

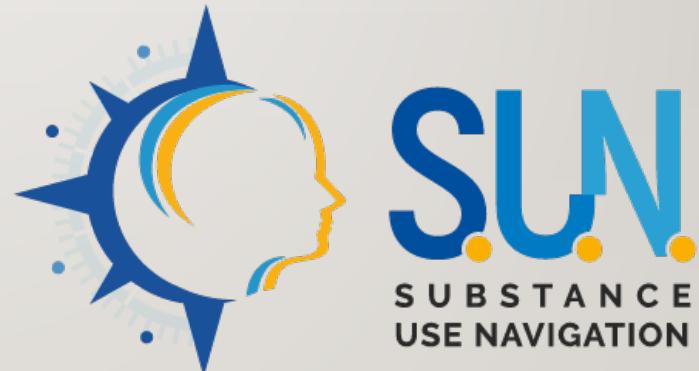
# DEVELOPING SUBSTANCE USE NAVIGATION: INTEGRATED EDUCATION AND MOBILE HEALTH TRACKING FOR COLLEGE STUDENTS

## METHODOLOGICAL APPENDIX

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## Starting point: Existing Scales

### A) Child Health Utility instrument (CHU9D)

[each is Likert 1-5 (e.g. don't feel worried, feel a little bit worried, feel a bit worried, feel quite worried, feel very worried)]

1. How worried are you today?
2. How sad are you today?
3. How much pain do you have today?
4. How tired are you today?
5. How annoyed are you today?
6. How are you doing with your schoolwork/homework today?
7. How did you sleep last night?
8. How are you doing with your daily routine today? |
9. To what extent can you join in with activities today?

## Starting point: Existing Scales

### B) Warwick-Edinburgh Well-Being Scale (5 point Likert) – Ringdal et al.

1. I've been feeling optimistic about the future.
2. I've been feeling useful.
3. I've been feeling relaxed.
4. I've been dealing with problems well.
5. I've been thinking clearly.
6. I've been feeling close to other people.
7. I've been able to make up my own mind about things.
8. I've been interested in other people.
9. I've had energy to spare.
10. I've been feeling good about myself.
11. I've been feeling confident.
12. I've been feeling loved.
13. I've been interested in new things.
14. I've been feeling cheerful.

## Starting point: Existing Scales

### C) Hybrid of CHU and Edinburgh:

1. How are you doing? Mark all that apply.
  - a. Worried
    - i. [If selected worried] How worried are you?
    - ii. [If selected worried] Why?
  - b. Sad
    - i. [If selected sad] How sad are you?
    - ii. [If selected sad] Why? (classes, significant, other)
  - c. Pain
    - i. [If selected pain] How much pain are you in?
    - ii. [If selected pain] Why? (classes, significant, other)

# Starting point: Existing Scales

## D) Penn Alcohol Craving Scale 1

1. During the past week how often have you thought about drinking or how good a drink would make you feel?

- a. Never
- b. Rarely
- c. Occasionally
- d. Sometimes
- e. Often
- f. Most of the time
- g. Nearly all of the time

2. At its most severe point, how strong was your craving during the past week?

- a. None at all
- b. Slight, that is a very mild urge
- c. Mild urge
- d. Moderate urge
- e. Strong urge, but easily controlled
- f. Strong urge and difficult to control
- g. Strong urge and would have drunk alcohol if it were available

3. During the past week how much time have you spent thinking about drinking or about how good a drink would make you feel?

- a. None at all
- b. Less than 20 minutes
- c. 21 to 45 minutes
- d. 46 to 90 minutes
- e. 90 minutes to 3 hours
- f. Between 3 to 6 hours
- g. More than 6 hours

4. During the past week, how difficult would it have been to resist taking a drink if you had known

- a bottle was in your house?
- a. Not difficult at all
  - b. Very mildly difficult
  - c. Mildly difficult
  - d. Moderately difficult
  - e. Very difficult
  - f. Extremely difficult
  - g. Would not be able to resist

5. Keeping in mind your responses to the previous questions, please rate your overall average alcohol craving for the past week?

- a. Never thought about drinking and never had the urge to drink
- b. Rarely thought about drinking and rarely had the urge to drink
- c. Occasionally thought about drinking and occasionally had the urge to drink
- d. Sometimes thought about drinking and sometimes had the urge to drink
- e. Often thought about drinking and often had the urge to drink
- f. Thought about drinking most of the time and had the urge to drink most of the time
- g. Thought about drinking nearly all of the time and had the urge to drink nearly all of the Time

# Designing New Scale

## Block 1: Perceptions/Behaviors

Please indicate how strongly you agree or disagree with the following statements.

Today I feel able to meet my responsibilities (e.g. work, school).

Today I feel optimistic about the future.

Today I feel loved.

Today I feel annoyed/irritable.

Today I feel rested.

Today I feel happy.

Today I feel in physical pain.

Today I feel confident.

Today I feel worried/anxious.

Today I feel that my life has a purpose.

Today I feel sad.

Today I feel useful.

Today I feel energetic.

Today I feel supported.

Today I feel angry.

Today I feel in charge of my life.

Today I woke up feeling well-rested.

Today I ate well.

Today I took good care of myself.

Today I was helpful to others.

I did the following things for myself today (please choose all that apply):

- Ate healthy foods
- Got enough sleep
- Engaged in a physical activity (e.g., walking, sports)
- Spent time with people I like
- Engaged in a hobby
- Meditated or prayed
- Participating in a spiritual community
- Volunteered or contributed to a cause I believe in
- Spent time in nature
- Quiet time

Strongly Disagree

Disagree

Neither Agree nor Disagree

Agree

Strongly Agree

This statement is confusing/unclear

To what extent do you agree with the following statement:

At some point in my life, I was concerned about my use of alcohol, tobacco, or drugs.

- Strongly disagree
- Disagree
- Neither disagree nor agree
- Agree
- Strongly agree

## Block 2: Substance Use

To what extent do you agree with the following statement:

With respect to using alcohol, tobacco, or drugs, I have met my goal today.

- Agree
- Neither agree nor disagree
- Disagree

The following activities helped me to meet my goal (please choose all that apply):

- Medication
- Support group
- Counselling
- Family
- Friends
- Significant other
- Religious/spiritual activity
- Mindfulness/meditation
- Avoiding negative patterns of thinking
- Doing things for others
- Setting healthy boundaries
- Doing things I enjoy
- No access to substance
- Other:

The following activities contributed to not meeting my goal (please choose all that apply):

- Family
- Friends
- Significant other
- School
- Work
- Stress
- Depression
- Boredom
- Tiredness
- Social pressure
- Availability of the substance
- Unstable Housing
- Other

My urge/craving to use tobacco, alcohol, or drugs today has been:

- None
- Mild
- Moderate
- Strong
- Very strong

## Block 3: Existing Questionnaire

### A) Child Health Utility instrument (CHU9D)

[each is Likert 1-5 (e.g. don't feel worried, feel a little bit worried, feel a bit worried, feel quite worried, feel very worried)]

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### B) Warwick-Edinburgh Well-Being Scale (5 point Likert) – Ringdal et al.

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13. I've been interested in new things.
14. I've been feeling cheerful.

## Block 4: Demographics

What is your gender?

- Male  
 Female  
 Other

What is your ethnicity?

- Hispanic  
 Non-Hispanic

What is your class standing?

- Freshman  
 Sophomore  
 Junior  
 Senior  
 Graduate student  
 Other

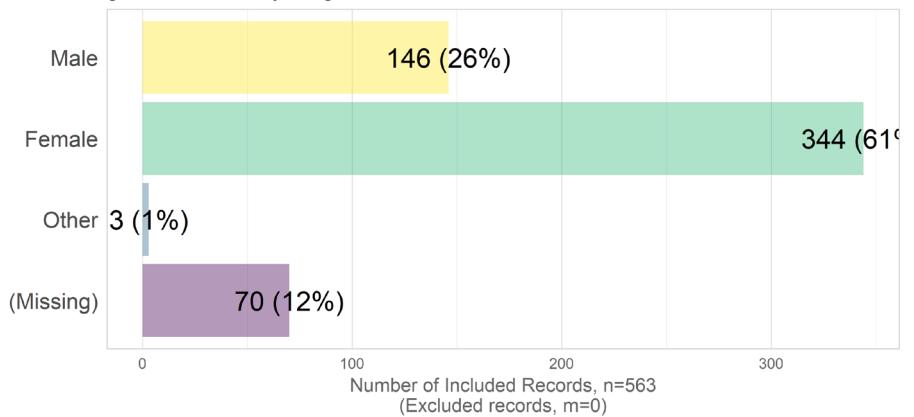
What is your race?

