The title

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The authors made the following contributions. First Author: Conceptualization, Writing - Original Draft Preparation, Writing - Review & Editing; Ernst-August Doelle: Writing - Review & Editing, Supervision.

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Abstract

One or two sentences providing a **basic introduction** to the field, comprehensible to a scientist in any discipline. Two to three sentences of **more detailed background**, comprehensible to scientists in related disciplines. One sentence clearly stating the **general problem** being addressed by this particular study. One sentence summarizing the main result (with the words "**here we show**" or their equivalent). Two or three sentences explaining what the **main result** reveals in direct comparison to what was thought to be the case previously, or how the main result adds to previous knowledge. One or two sentences to put the results into a more **general context**. Two or three sentences to provide a **broader perspective**, readily comprehensible to a scientist in any discipline.

Keywords: keywords

Word count: X

The title

Death is something each of us must learn to cope with, whether in healthy ways or less so. These issues may be at front of mind for many in light of the COVID-19 pandemic. Various existential philosophers and psychologists have proposed ways in which we deal with the awareness of death and the anxiety this awareness often causes. Psychoanalyst Erik Erikson (1950) proposed that during mid-life one becomes acutely aware of their oncoming death and is motivated to care for things which will outlast themselves. He called this act of caring generativity. In *The Denial of Death*, philosopher Ernest Becker (**becker1973?**) posits that humans undertake immortality projects to curb their sense of vulnerability to death. Similarly, psychiatrist Robert Jay Lifton (**lifton1979?**), a mentee of Erikson, described the awareness of death as being ever present and motivating us to create symbols, thereby allowing us to imagine ourselves as symbolically immortalized. Existential psychiatrist Irvin Yalom (**yalom2008?**) notes that many of his clients experiencing anxiety about their death take comfort in "rippling," the idea that one's lasting effects on the world will ripple out and influence the world after they have died.

Although these thinkers use different terminology, there are several common themes among their ideas. (1) Our physical death is an inevitability, and we often find our awareness of its inevitability to be aversive. This aversion may be referred to variously as angst, death-anxiety, despair, being-towards-death, terror, and so on. However, (2) we take comfort in the idea that other, non-physical parts of us continue to exist indefinitely after our biological death, through mechanisms such as the heroic archetype and symbolic self. (3) Finally, we can take action to promote these non-physical aspects of the self, such as through search for meaning, sense of immortality, care, generativity, and rippling.

One of these bodies of thought, called symbolic immortality, was originally theorized by Lifton (**lifton1979?**), who thought that awareness of death drives a fundamental human desire for a sense of continuity lasting beyond the lifespan. Essentially, humans are meaning-seeking creatures, and throughout our lives, this search for meaning involves an evolving psychological imagery of life and death. Death, or the transient nature of life, threatens our search for meaning. Lifton thought that if we could achieve what we believe to be some form of immortality, we could overcome this loss of meaning, and the awareness of death could instead drive an inner vitality (imagery associated with connection, integrity, and movement). If this drive toward vitality is lost, we are vulnerable to a psychic numbness or death-in-life (imagery associated with separation, disintegration, and stasis). In Lifton's own words, "Death does indeed bring about biological and psychic annihilation. But life includes symbolic perceptions of connections that precede and outlast that annihilation" (**lifton1979?**).

Lifton (**lifton1979?**) proposed five modes of experience or ways of achieving symbolic immortality: The biological (or biosocial) mode in which one lives on through their genetic and sociocultural progeny, the creative mode in which one's accomplishments and contribution outlast oneself, the natural mode in which one feels they are a part of the broader universe, the spiritual mode in which one seeks to transcend the physical realm to a higher spiritual realm beyond death, and the mode of experiential transcendence in which one experiences a phenomenological state of flow. The experiential mode must occur in the context of at least one of the other four to really be considered transcendent, but it is thought to have a great capacity to bring about personal change.

Claims of how we suppress death-anxiety have been investigated experimentally, primarily through the paradigm of Terror Management Theory (TMT). Based on the theories of Ernest Becker, TMT posits that human awareness of death is always present to some degree. This awareness of our inevitable death, coupled with a strong aversion to thoughts of death, causes terror and is pushed out of our consciousness by our creation of meaning systems (Greenberg, Pyszczynski, & Solomon, 1986). TMT proposes that self-esteem, interpersonal relationships, and cultural worldview work together to buffer against our anxiety about death. It is assumed that these buffers suppress thoughts of death by providing a sense of symbolic immortality, though little systematic research has been conducted on this construct. The results of this buffering process are not always positive. For example, experimentally priming mortality salience can lead to more positive attitudes toward in-group members but harsher negative attitudes toward out-group members (Greenberg et al., 1990).

TMT refers to a person's awareness of death as mortality salience (MS). The MS hypothesis of TMT posits than an increase in one's awareness of death causes an increase in compensatory behaviors to lower their death anxiety, either by distracting from the awareness of death or by the promotion of meaningful cultural worldviews. In the MS paradigm, experimentally priming a participant's awareness of death (for example, by having participants write about death and then complete a distraction task) is thought to cause an increase in compensatory buffers. A meta-analysis of 277 experiments found mortality salience to have a robust, moderate overall effect size: $r(276) = 0.35$, $p = .00$ (Burke, Martens, & Faucher, 2010). Altogether, these experiments provide convincing evidence for TMT and the MS hypothesis in particular.

