



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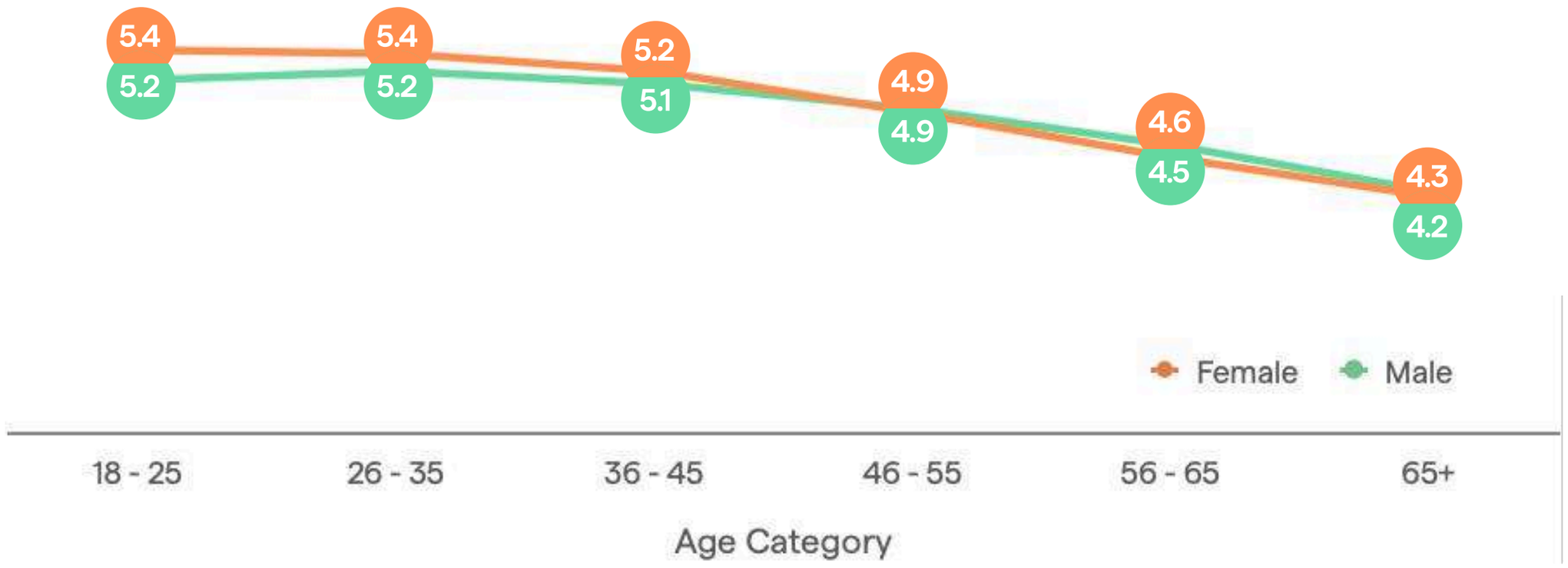
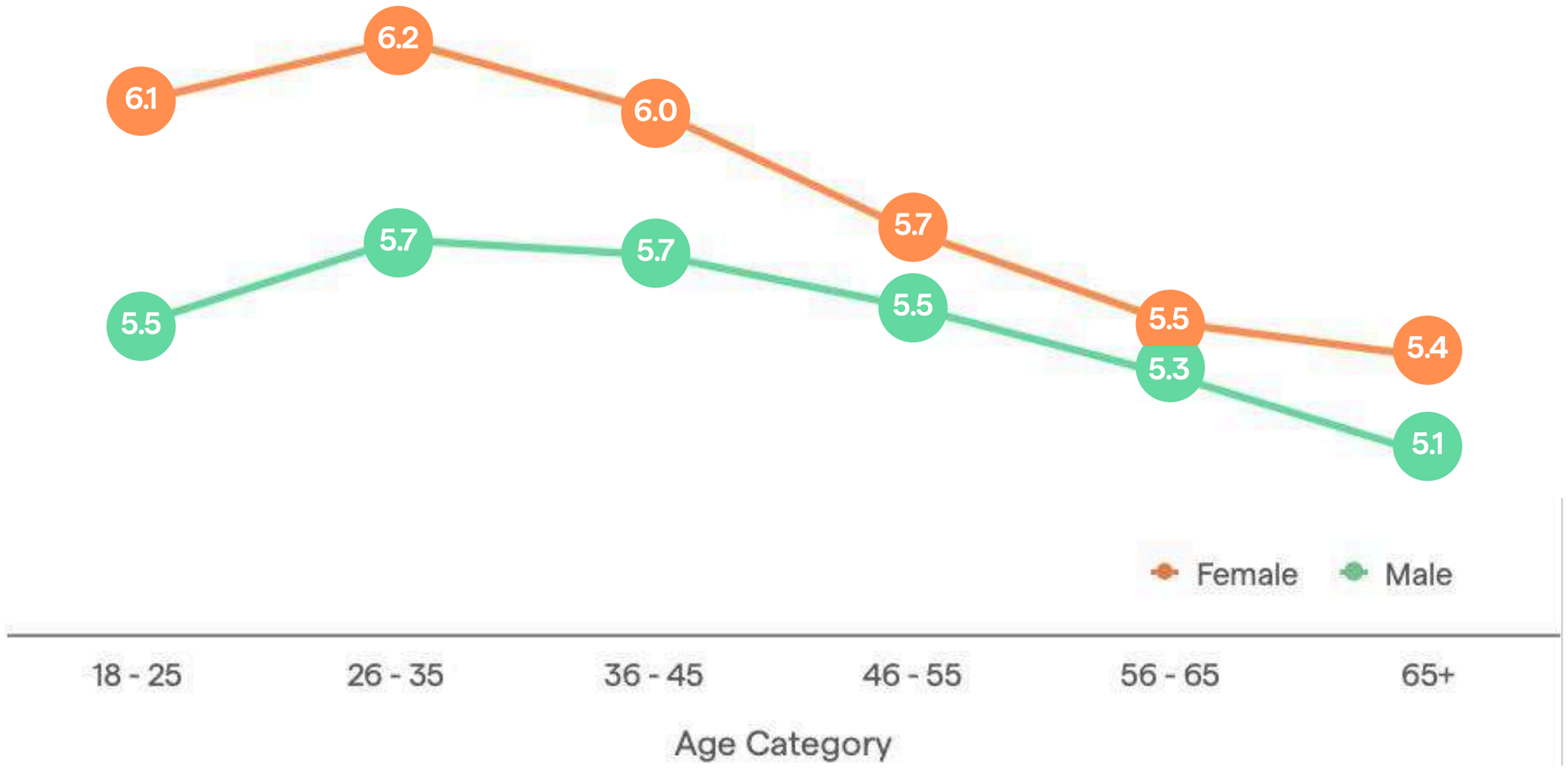
Restless