- Black  
 White  
 Other

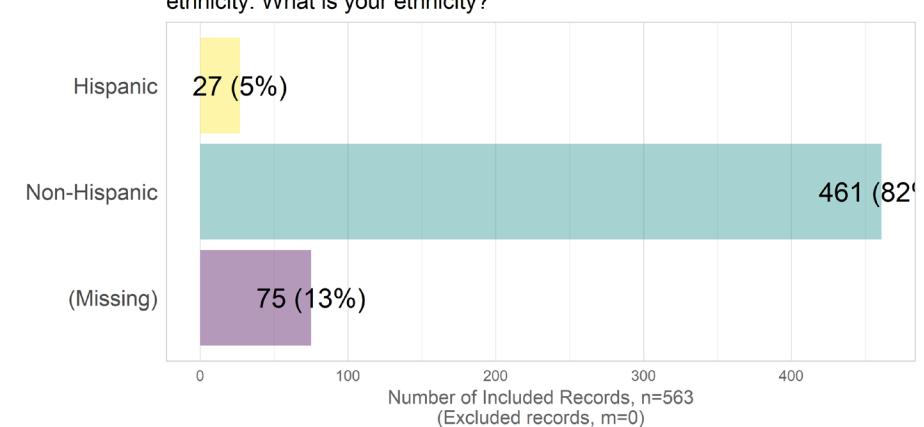
# Results

## Block 4: Demographics

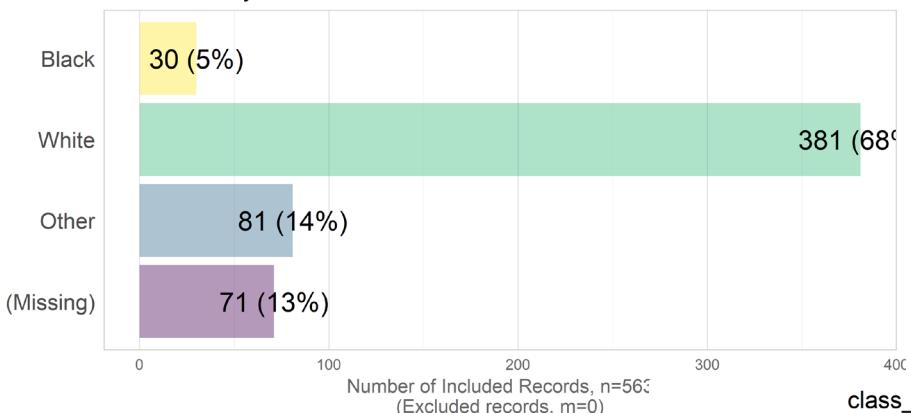
gender: What is your gender?



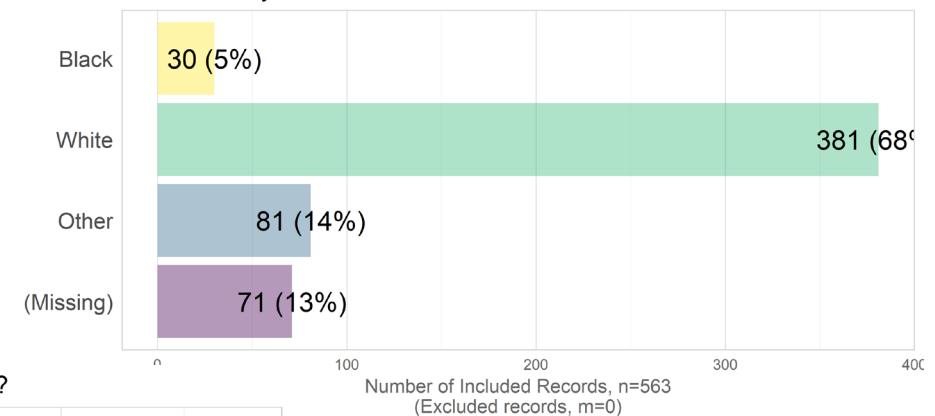
ethnicity: What is your ethnicity?



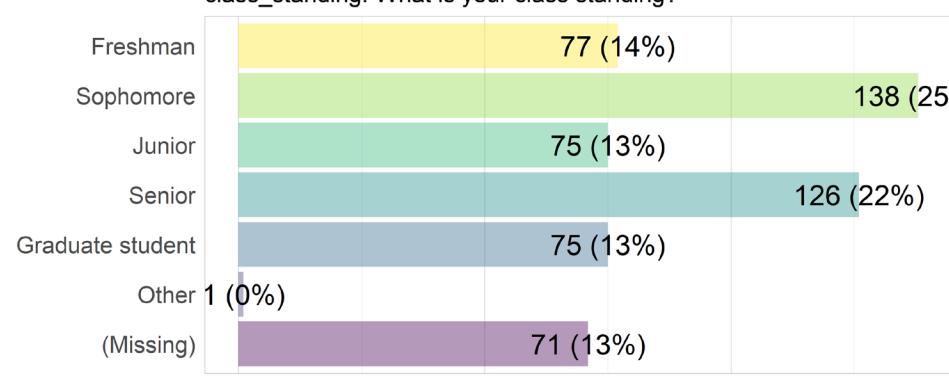
race: What is your race?



race: What is your race?

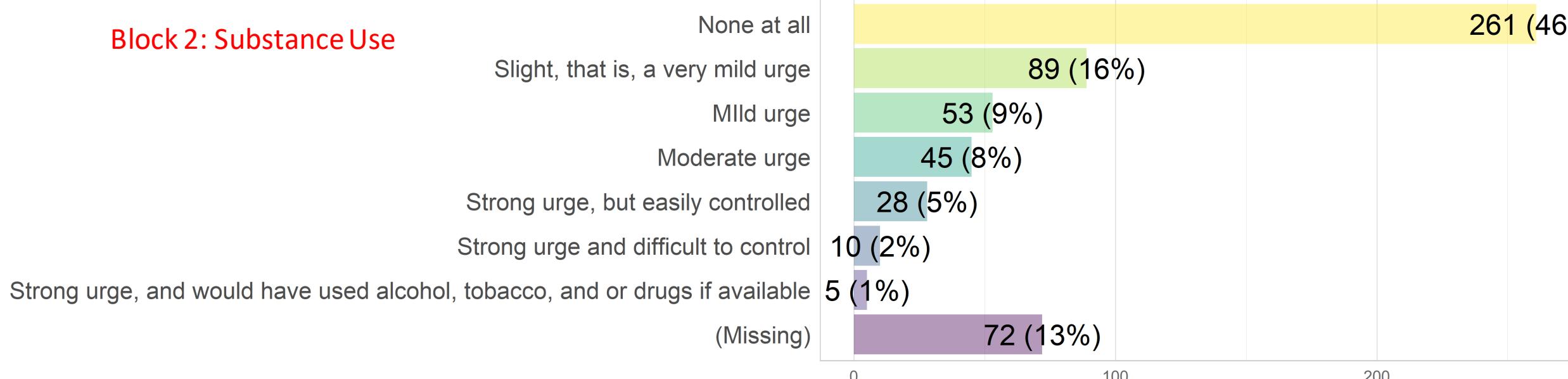


class\_standing: What is your class standing?