Though some avoidance of (or buffering against) death anxiety is thought to be universal and has the potential to increase interpersonal conflict, awareness of death through symbolic immortality may also have potential as a positive force. In particular, it is thought to be an underlying motive for what Erikson referred to as generativity. Generativity is the seventh of eight proposed stages in Erikson's (1950) theory of psychosocial development, which he associated with midlife and described as "the concern in establishing and guiding the next generation" (E. H. Erikson, 1963, p. 267). Little systematic research was conducted on this subject until the 1980's. Kotre (1984) expanded on the theory and proposed that the drive for generativity was related to a motive to expand the sense of self beyond the lifetime, especially in light of the fear of death.

McAdams and de St. Aubin (1992) sought to formalize the study of generativity as a multidimensional construct. Their seven components of generativity include cultural demand, inner desire (for symbolic immortality and community), concern (for the next generation), belief (in the human species), commitment, action, and narration (of generativity within one's life story). In addition to a quantitative measure of generative concern (the Loyola Generativity Scale), they developed a system for content analysis of autobiographical episodes pertaining to generativity, and symbolic immortality is one of the five themes they found. Here they define symbolic immortality as "any reference to leaving a legacy, having an enduring influence, or leaving behind products that will outlive one's physical existence," a theme clearly related to both Lifton's and Erikson's theories (McAdams & St. Aubin, 1992, p. 1011).

These research areas depend on the construct of symbolic immortality for their theoretical frameworks, but few researchers have attempted to systematically and quantitatively assess this construct. Two attempts have been made to develop such a measurement: Drolet's (1990) Sense of Symbolic Immortality Scale and Mathews and Kling's (1988) measure of symbolic immortality, based on an original questionnaire by Mathews and Mister (1987).

Drolet (1990) developed the Sense of Symbolic Immortality Scale based on Robert J. Lifton's theory of symbolic immortality and its five modes of experience. Drolet studied 136 adults, ages 18-30 and 30-40, and hypothesized that those in their 30's (established adults) would have a greater sense of symbolic immortality than the young adults (18-30). The measure is inherently subjective, not only by the nature of self-report, but in that the scale seeks to measure what a person *believes* and how they *feel* about these subjects. The scale as a whole had a high internal consistency ($\alpha = .91$) and test-retest reliability was $r = .97$. Internal consistency of subscales for the five theoretical modes of immortality was mixed. Of the five, spiritual immortality was the most distinct from the scale as a whole and the other subscales. Factor analysis showed three factors, mapping onto biosocial, creative, and spiritual. The transcendent and natural items may be closely related to biosocial.

Moving beyond the scale development itself, SSI correlated negatively with Templer's Death Anxiety Scale and had a strong ($r = .84$) positive relationship with Maholick's Purpose in Life Test (Drolet, 1990). In interpreting the very strong correlation, the author suggests that SSI is a broader construct than Purpose in Life and the scale itself may be less prone to social desirability effects than the PIL, although this had not been directly tested. Age group was also related, with established adults having a higher SSI, particularly in the biosocial and creative domains.

We see multiple issues with using the Symbolic Immortality Scale. First, the study was underpowered, conducting exploratory factor analysis of 67 items using a sample of 136. Second, the scale was developed in French, and we do not take for granted the psychometric properties of a translated version. Third and most fundamentally, the scale has poor face validity and appears to measure the constructs theorized to symbolically immortalize rather than a sense of symbolic immortality directly. For example, the scale includes items such as "My sex life contributes greatly to my well-being", "Intimate relationships scare me", and "I am sure of who I am." Although related to the constructs (such as interpersonal relationships and self-esteem) which theoretically help cope with death, it is unclear how these items represent the construct of symbolic immortality itself.

Mathews and Mister (1987) also developed a scale pertaining to symbolic immortality, sensation seeking, and psychic numbness in a study including 400 adults. Experiential transcendence was operationalized as similar to Zuckerman's (1979) sensation seeking, which may not fully capture the original intent (the experience of losing oneself). Items were mapped onto five factors, and the five factors largely aligned with Lifton's constructs. Although internal consistency was at least acceptable for each factor, goodness of fit statistics are not reported. Some studies have used a revised version of the scale by Mathews and Kling (1988), who adapted it for a study on prosocial behavior in the context of nonprofit volunteer motivation. They reported similar results for their revised scale. The items on these scales seem to have more face validity than the scale by Drolet, but some factors seem more behavioral and unnecessarily specific: pertaining to one's religiosity or biological children, whereas Lifton's theory allows for a broader interpretation of these dimensions. The Nature and Creative factors seem most useful and theoretically aligned with Lifton.

Much more advanced factor analysis methods have been developed since the 1980s, but to our knowledge, these scales have not been tested with more robust tools. The goal of the present research is to develop an up-to-date symbolic immortality scale that more directly measures one's sense of symbolic immortality and which contains items more generally applicable to broad groups of participants (e.g., regardless of a person's religious beliefs and parental status). We have attempted to use current best practices for scale development and analysis.