Stickler



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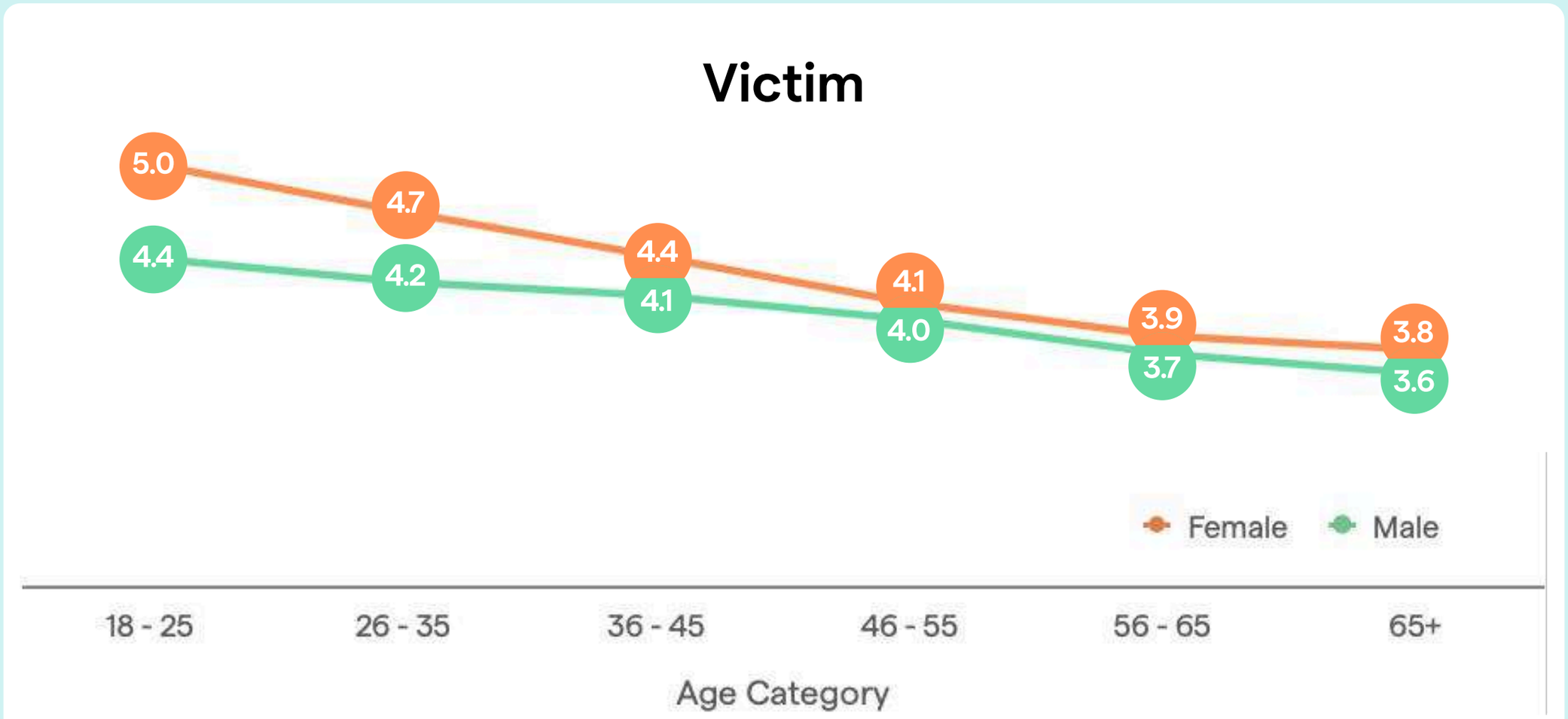