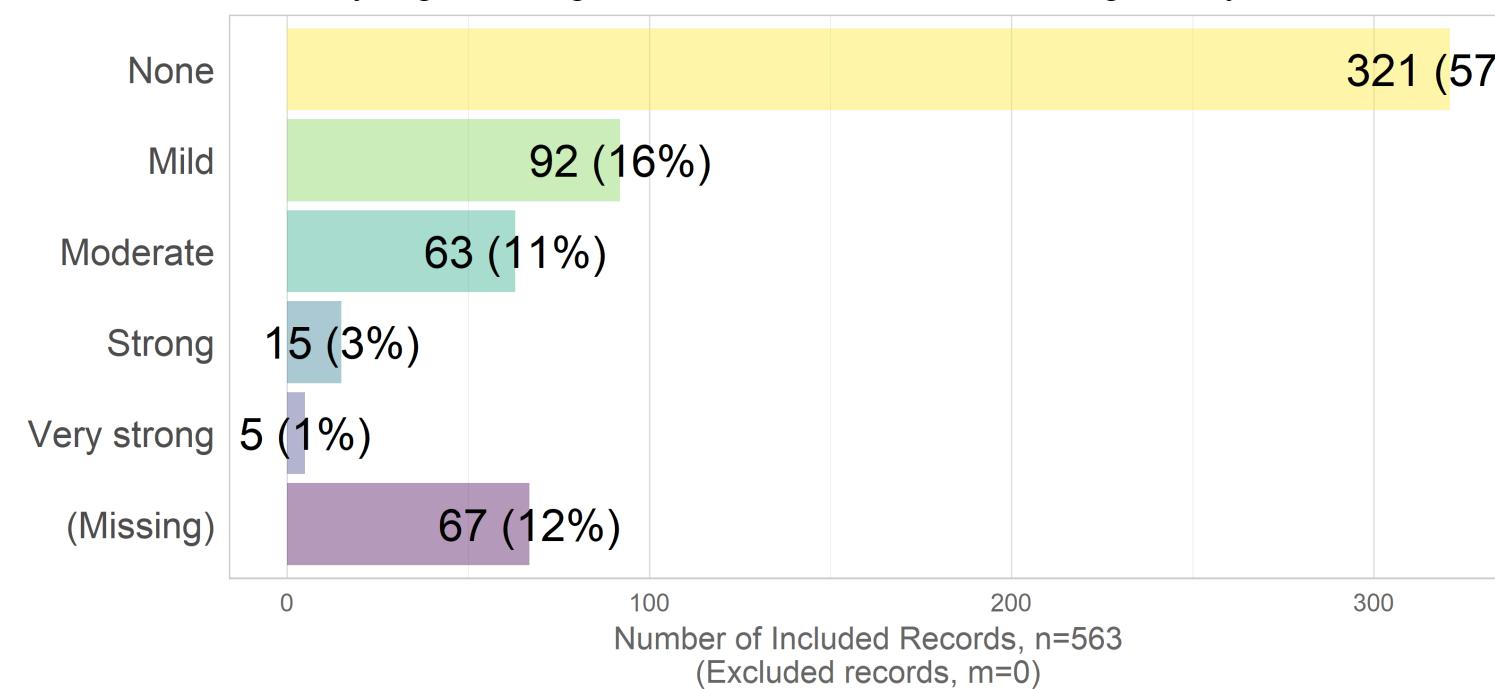
## Block 2: Substance Use

Q40: My urge/craving to use alcohol, tobacco, or drugs has been...



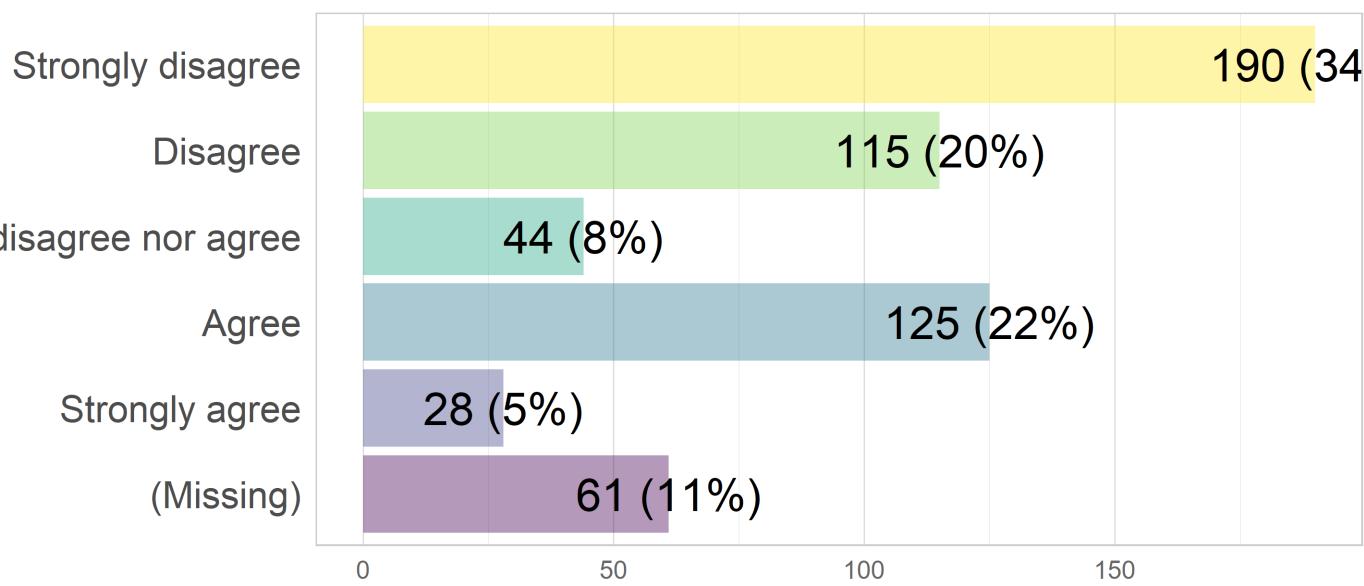
Q16: My urge/craving to use tobacco, alcohol, or drugs today has been:

Number of Included Records, n=563  
(Excluded records, m=0)

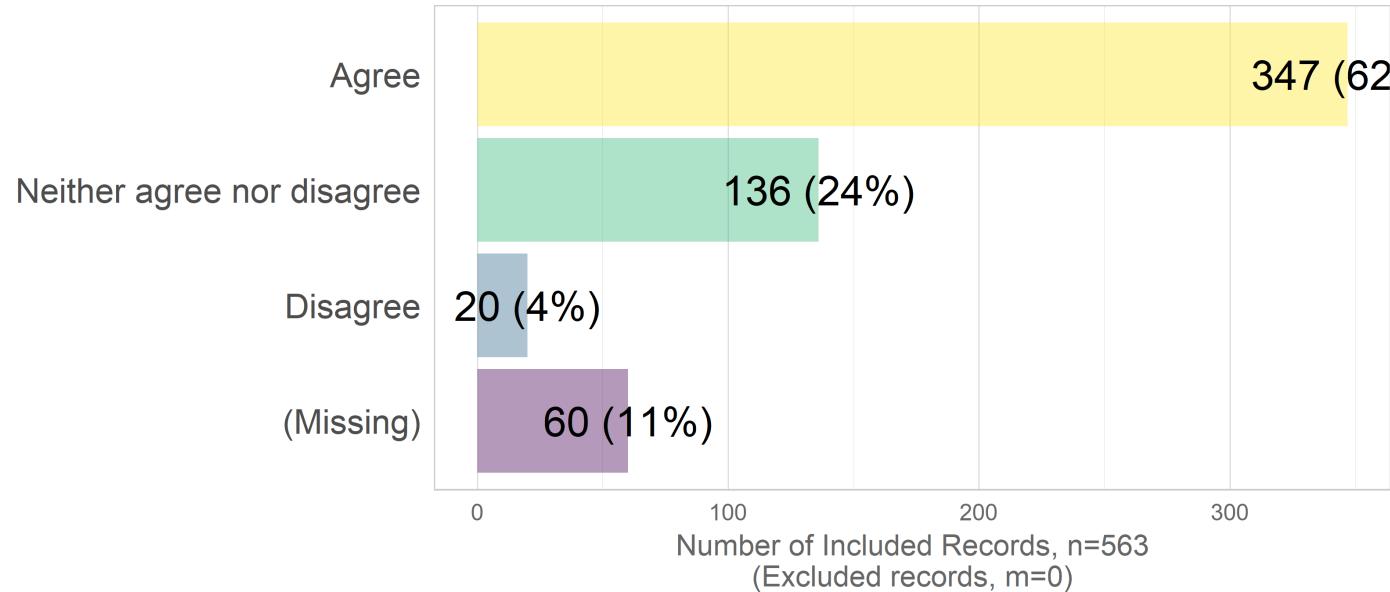


## Block 2: Substance Use

Q9: To what extent do you agree with the following statement:  
At some point in my life, I was concerned about my use of alcohol