Method

Participants

Material

Procedure

Data analysis

Results

Data Screening

```
## [1] 352
```

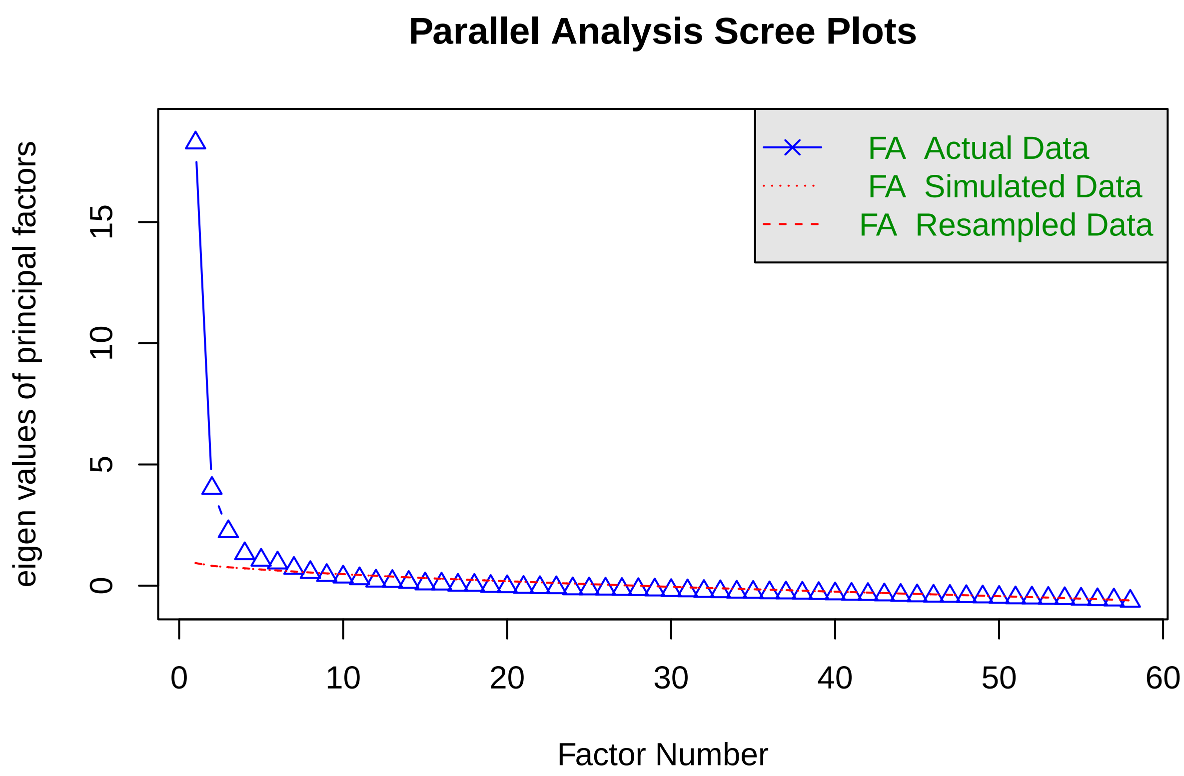
```
## [1] 353
```

```
## [1] 326
```

```
## [1] 326
```

EFA

Number of Factors. also do five




```
## Parallel analysis suggests that the number of factors =  7  and the number of compone
```

```
## [1] 5
```

```
## [1] 7
```