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PQ Assessment

PQ (Positive Intelligence Quotient™, or Positivity Quotient™ for short) measures the relative strength of the positive versus negative mental muscles. PQ is the measure of mental fitness. It is determined based on how much positive versus negative emotions are experienced in the course of a typical 24-hour period. The participant reports how strongly she has experienced positive or negative emotions through 24 pairs of emotions. As described in chapter 8 of Positive Intelligence, various researchers have measured positive to negative ratios, associating them with team performance and individuals or marriages flourishing or languishing.

Perhaps the most publicized research on these positive/negative ratios is John Gottman's on marriage, prominently highlighted in Malcolm Gladwell's Blink. He can successfully predict, with over 90 percent accuracy, whether a newlywed couple will be married or divorced four to six years later. He identified an average PQ equivalent score of 82 for "flourishing" marriages and 41 for marriages heading to dissolution.[3]

As a collection, the different research findings cited in Positive Intelligence support a tipping point at a positive negative ratio of 3/1 which corresponds to the PQ Score of 75. To ensure peak performance, sustained mental wellness, and thriving relationships, we encourage participants to raise their PQ scores above 75.

[3] John Mordechai Gottman, Robert Wayne Levenson. A two-factor model for predicting when a couple will divorce: exploratory analyses using 14-year longitudinal data. Fam Process. Spring 2002;41(1):83-96. doi: 10.1111/j.1545-5300.2002.40102000083.x.

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A single PQ Score measurement could be biased by atypical experiences in the preceding 24 hours. We therefore encourage participants to take the assessment after a “typical” day, and do a few measurements over time, so they can get an accurate view.

Factor Validity and Score Reliability

The PQ Assessment consists of 24 items containing emotions; participants select the greatest degree that they have experienced each emotion since the same time the previous day using a 5-point Likert scale that ranges from 0 (Not at all) to 4 = Extremely). Data were analyzed for a total of 64,712 respondents who completed the PQ Assessment from 8/19/2019 – 7/30/2021. For participants who submitted more than one assessment, the earliest assessment was chosen for the analysis.

Principal factor analysis was performed using the 24 items for the PQ Assessment. The results indicated that the first two factors explained 75% and 24% of the total variance, and an examination of the scree plot indicated a large break in the graph after the second factor. The first and second factors were labeled positive and negative emotion, respectively.

The rotated factor pattern for the PQ Assessment is displayed in Table 4. Factor loadings were considered significant if they exceeded .40 in absolute value. All items displayed good simple structure, that is, they loaded on only one of the two factors, with the exception of item 16, which had a strong positive loading on the first factor and a smaller negative loading on the second factor. The proportion of variance in the items explained by the two factors (h2) ranged from 21% to 64%, with an average of 47%.