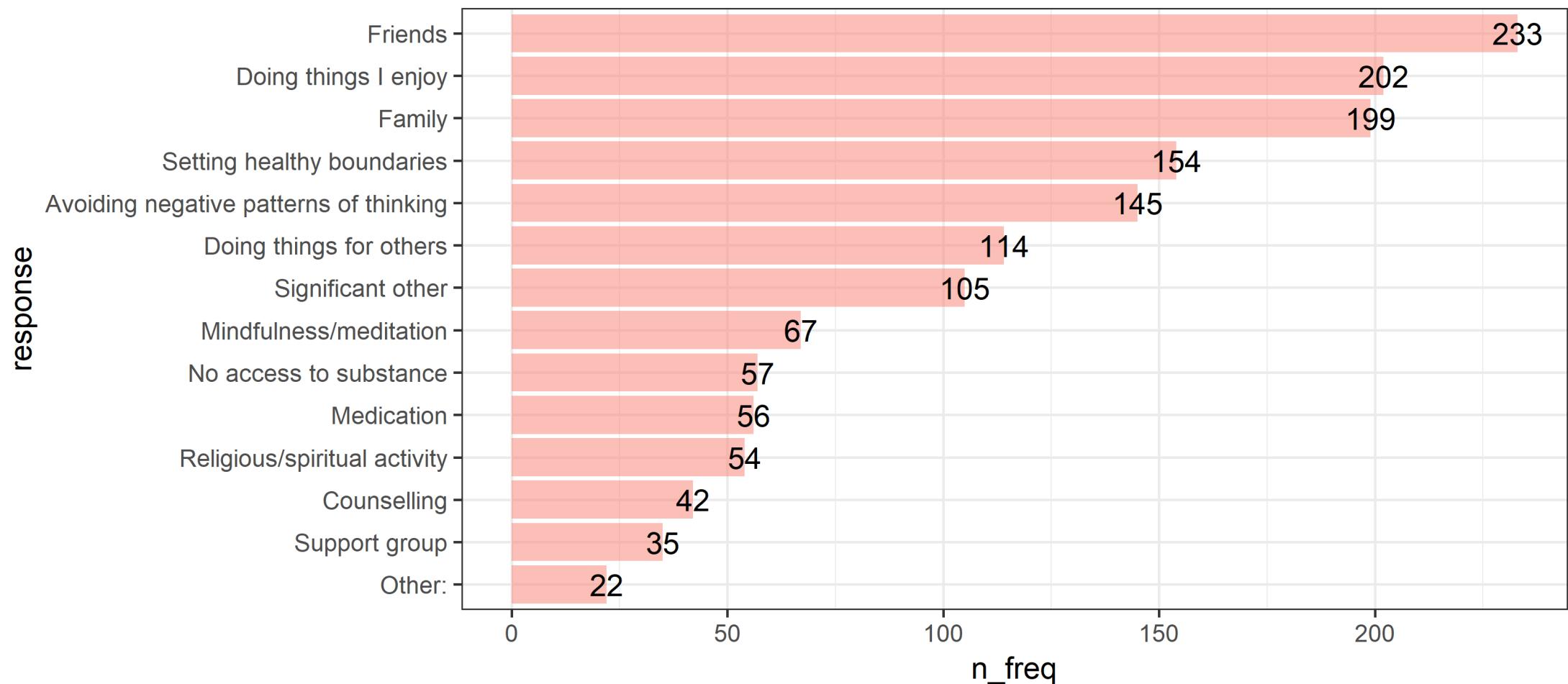


Q11: To what extent do you agree with the following statement:  
With respect to using alcohol, tobacco, or drugs, I have met my



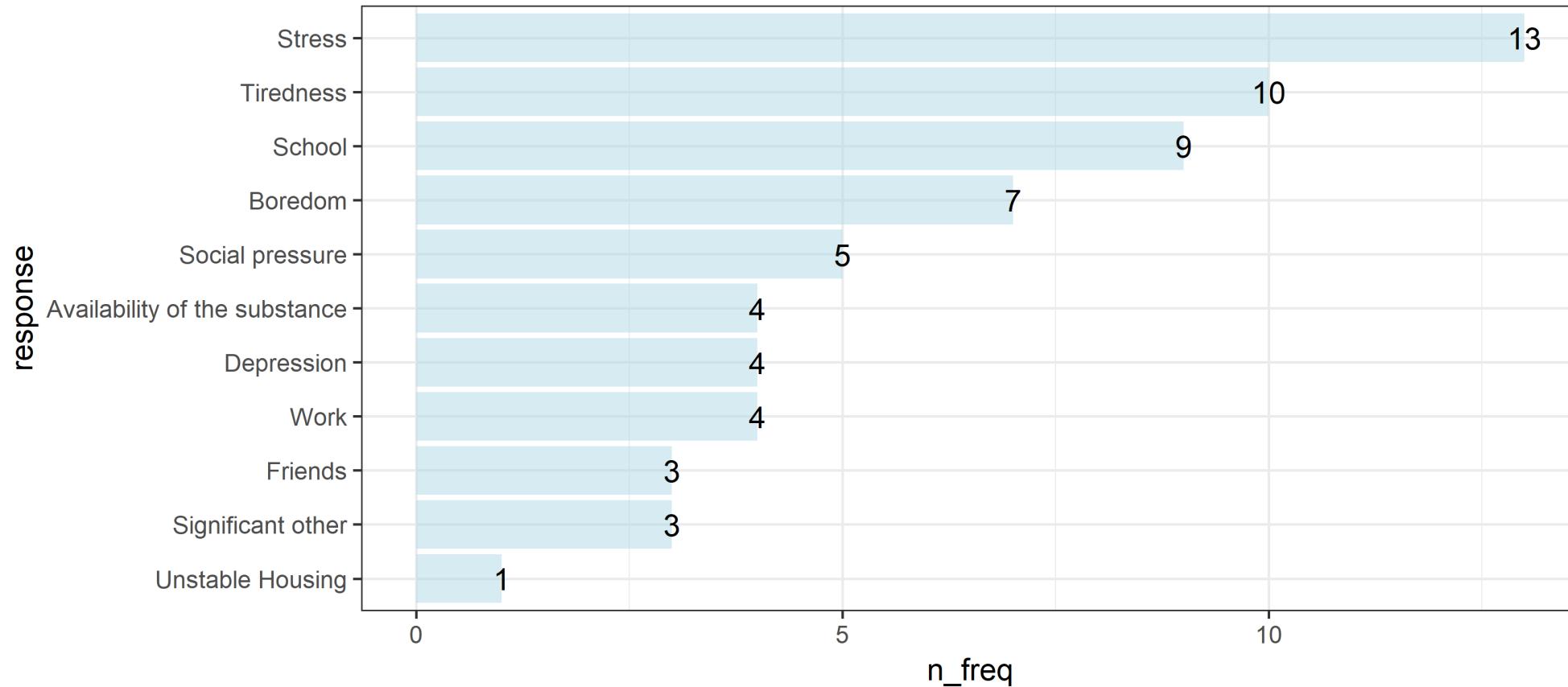
## Block 2: Substance Use

Q12: The following activities helped me to meet my goal (please choose all that apply)  
(frequency of non-unique responses)



## Block 2: Substance Use

Q13: The following activities contributed to not meeting my goal (please choose all that apply)  
(frequency of non-unique responses)



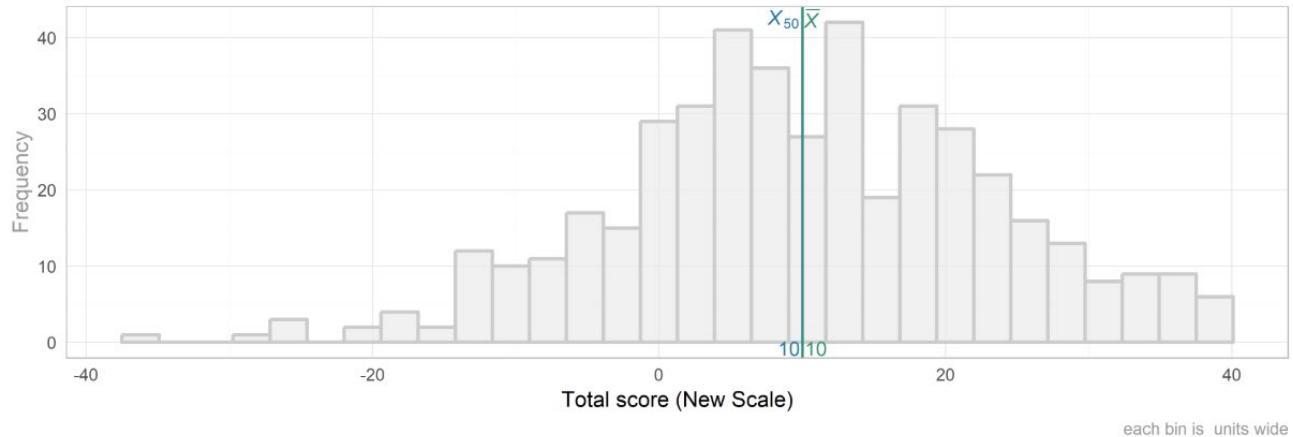
# Block 1: Perceptions/Behaviors

## Item Analysis: New

- Q4\_1 - duties
- Q4\_2 - optimistic
- Q4\_3 - loved
- Q4\_4 - annoyed
- Q4\_5 - rested
- Q4\_6 - happy
- Q4\_7 - pain
- Q4\_8 - confident
- Q4\_9 - worried
- Q4\_10 - purpose
- Q4\_11 - sad
- Q4\_12 - useful
- Q4\_13 - energetic
- Q4\_14 - supported
- Q4\_15 - angry
- Q4\_16 - control
- Q6\_1 - slept
- Q6\_2 - ate
- Q6\_3 - selfcare
- Q6\_4 - helpful