Simple Structure.

```
## Factor Analysis using method =  ml
## Call: fa(r = efaDF, nfactors = 2, rotate = "oblimin", fm = "ml")
```

```
## Standardized loadings (pattern matrix) based upon correlation matrix
##         ML1   ML2    h2   u2 com
## Q2_1   0.57  0.15 0.436 0.56 1.1
## Q2_2   0.77 -0.05 0.552 0.45 1.0
## Q2_3   0.76 -0.08 0.528 0.47 1.0
## Q2_4   0.70  0.05 0.523 0.48 1.0
## Q2_5   0.73 -0.10 0.466 0.53 1.0
## Q2_6   0.72  0.06 0.561 0.44 1.0
## Q2_7   0.47  0.07 0.259 0.74 1.0
## Q2_8   0.65 -0.03 0.408 0.59 1.0
## Q2_9   0.63  0.01 0.405 0.60 1.0
## Q2_10  0.58 -0.05 0.308 0.69 1.0
## Q2_11  0.18  0.64 0.546 0.45 1.2
## Q2_12 -0.05  0.92 0.805 0.19 1.0
## Q2_13  0.11  0.18 0.066 0.93 1.6
## Q2_14  0.66  0.06 0.480 0.52 1.0
## Q2_15  0.68 -0.08 0.421 0.58 1.0
## Q2_16  0.79 -0.08 0.571 0.43 1.0
## Q2_17 -0.01  0.92 0.836 0.16 1.0
## Q2_18  0.14  0.75 0.686 0.31 1.1
## Q2_19  0.46  0.12 0.286 0.71 1.1
## Q2_20  0.64 -0.11 0.354 0.65 1.1
## Q4_1   0.71 -0.06 0.468 0.53 1.0
## Q4_2   0.60 -0.05 0.328 0.67 1.0
## Q4_3   0.60 -0.06 0.335 0.66 1.0
## Q4_4   0.52  0.13 0.351 0.65 1.1
## Q4_5   0.67 -0.06 0.410 0.59 1.0
```

```
## Q4_6   0.52  0.19 0.411 0.59 1.3
## Q4_7   0.31 -0.13 0.073 0.93 1.3
## Q4_8   0.34  0.07 0.148 0.85 1.1
## Q4_9   0.65  0.15 0.533 0.47 1.1
## Q4_10  0.68  0.03 0.481 0.52 1.0
## Q4_11  0.09  0.14 0.042 0.96 1.7
## Q4_12  0.40 -0.04 0.146 0.85 1.0
## Q4_13  0.23  0.38 0.286 0.71 1.7
## Q4_14  0.17  0.46 0.317 0.68 1.3
## Q4_15  0.63  0.04 0.421 0.58 1.0
## Q4_16  0.55  0.01 0.312 0.69 1.0
## Q4_17  0.12  0.51 0.336 0.66 1.1
## Q4_18  0.10  0.19 0.064 0.94 1.5
## Q4_19 -0.07  0.95 0.834 0.17 1.0
## Q5_1   0.07  0.78 0.670 0.33 1.0
## Q5_2   0.02  0.85 0.740 0.26 1.0
## Q5_3   0.09  0.50 0.305 0.70 1.1
## Q5_4   0.51  0.25 0.446 0.55 1.5
## Q5_5   0.14  0.00 0.021 0.98 1.0
## Q5_6   0.44  0.16 0.290 0.71 1.3
## Q5_7   0.59 -0.01 0.338 0.66 1.0
## Q5_8   0.68  0.04 0.491 0.51 1.0
## Q5_9   0.75 -0.03 0.547 0.45 1.0
## Q5_10 -0.06  0.85 0.669 0.33 1.0
## Q5_11 -0.02  0.15 0.020 0.98 1.0
## Q5_12  0.05  0.30 0.107 0.89 1.1
## Q5_13  0.74  0.04 0.574 0.43 1.0
```

```
## Q5_14  0.31 -0.04 0.085 0.91 1.0
## Q5_15  0.57  0.09 0.387 0.61 1.1
## Q5_17  0.49  0.15 0.334 0.67 1.2
## Q5_18  0.35  0.20 0.232 0.77 1.6
## Q5_19  0.52  0.25 0.466 0.53 1.4
## Q5_20  0.19 -0.06 0.029 0.97 1.2
##
##                         ML1  ML2
## SS loadings           14.91 7.63
## Proportion Var         0.26 0.13
## Cumulative Var         0.26 0.39
## Proportion Explained   0.66 0.34
## Cumulative Proportion  0.66 1.00
##
##  With factor correlations of
##      ML1  ML2
## ML1 1.00 0.49
## ML2 0.49 1.00
##
## Mean item complexity =  1.1
## Test of the hypothesis that 2 factors are sufficient.
##
## df null model =  1653  with the objective function =  38.9 with Chi Square =  12870.7
## df of  the model are 1538  and the objective function was  12.63
##
## The root mean square of the residuals (RMSR) is  0.07
## The df corrected root mean square of the residuals is  0.07
```

```
##
## The harmonic n.obs is  352 with the empirical chi square  5082.08  with prob <  0
## The total n.obs was  352  with Likelihood Chi Square =  4161.82  with prob <  4.3e-24
##
## Tucker Lewis Index of factoring reliability =  0.747
## RMSEA index =  0.07  and the 90 % confidence intervals are  0.067 0.072
## BIC =  -4856.44
## Fit based upon off diagonal values = 0.96
## Measures of factor score adequacy
##                                                    ML1  ML2
## Correlation of (regression) scores with factors   0.98 0.98
## Multiple R square of scores with factors          0.96 0.96
## Minimum