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Table 4. Rotated Factor Pattern for Items from PQ Assessment

Item	h^2	Positive emotion	Negative emotion
14	64	**76**	-27
8	58	**75**	-14
18	59	**73**	-24
20	59	**72**	-27
6	45	**67**	-2
16	57	**64**	**-41**
12	40	**63**	-2
4	43	**63**	-18
0	39	**62**	-6
10	48	**60**	-36
2	36	**59**	-11
22	42	**55**	-34
23	59	-23	**73**
9	53	-14	**71**
19	53	-16	**71**
13	56	-28	**69**
11	44	-17	**64**
5	42	-13	**63**
1	47	-26	**63**
3	43	-19	**63**
15	37	-9	**60**
17	35	-14	**58**
21	34	-22	**54**
7	21	4	**45**

Note: Principal factors varimax rotation with two retained factors. Factor loadings are highlighted if they exceed .40. For each item, h2 is the proportion of its variance explained by the two factors.

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Overall, the factorial validity of the PQ Assessment is supported by the results of the factor analysis, and the scores for the items loading on each factor are analyzed separately in the computation of the PQ score. The internal consistency of the PQ Score Assessment was acceptable for both positive and negative emotions. In particular, Cronbach's alpha was .80 for positive emotion and .90 for negative emotion.

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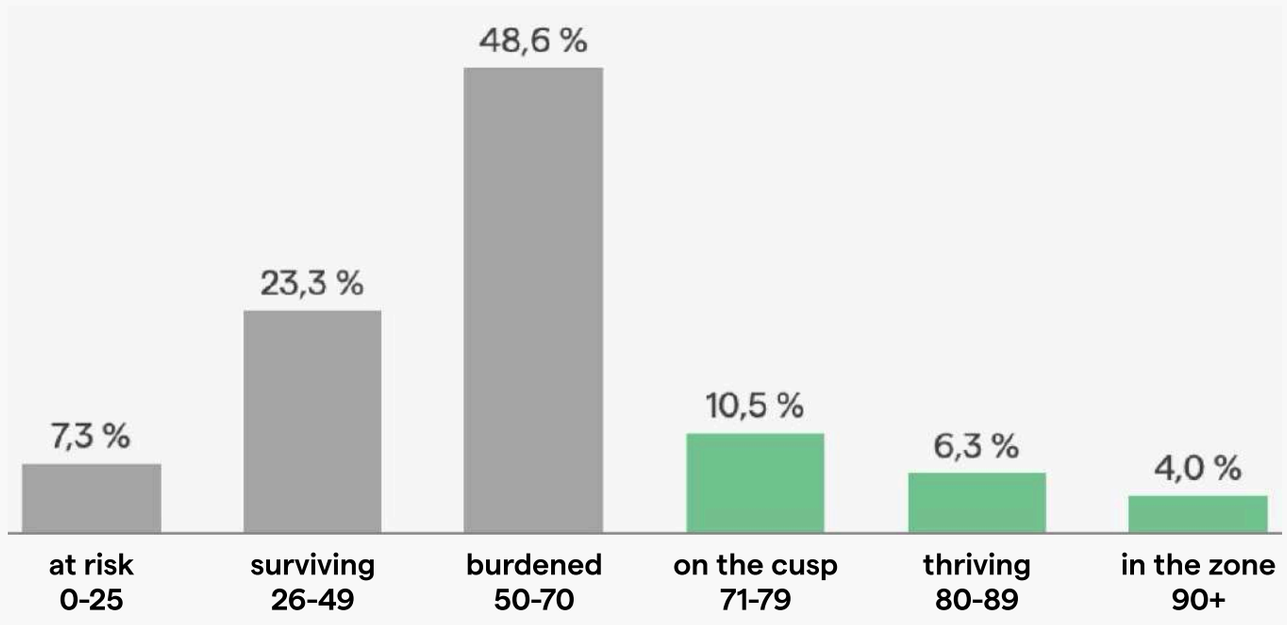
Distribution of PQ Scores