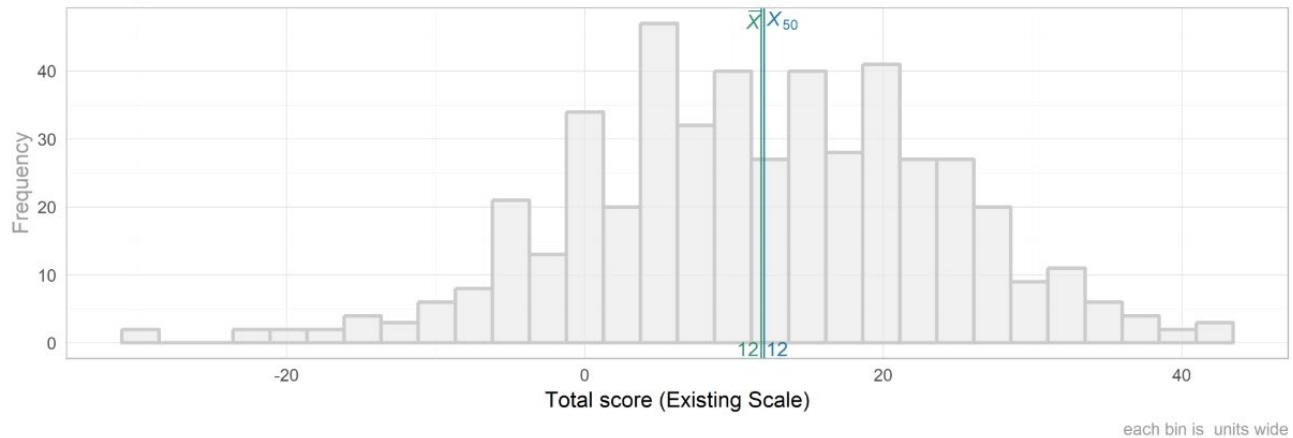
## Total scores

Distribution of total Scores  
New Scale



each bin is units wide

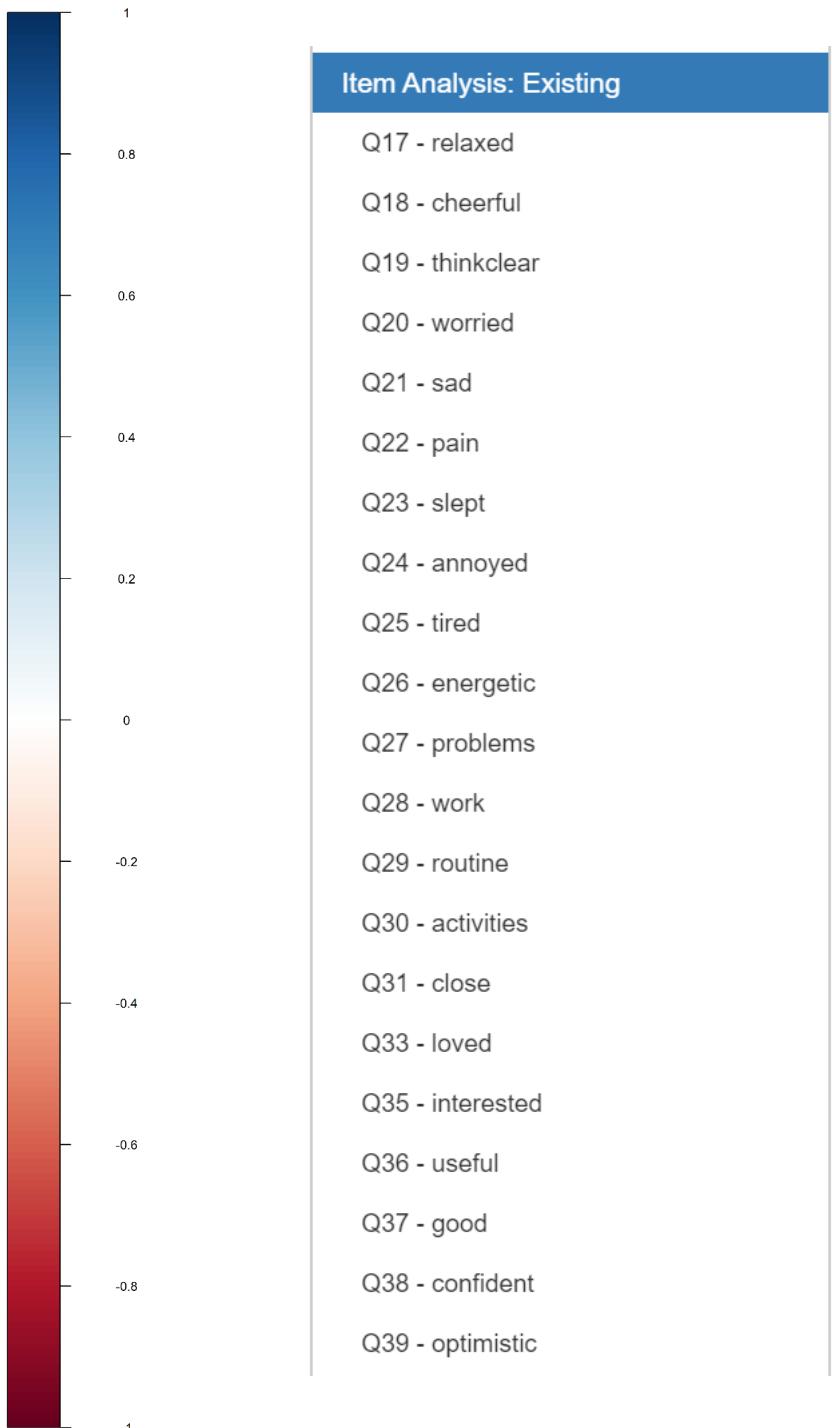
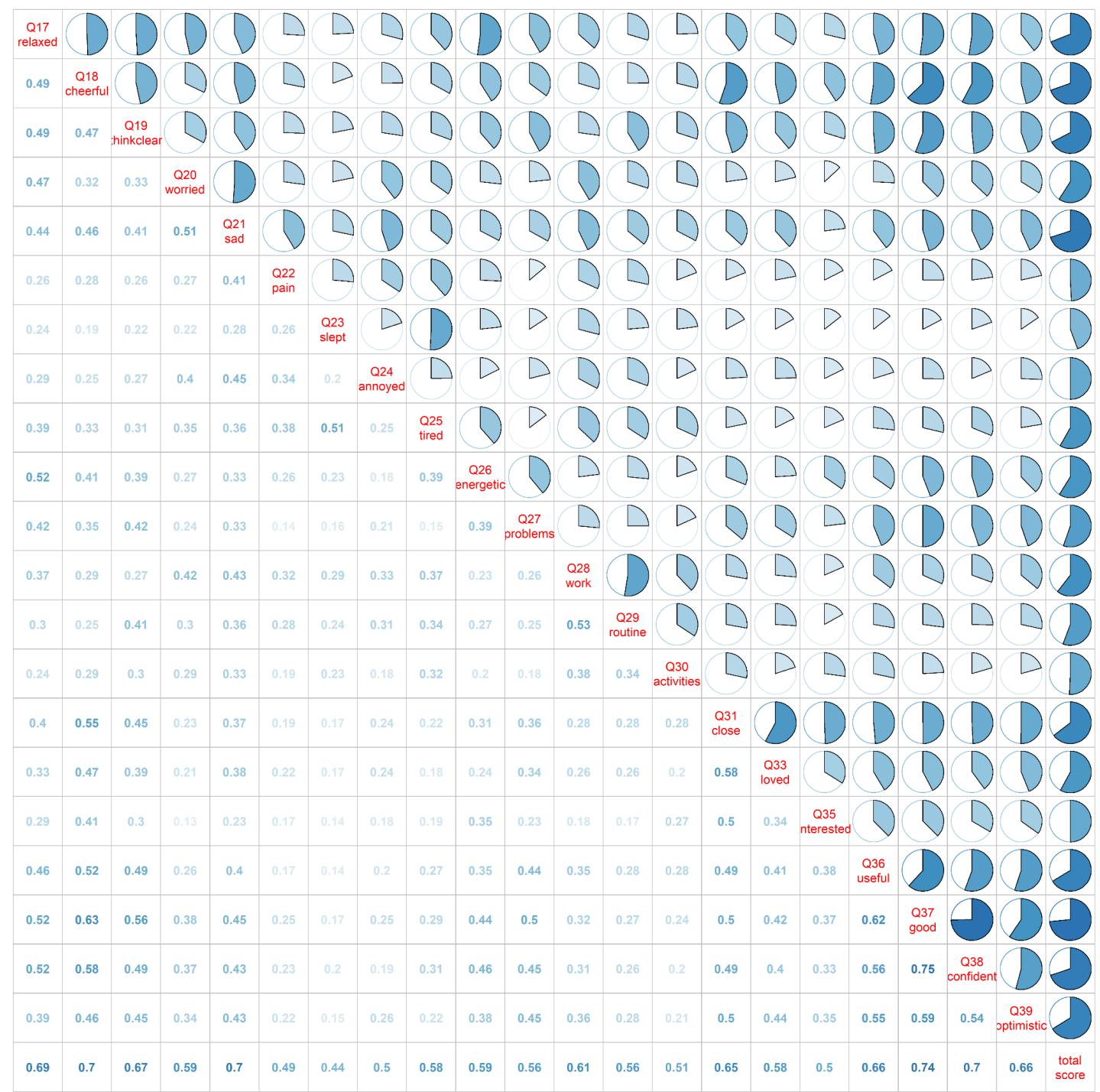
Distribution of total Scores  
Existing Scale