correlation of possible factor scores     0.93 0.93

## Factor Analysis using method =  ml
## Call: fa(r = efaDF %>% select(efa_loadings %>% filter(keep == "yes") %>%
##     pull(question)), nfactors = 2, rotate = "oblimin", fm = "ml")
## Standardized loadings (pattern matrix) based upon correlation matrix
##         ML1   ML2    h2   u2 com
## Q2_1   0.57  0.15 0.435 0.56 1.1
## Q2_2   0.77 -0.06 0.551 0.45 1.0
## Q2_3   0.76 -0.08 0.529 0.47 1.0
## Q2_4   0.69  0.06 0.525 0.47 1.0
## Q2_5   0.73 -0.10 0.467 0.53 1.0
## Q2_6   0.72  0.06 0.561 0.44 1.0
## Q2_7   0.47  0.07 0.260 0.74 1.0
## Q2_8   0.65 -0.02 0.408 0.59 1.0
## Q2_9   0.63  0.01 0.406 0.59 1.0
```

```
## Q2_10  0.58 -0.05 0.306 0.69 1.0
## Q2_11  0.18  0.64 0.545 0.45 1.2
## Q2_12 -0.05  0.92 0.805 0.20 1.0
## Q2_14  0.66  0.05 0.477 0.52 1.0
## Q2_15  0.68 -0.08 0.422 0.58 1.0
## Q2_16  0.79 -0.08 0.572 0.43 1.0
## Q2_17 -0.01  0.92 0.837 0.16 1.0
## Q2_18  0.14  0.75 0.686 0.31 1.1
## Q2_19  0.46  0.13 0.287 0.71 1.1
## Q2_20  0.64 -0.10 0.353 0.65 1.0
## Q4_1   0.71 -0.06 0.469 0.53 1.0
## Q4_2   0.60 -0.06 0.329 0.67 1.0
## Q4_3   0.60 -0.05 0.335 0.67 1.0
## Q4_4   0.52  0.13 0.349 0.65 1.1
## Q4_5   0.67 -0.06 0.410 0.59 1.0
## Q4_6   0.52  0.20 0.413 0.59 1.3
## Q4_7   0.31 -0.13 0.072 0.93 1.4
## Q4_8   0.34  0.07 0.146 0.85 1.1
## Q4_9   0.65  0.14 0.533 0.47 1.1
## Q4_10  0.68  0.02 0.481 0.52 1.0
## Q4_12  0.40 -0.04 0.145 0.86 1.0
## Q4_13  0.23  0.38 0.285 0.72 1.7
## Q4_14  0.16  0.47 0.321 0.68 1.2
## Q4_15  0.63  0.04 0.423 0.58 1.0
## Q4_16  0.55  0.01 0.309 0.69 1.0
## Q4_17  0.12  0.51 0.329 0.67 1.1
## Q4_19 -0.07  0.95 0.835 0.16 1.0
```

```
## Q5_1   0.07  0.78 0.672 0.33 1.0
## Q5_2   0.02  0.85 0.742 0.26 1.0
## Q5_3   0.08  0.51 0.306 0.69 1.1
## Q5_4   0.51  0.25 0.446 0.55 1.5
## Q5_6   0.44  0.16 0.288 0.71 1.2
## Q5_7   0.59 -0.02 0.337 0.66 1.0
## Q5_8   0.68  0.04 0.489 0.51 1.0
## Q5_9   0.75 -0.02 0.549 0.45 1.0
## Q5_10 -0.06  0.85 0.666 0.33 1.0
## Q5_13  0.74  0.04 0.574 0.43 1.0
## Q5_14  0.31 -0.04 0.085 0.91 1.0
## Q5_15  0.57  0.09 0.388 0.61 1.1
## Q5_17  0.49  0.15 0.334 0.67 1.2
## Q5_18  0.35  0.20 0.230 0.77 1.6
## Q5_19  0.52  0.25 0.466 0.53 1.4
##
##                         ML1  ML2
## SS loadings           14.80 7.39
## Proportion Var         0.29 0.14
## Cumulative Var         0.29 0.44
## Proportion Explained   0.67 0.33
## Cumulative Proportion  0.67 1.00
##
##  With factor correlations of
##      ML1  ML2
## ML1 1.00 0.49
## ML2 0.49 1.00
```

```
##
## Mean item complexity =  1.1
## Test of the hypothesis that 2 factors are sufficient.
##
## df null model =  1275  with the objective function =  35.47 with Chi Square =  11817.
## df of  the model are 1174  and the objective function was  9.54
##
## The root mean square of the residuals (RMSR) is  0.06
## The df corrected root mean square of the residuals is  0.06
##
## The harmonic n.obs is  352 with the empirical chi square  2962.25  with prob <  4.6e-
## The total n.obs was  352  with Likelihood Chi Square =  3164.31  with prob <  3.7e-18
##
## Tucker Lewis Index of factoring reliability =  0.794
## RMSEA index =  0.069  and the 90 % confidence intervals are  0.067 0.072
## BIC =  -3719.59
## Fit based upon off diagonal values = 0.98
## Measures of factor score adequacy
##                                                    ML1  ML2
## Correlation of (regression) scores with factors   0.98 0.98
## Multiple R square of scores with factors          0.96 0.96
## Minimum correlation of possible factor scores     0.93 0.93

## Factor Analysis using method =  ml
## Call: fa(r = efaDF, nfactors = 3, rotate = "oblimin", fm = "ml")
## Standardized loadings (pattern matrix) based upon correlation matrix
##          ML1   ML2   ML3    h2   u2 com
## Q2_1    0.47  0.17  0.20 0.445 0.56 1.6
```