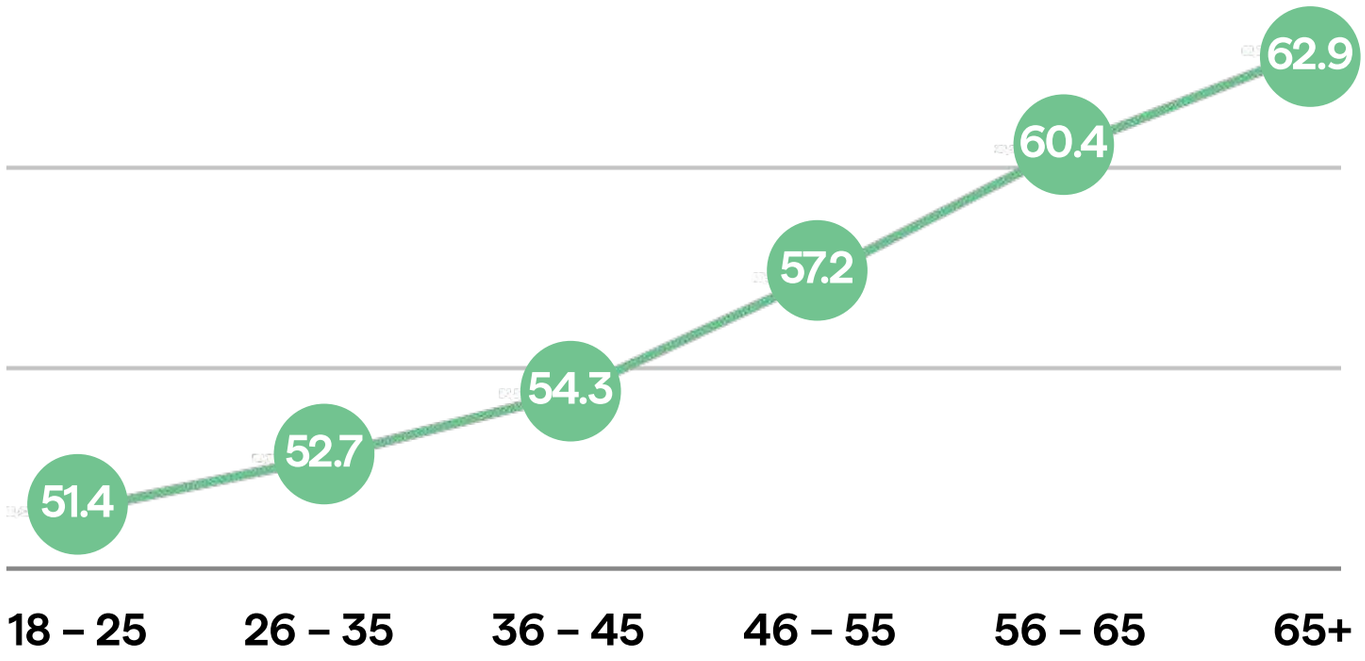
While each PQ Score is reported with its associated percentile ranking, we also report the data in “bands” to communicate its general implications. The following represents the % of the global population scoring in each band:



Mean and Media PQ Score: 55.5
Standard Deviation: 18.4

Gender and Age Differences:

There’s minimal gender difference in PQ Scores. However, there’s a significant improvement of PQ Scores as one ages. The average PQ score steadily increases by age from 51 for the 18–25 age group to 63 for the 65+ age group.



Average: 56

PQ Score by Age (N=64,651)

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Ongoing Research

Given the large number of people participating in Positive Intelligence programs, we continue to fine tune the assessment in conjunction with a rich array of other information based on the experience of program participants. We'll be periodically updating and expanding this document accordingly.

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Appendix 1. Descriptive Statistics for the Saboteur Assessment (N=800 Respondents)

ITEM	M	SD
1	2.16	1.24
2	2.54	1.13
3	2.01	1.24
4	1.96	1.35
5	1.47	1.20
6	2.41	1.13
7	2.61	1.09
8	1.56	1.24
9	2.57	1.18
10	2.69	1.14
11	2.54	1.16
12	2.26	1.34
13	2.14	1.14
14	1.97	1.24
15	2.12	1.26
16	2.08	1.23
17	1.53	1.19
18	1.63	1.25
19	1.75	1.24
20	2.19	1.15
21	2.49	1.12
22	1.65	1.23
23	2.30	1.22
24	1.87	1.27
25	2.72	1.09
26	2.68	1.08
27	1.77	1.20
28	2.45	1.18
29	2.00	1.25
30	2.06	1.21
31	1.66	1.23
32	2.10	1.19
33	2.24	1.13
34	1.69	1.20
35	2.07	1.11
36	2.32	1.29
37	1.88	1.35
38	2.30	1.18
39	2.13	1.18
40	2.53	1.16
41	1.41	1.27
42	1.42	1.25
43	2.71	1.08
44	2.16	1.27
45	2.91	0.99

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