each bin is units wide

## Item Analysis: Existing

- Q17 - relaxed
- Q18 - cheerful
- Q19 - thinkclear
- Q20 - worried
- Q21 - sad
- Q22 - pain
- Q23 - slept
- Q24 - annoyed
- Q25 - tired
- Q26 - energetic
- Q27 - problems
- Q28 - work
- Q29 - routine
- Q30 - activities
- Q31 - close
- Q33 - loved
- Q35 - interested
- Q36 - useful
- Q37 - good
- Q38 - confident
- Q39 - optimistic



## Item Analysis: New

Q4\_1 - duties

Q4\_2 - optimistic

Q4\_3 - loved

Q4\_4 - annoyed

Q4\_5 - rested

Q4\_6 - happy

Q4\_7 - pain

Q4\_8 - confident

Q4\_9 - worried

Q4\_10 - purpose

Q4\_11 - sad

Q4\_12 - useful

Q4\_13 - energetic

Q4\_14 - supported

Q4\_15 - angry

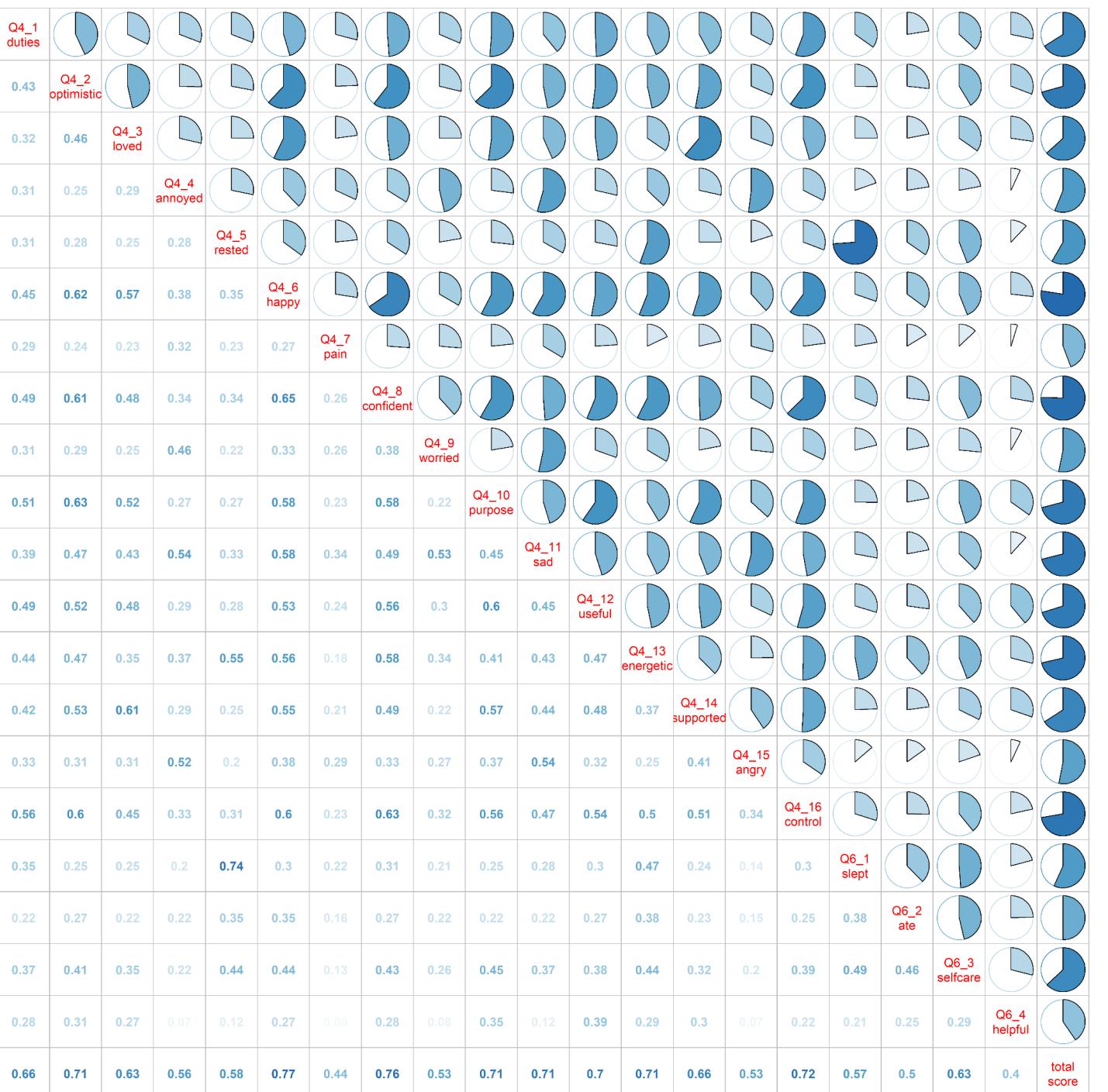
Q4\_16 - control

Q6\_1 - slept

Q6\_2 - ate