```
## Q2_2   0.63 -0.03  0.28 0.572 0.43 1.4
## Q2_3   0.72 -0.05  0.08 0.528 0.47 1.0
## Q2_4   0.71  0.09 -0.04 0.548 0.45 1.0
## Q2_5   0.74 -0.07 -0.04 0.495 0.51 1.0
## Q2_6   0.64  0.09  0.16 0.560 0.44 1.2
## Q2_7   0.59  0.10 -0.26 0.371 0.63 1.4
## Q2_8   0.74  0.01 -0.18 0.500 0.50 1.1
## Q2_9   0.72  0.04 -0.18 0.492 0.51 1.1
## Q2_10  0.39 -0.04  0.40 0.395 0.61 2.0
## Q2_11  0.14  0.64  0.06 0.546 0.45 1.1
## Q2_12 -0.06  0.92  0.02 0.804 0.20 1.0
## Q2_13 -0.06  0.18  0.37 0.179 0.82 1.5
## Q2_14  0.45  0.07  0.45 0.588 0.41 2.0
## Q2_15  0.62 -0.05  0.11 0.418 0.58 1.1
## Q2_16  0.75 -0.04  0.07 0.573 0.43 1.0
## Q2_17  0.00  0.92 -0.02 0.837 0.16 1.0
## Q2_18  0.13  0.76  0.02 0.686 0.31 1.1
## Q2_19  0.53  0.15 -0.15 0.338 0.66 1.3
## Q2_20  0.71 -0.07 -0.14 0.420 0.58 1.1
## Q4_1   0.75 -0.02 -0.09 0.517 0.48 1.0
## Q4_2   0.60 -0.03  0.00 0.340 0.66 1.0
## Q4_3   0.64 -0.03 -0.07 0.367 0.63 1.0
## Q4_4   0.40  0.15  0.23 0.371 0.63 1.9
## Q4_5   0.54 -0.04  0.25 0.425 0.57 1.4
## Q4_6   0.58  0.22 -0.13 0.459 0.54 1.4
## Q4_7   0.07 -0.13  0.51 0.270 0.73 1.2
## Q4_8   0.19  0.08  0.32 0.208 0.79 1.8
```

```
## Q4_9    0.54  0.17  0.21 0.539 0.46 1.5
## Q4_10   0.52  0.05  0.33 0.522 0.48 1.7
## Q4_11 -0.12  0.13  0.45 0.212 0.79 1.3
## Q4_12   0.42 -0.01 -0.06 0.161 0.84 1.0
## Q4_13   0.20  0.39  0.07 0.287 0.71 1.6
## Q4_14   0.23  0.48 -0.14 0.346 0.65 1.6
## Q4_15   0.66  0.07 -0.07 0.451 0.55 1.0
## Q4_16   0.30  0.01  0.54 0.497 0.50 1.6
## Q4_17   0.00  0.51  0.25 0.381 0.62 1.4
## Q4_18 -0.17  0.18  0.55 0.326 0.67 1.4
## Q4_19 -0.05  0.95 -0.06 0.837 0.16 1.0
## Q5_1    0.07  0.78  0.00 0.670 0.33 1.0
## Q5_2    0.04  0.85 -0.04 0.744 0.26 1.0
## Q5_3    0.09  0.51  0.00 0.305 0.69 1.1
## Q5_4    0.50  0.28  0.00 0.453 0.55 1.6
## Q5_5    0.13  0.01  0.03 0.021 0.98 1.1
## Q5_6    0.33  0.17  0.24 0.313 0.69 2.4
## Q5_7    0.46  0.01  0.25 0.356 0.64 1.5
## Q5_8    0.49  0.06  0.41 0.568 0.43 2.0
## Q5_9    0.70  0.01  0.08 0.544 0.46 1.0
## Q5_10 -0.09  0.84  0.05 0.671 0.33 1.0
## Q5_11 -0.09  0.15  0.15 0.042 0.96 2.7
## Q5_12 -0.17  0.29  0.46 0.294 0.71 2.0
## Q5_13   0.61  0.07  0.25 0.583 0.42 1.4
## Q5_14   0.21 -0.03  0.21 0.107 0.89 2.0
## Q5_15   0.62  0.12 -0.10 0.431 0.57 1.1
## Q5_17   0.46  0.17  0.04 0.335 0.66 1.3
```

```
## Q5_18  0.29  0.21  0.12 0.233 0.77 2.2
## Q5_19  0.44  0.27  0.17 0.468 0.53 2.0
## Q5_20  0.20 -0.06 -0.02 0.032 0.97 1.2
##
##                        ML1  ML2  ML3
## SS loadings           13.39 7.95 3.65
## Proportion Var         0.23 0.14 0.06
## Cumulative Var         0.23 0.37 0.43
## Proportion Explained   0.54 0.32 0.15
## Cumulative Proportion  0.54 0.85 1.00
##
##  With factor correlations of
##      ML1  ML2  ML3
## ML1 1.00 0.45 0.32
## ML2 0.45 1.00 0.23
## ML3 0.32 0.23 1.00
##
## Mean item complexity =  1.4
## Test of the hypothesis that 3 factors are sufficient.
##
## df null model =  1653  with the objective function =  38.9 with Chi Square =  12870.7
## df of  the model are 1482  and the objective function was  10.58
##
## The root mean square of the residuals (RMSR) is  0.05
## The df corrected root mean square of the residuals is  0.05
##
## The harmonic n.obs is  352 with the empirical chi square  3147.43  with prob <  7.2e-
```

```