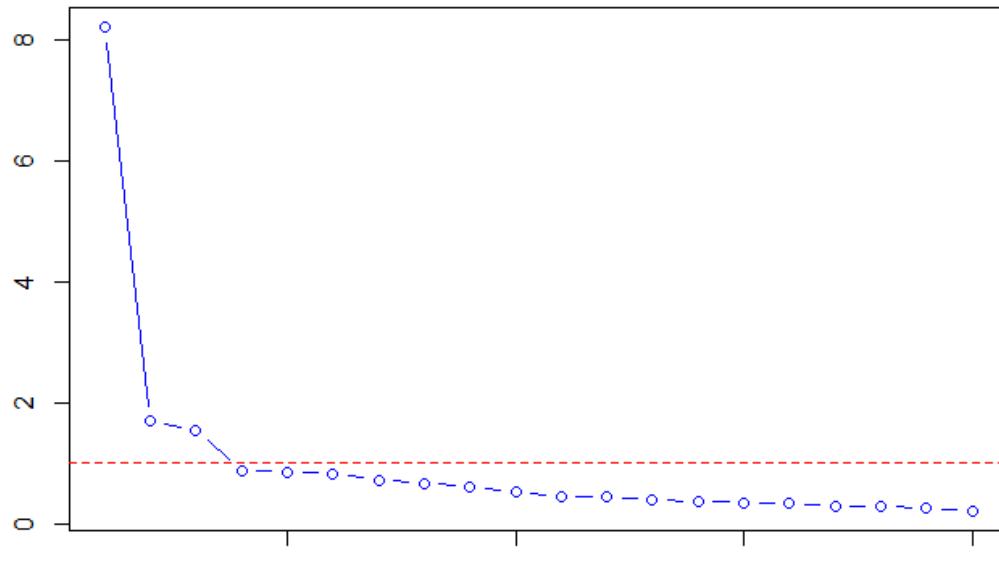
Q6\_3 - selfcare

Q6\_4 - helpful

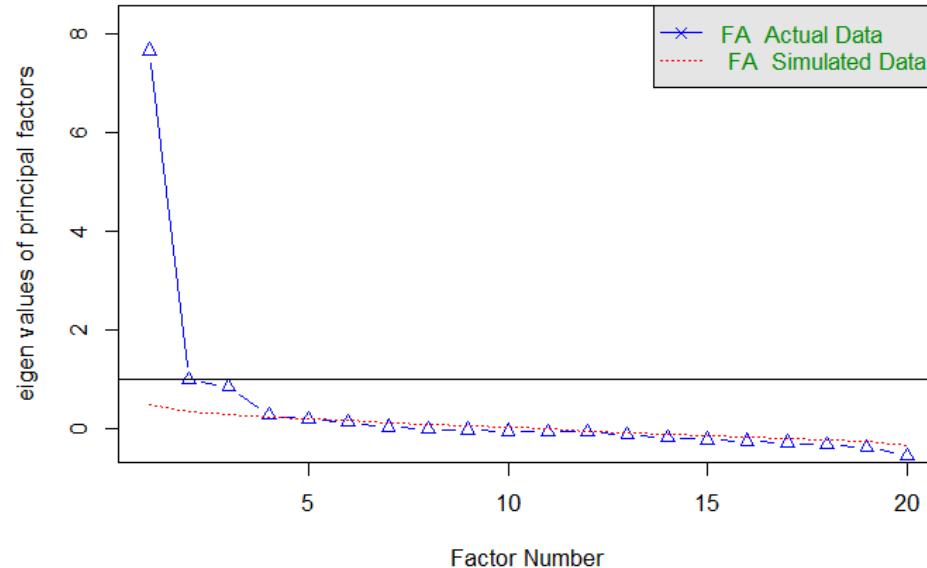


### Scree Plot

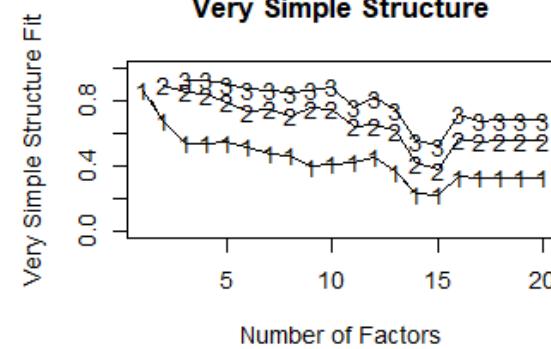
Eigenvalue



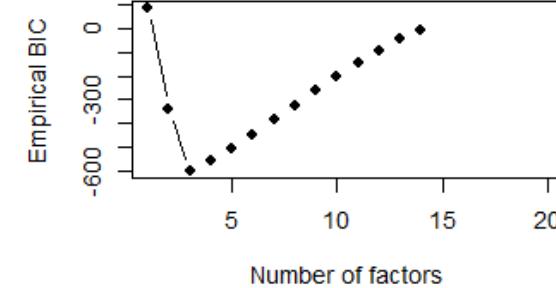
### Parallel Analysis Scree Plots



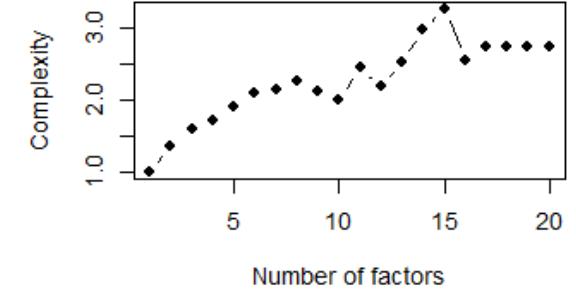
### Very Simple Structure



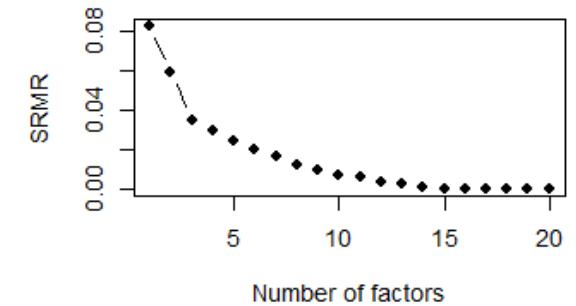
### Empirical BIC



### Complexity



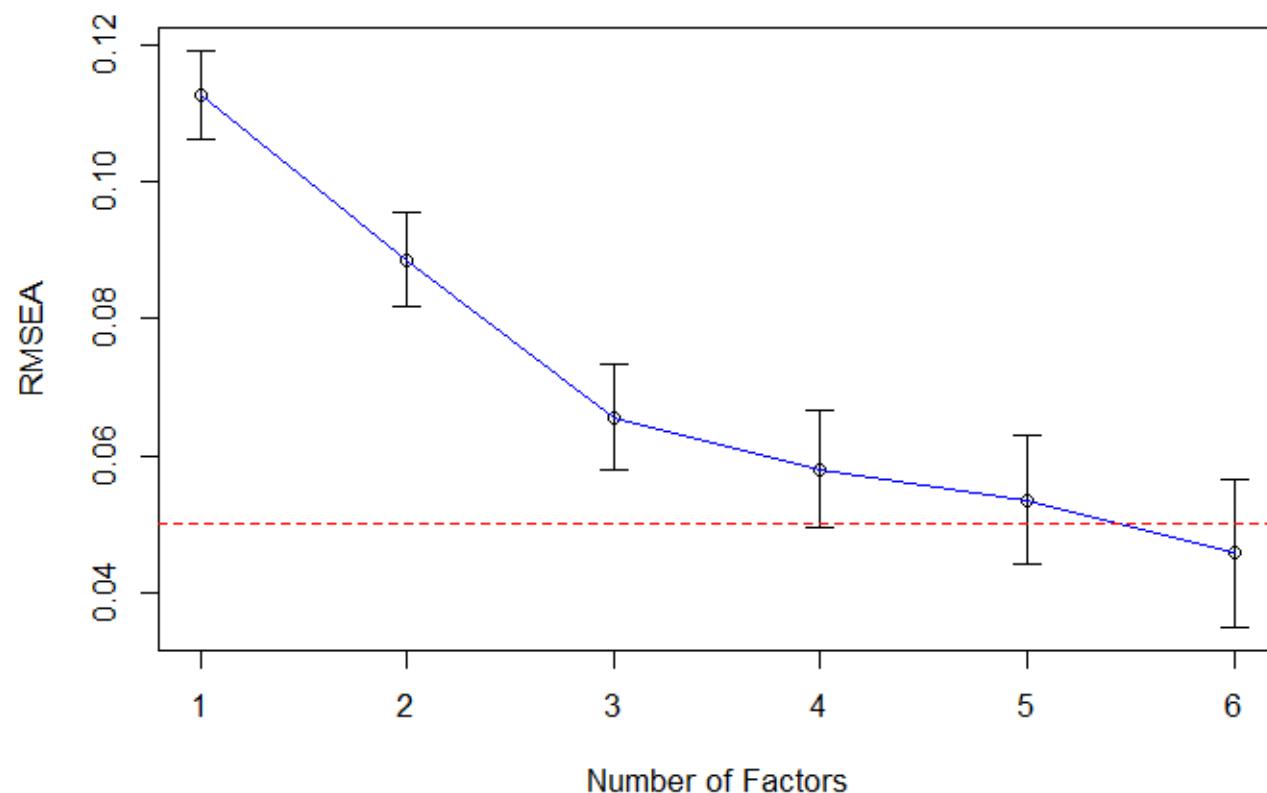
### Root Mean Residual



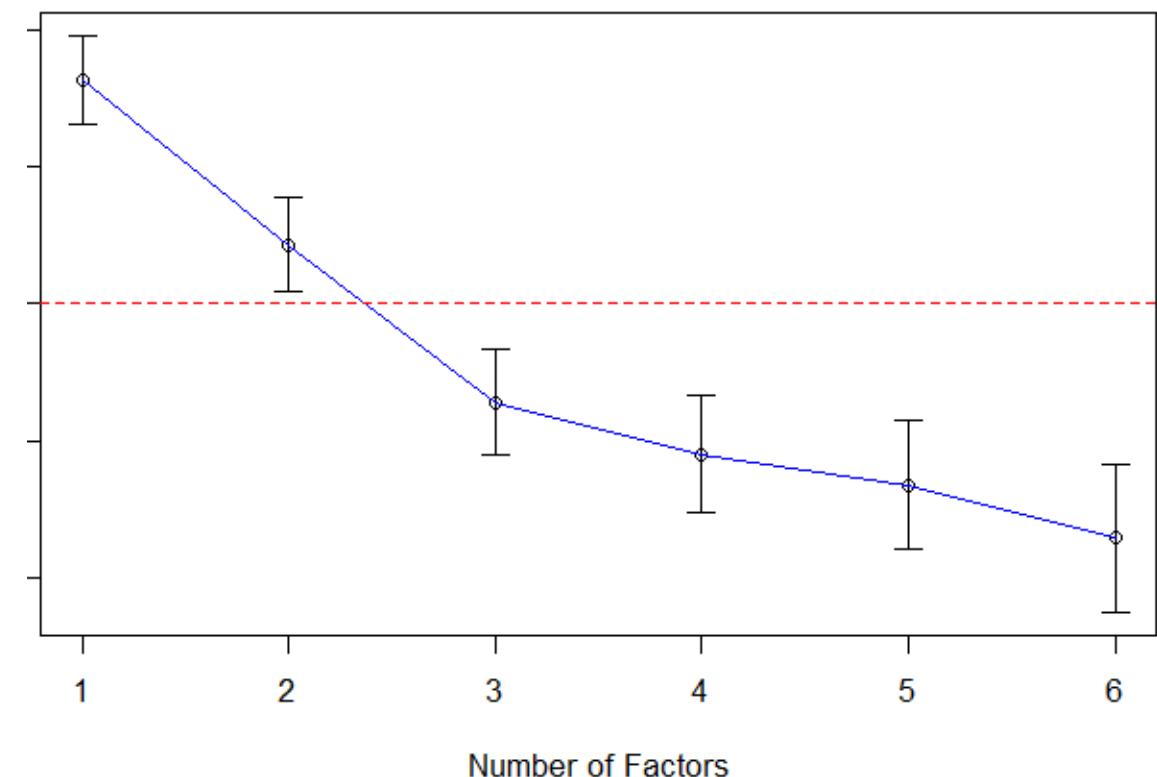
eigen	value
1	1 8.2120510
2	2 1.6938274
3	3 1.5492364
4	4 0.8865132
5	5 0.8534162
6	6 0.8341441
7	7 0.7270440
8	8 0.6757051
9	9 0.6091630
10	10 0.5387882
11	11 0.4550178
12	12 0.4447041
13	13 0.3993914
14	14 0.3738538
15	15 0.3482113