## The total n.obs was  352  with Likelihood Chi Square =  3478.38  with prob <  1.2e-16
##
## Tucker Lewis Index of factoring reliability =  0.8
## RMSEA index =  0.062  and the 90 % confidence intervals are  0.059 0.065
## BIC =  -5211.52
## Fit based upon off diagonal values = 0.98
## Measures of factor score adequacy
##                                                    ML1  ML2  ML3
## Correlation of (regression) scores with factors   0.98 0.98 0.92
## Multiple R square of scores with factors          0.96 0.96 0.84
## Minimum correlation of possible factor scores     0.92 0.93 0.68

## Factor Analysis using method =  ml
## Call: fa(r = efaDF %>% select(efa_loadings %>% filter(keep == "yes") %>%
##     pull(question)), nfactors = 3, rotate = "oblimin", fm = "ml")
## Standardized loadings (pattern matrix) based upon correlation matrix
##         ML2   ML1   ML3   h2   u2 com
## Q2_1   0.53  0.13  0.18 0.45 0.55 1.4
## Q2_2   0.70 -0.06  0.18 0.54 0.46 1.1
## Q2_3   0.75 -0.05 -0.02 0.53 0.47 1.0
## Q2_4   0.71  0.10 -0.11 0.56 0.44 1.1
## Q2_5   0.75 -0.06 -0.11 0.50 0.50 1.1
## Q2_6   0.69  0.06  0.09 0.55 0.45 1.0
## Q2_7   0.53  0.11 -0.18 0.33 0.67 1.3
## Q2_8   0.69  0.01 -0.12 0.46 0.54 1.1
## Q2_9   0.68  0.03 -0.11 0.46 0.54 1.1
## Q2_11  0.16  0.62  0.09 0.55 0.45 1.2
## Q2_12 -0.05  0.92  0.00 0.81 0.19 1.0
```

```
## Q2_13  0.02  0.10  0.42 0.21 0.79 1.1
## Q2_15  0.66 -0.05  0.00 0.41 0.59 1.0
## Q2_16  0.78 -0.04 -0.05 0.57 0.43 1.0
## Q2_17  0.00  0.92 -0.01 0.84 0.16 1.0
## Q2_18  0.14  0.74  0.05 0.69 0.31 1.1
## Q2_19  0.50  0.14 -0.09 0.32 0.68 1.2
## Q2_20  0.67 -0.07 -0.11 0.40 0.60 1.1
## Q4_1   0.73 -0.03 -0.07 0.50 0.50 1.0
## Q4_2   0.61 -0.05  0.01 0.35 0.65 1.0
## Q4_3   0.63 -0.03 -0.08 0.37 0.63 1.0
## Q4_4   0.46  0.11  0.20 0.36 0.64 1.5
## Q4_5   0.61 -0.09  0.22 0.42 0.58 1.3
## Q4_6   0.56  0.23 -0.12 0.45 0.55 1.4
## Q4_7   0.19 -0.20  0.43 0.21 0.79 1.8
## Q4_8   0.27  0.01  0.34 0.23 0.77 1.9
## Q4_9   0.60  0.13  0.18 0.54 0.46 1.3
## Q4_11 -0.01  0.04  0.50 0.26 0.74 1.0
## Q4_12  0.41 -0.03 -0.02 0.16 0.84 1.0
## Q4_13  0.22  0.35  0.14 0.30 0.70 2.1
## Q4_14  0.20  0.49 -0.11 0.34 0.66 1.5
## Q4_15  0.65  0.08 -0.09 0.45 0.55 1.1
## Q4_17  0.06  0.44  0.34 0.42 0.58 1.9
## Q4_18 -0.05  0.05  0.68 0.48 0.52 1.0
## Q4_19 -0.06  0.96 -0.05 0.84 0.16 1.0
## Q5_1   0.08  0.78  0.00 0.67 0.33 1.0
## Q5_2   0.03  0.85 -0.02 0.74 0.26 1.0
## Q5_3   0.08  0.51  0.00 0.31 0.69 1.1
```

```
## Q5_4   0.51  0.25  0.05 0.45 0.55 1.5
## Q5_6   0.39  0.13  0.22 0.31 0.69 1.8
## Q5_7   0.53 -0.04  0.23 0.36 0.64 1.4
## Q5_9   0.74 -0.01  0.03 0.55 0.45 1.0
## Q5_10 -0.07  0.82  0.09 0.67 0.33 1.0
## Q5_12 -0.06  0.18  0.57 0.39 0.61 1.2
## Q5_13  0.68  0.01  0.25 0.60 0.40 1.3
## Q5_15  0.60  0.10 -0.02 0.42 0.58 1.1
## Q5_17  0.48  0.13  0.09 0.34 0.66 1.2
## Q5_19  0.49  0.24  0.12 0.46 0.54 1.6
##
##                         ML2  ML1  ML3
## SS loadings           12.36 7.36 2.42
## Proportion Var         0.26 0.15 0.05
## Cumulative Var         0.26 0.41 0.46
## Proportion Explained   0.56 0.33 0.11
## Cumulative Proportion  0.56 0.89 1.00
##
##  With factor correlations of
##      ML2  ML1  ML3
## ML2 1.00 0.46 0.20
## ML1 0.46 1.00 0.28
## ML3 0.20 0.28 1.00
##
## Mean item complexity =  1.2
## Test of the hypothesis that 3 factors are sufficient.
##
```

```
## df null model =  1128  with the objective function =  31.98 with Chi Square =  10685.
## df of  the model are 987  and the objective function was  7.17
##
## The root mean square of the residuals (RMSR) is  0.05
## The df corrected root mean square of the residuals is  0.05
##
## The harmonic n.obs is  352 with the empirical chi square  1731.72  with prob <  1.4e-
## The total n.obs was  352  with Likelihood Chi Square =  2381.61  with prob <  1.1e-11
##
## Tucker Lewis Index of factoring reliability =  0.832
## RMSEA index =  0.063  and the 90 % confidence intervals are  0.06 0.067
## BIC =  -3405.79
## Fit based upon off diagonal values = 0.98
## Measures of factor score adequacy
##                                                    ML2  ML1  ML3
## Correlation of (regression) scores with factors   0.98 0.98 0.89
## Multiple R square of scores with factors          0.96 0.96 0.79
## Minimum correlation of possible factor scores     0.92 0.93 0.58
```