New scale analysis: How many factors?

**RMSEA Plot**



**RMSEA Plot**



New scale analysis: How many factors?

## Item Analysis: New

Q4\_1 - duties

Q4\_2 - optimistic

Q4\_3 - loved

Q4\_4 - annoyed

Q4\_5 - rested

Q4\_6 - happy

Q4\_7 - pain

Q4\_8 - confident

Q4\_9 - worried

Q4\_10 - purpose

Q4\_11 - sad

Q4\_12 - useful

Q4\_13 - energetic

Q4\_14 - supported

Q4\_15 - angry

Q4\_16 - control

Q6\_1 - slept

Q6\_2 - ate

Q6\_3 - selfcare

Q6\_4 - helpful

## New scale analysis: What items should be included into the mobile daily questionnaire?

### Guidelines for preference:

- High item-total correlation to the new scale
- High item-total correlation to the CHU and Warwick scales
- Items should cover all factors that seem to be present (3)
- Items with more pronounced weights onto a single factor should be preferred





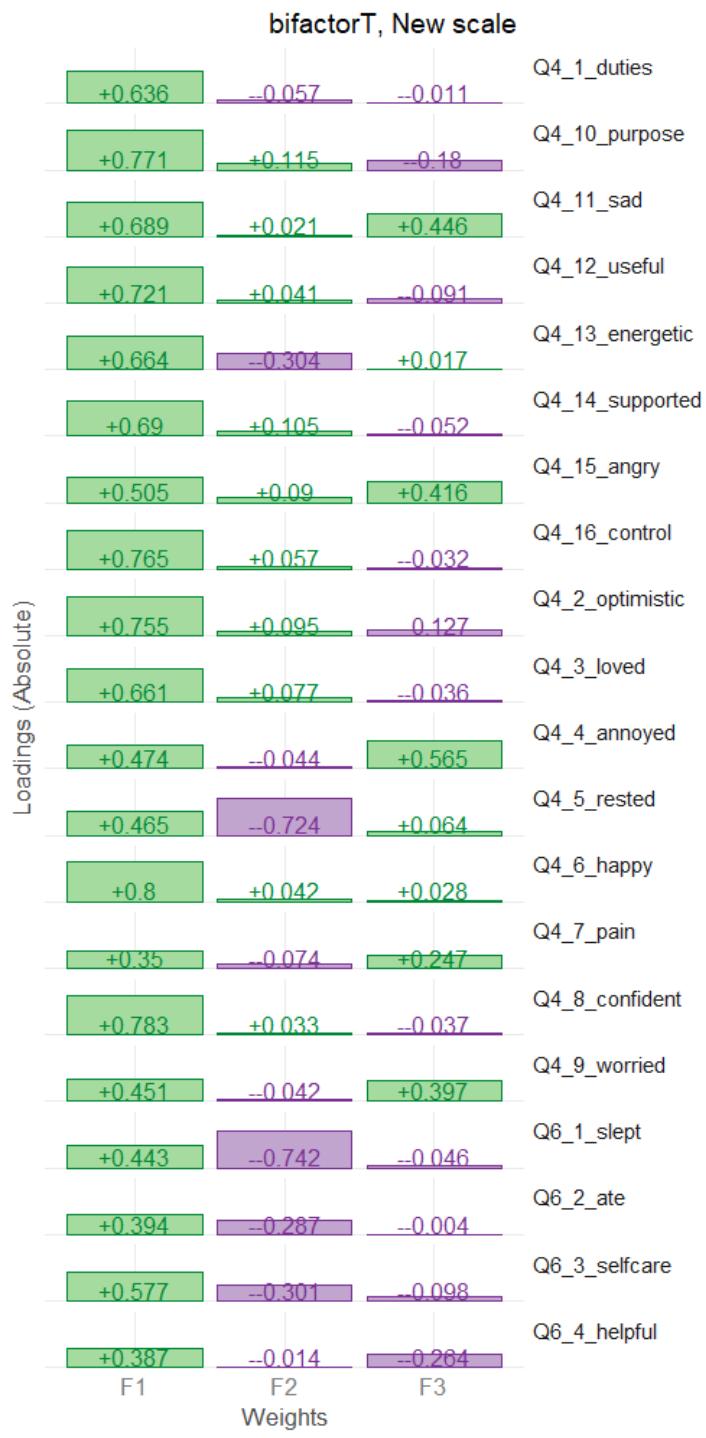
Even though the new scale shows good unidimensionality, diagnostic tests revealed that there appear to be two subfactors:

- “Self-Care”

- Q4\_13 (*Today I feel energetic*)
- Q4\_5 (*Today I feel rested*)
- Q6\_1 (*Today I woke up feeling well-rested*)
- Q6\_2 (*Today I ate well*)
- Q6\_3 (*Today I took good care of myself*)

- “Distress”

- Q4\_11 (*Today I feel sad*)
- Q4\_15 (*Today I feel angry*)
- Q4\_4 (*Today I feel annoyed/irritable*)
- Q4\_7 (*Today I feel in physical pain*) (<.30)
- Q4\_9 (*Today I feel worried/anxious*)



# Chosen items

## Main Factor

**Q4\_6 (Today I feel happy)** – because it had the highest loading on the general factor and highest item-total correlation on all scales.

**Q4\_8 (Today I feel confident)** - had consistently higher loading on the general factor than other two (Q4\_16 and Q4\_2) while being similar to them in term of the content

**Q4\_10 (Today I feel that my life has a purpose)** - because this item appears to cover the spiritual/self-actualization domain.

**Q4\_14 (Today I feel supported)** - we chose Q4\_14 (Today I feel supported) over Q4\_3 (Today I feel loved), because the former had higher loading, and higher item-total correlations.

## Subfactors

- **Q6\_3 (Today I took good care of myself)** - SELFCARE subfactor - Two other items had the next highest loadings on the “Self-Care” factor: Q4\_13 (Today I feel energetic) and Q6\_3 (Today I took good care of myself). We felt that Q4\_13 was similar to Q4\_5, while Q6\_3 provided a different facet of well-being. Therefore, choosing between the two we settled on the latter.

- **Q4\_5 (Today I feel rested)** - SELFCARE subfactor - Items Q4\_5 (Today I feel rested) and Q6\_1 (Today I woke up feeling well-rested) had highest loadings on the “Self-Care” factors, consistently across rotations. Deciding between them, we opted for Q4\_5 because it had slightly higher item-total correlations with both the new and existing scales.

- **Q4\_4 (Today I feel annoyed/irritable)** - DISTRESS subfactor - because it consistently loaded the strongest onto the “Distress” factor

## Item Analysis: New

Q4\_1 - duties

Q4\_2 - optimistic

Q4\_3 - loved

Q4\_4 - annoyed

Q4\_5 - rested

Q4\_6 - happy

Q4\_7 - pain

Q4\_8 - confident

Q4\_9 - worried

Q4\_10 - purpose

Q4\_11 - sad

Q4\_12 - useful

Q4\_13 - energetic

Q4\_14 - supported

Q4\_15 - angry

Q4\_16 - control

Q6\_1 - slept

Q6\_2 - ate

Q6\_3 - selfcare

Q6\_4 - helpful