```
## Factor Analysis using method =  ml
## Call: fa(r = efaDF, nfactors = 5, rotate = "oblimin", fm = "ml")
## Standardized loadings (pattern matrix) based upon correlation matrix
##         ML2   ML5   ML1   ML3   ML4   h2   u2 com
## Q2_1   0.13  0.40  0.13  0.27 -0.05 0.48 0.52 2.3
## Q2_2  -0.01  0.20  0.49  0.25  0.04 0.57 0.43 1.9
## Q2_3   0.04  0.02  0.81 -0.06  0.00 0.67 0.33 1.0
## Q2_4   0.14  0.24  0.52 -0.09  0.10 0.58 0.42 1.7
## Q2_5  -0.03  0.33  0.45 -0.04  0.05 0.48 0.52 1.9
```

```
## Q2_6    0.09  0.32  0.34  0.18  0.11 0.56 0.44 2.9
## Q2_7    0.11  0.48  0.13 -0.18  0.05 0.36 0.64 1.6
## Q2_8   -0.04  0.77  0.05 -0.08  0.01 0.59 0.41 1.0
## Q2_9   -0.02  0.79  0.02 -0.07 -0.04 0.61 0.39 1.0
## Q2_10 -0.03  0.03  0.39  0.36  0.06 0.39 0.61 2.1
## Q2_11  0.64  0.06  0.10  0.06  0.01 0.55 0.45 1.1
## Q2_12  0.92 -0.07  0.04  0.01 -0.06 0.81 0.19 1.0
## Q2_13  0.11  0.05 -0.07  0.41 -0.13 0.22 0.78 1.4
## Q2_14  0.08  0.01  0.49  0.39  0.06 0.59 0.41 2.0
## Q2_15  0.04 -0.05  0.79 -0.04 -0.04 0.57 0.43 1.0
## Q2_16  0.05  0.04  0.82 -0.08  0.01 0.72 0.28 1.0
## Q2_17  0.92  0.00  0.03 -0.03 -0.07 0.84 0.16 1.0
## Q2_18  0.77  0.01  0.11  0.01  0.05 0.69 0.31 1.1
## Q2_19  0.11  0.61 -0.06 -0.02  0.04 0.39 0.61 1.1
## Q2_20 -0.09  0.59  0.13 -0.06  0.15 0.45 0.55 1.3
## Q4_1  -0.03  0.57  0.25 -0.03  0.01 0.53 0.47 1.4
## Q4_2  -0.01  0.33  0.30  0.03  0.02 0.33 0.67 2.0
## Q4_3   0.00  0.35  0.29 -0.03  0.09 0.35 0.65 2.1
## Q4_4   0.15  0.17  0.26  0.24  0.05 0.37 0.63 3.4
## Q4_5  -0.05  0.28  0.32  0.27  0.02 0.43 0.57 3.0
## Q4_6   0.23  0.41  0.21 -0.07 -0.02 0.45 0.55 2.2
## Q4_7  -0.16 -0.09  0.12  0.53  0.16 0.31 0.69 1.6
## Q4_8   0.00  0.29 -0.07  0.41 -0.02 0.27 0.73 1.9
## Q4_9   0.15  0.34  0.26  0.24  0.00 0.54 0.46 3.2
## Q4_10  0.07  0.09  0.51  0.27 -0.04 0.53 0.47 1.7
## Q4_11  0.05  0.04 -0.07  0.50 -0.26 0.31 0.69 1.6
## Q4_12 -0.01  0.27  0.13 -0.01  0.13 0.16 0.84 2.0
```

```
## Q4_13  0.36  0.19  0.00  0.12  0.08 0.30 0.70 1.9
## Q4_14  0.49  0.13  0.07 -0.12  0.12 0.35 0.65 1.4
## Q4_15  0.10  0.33  0.38 -0.06  0.00 0.45 0.55 2.2
## Q4_16  0.02 -0.07  0.40  0.49  0.07 0.50 0.50 2.0
## Q4_17  0.49 -0.02  0.01  0.26  0.10 0.39 0.61 1.6
## Q4_18  0.10 -0.04 -0.16  0.63  0.06 0.40 0.60 1.2
## Q4_19  0.94  0.03 -0.07 -0.04 -0.04 0.84 0.16 1.0
## Q5_1   0.79  0.00  0.05  0.00  0.07 0.68 0.32 1.0
## Q5_2   0.85  0.03 -0.01 -0.03  0.07 0.75 0.25 1.0
## Q5_3   0.52  0.01 -0.04  0.02  0.40 0.47 0.53 1.9
## Q5_4   0.24  0.46  0.05  0.09  0.12 0.49 0.51 1.8
## Q5_5   0.01  0.04 -0.11  0.08  0.65 0.42 0.58 1.1
## Q5_6   0.15  0.17  0.16  0.27  0.08 0.32 0.68 3.4
## Q5_7  -0.01  0.23  0.27  0.26  0.05 0.36 0.64 3.0
## Q5_8   0.07  0.10  0.45  0.37  0.01 0.57 0.43 2.1
## Q5_9   0.06  0.21  0.56  0.04  0.02 0.57 0.43 1.3
## Q5_10  0.82  0.00 -0.07  0.06 -0.06 0.67 0.33 1.0
## Q5_11  0.10  0.09 -0.02  0.18 -0.54 0.33 0.67 1.4
## Q5_12  0.22 -0.06 -0.09  0.50 -0.05 0.32 0.68 1.5
## Q5_13  0.05  0.36  0.30  0.29  0.00 0.59 0.41 2.9
## Q5_14 -0.03  0.04  0.21  0.20 -0.05 0.11 0.89 2.2
## Q5_15  0.05  0.76 -0.07  0.04 -0.03 0.56 0.44 1.0
## Q5_17  0.10  0.60 -0.09  0.19 -0.05 0.44 0.56 1.3
## Q5_18  0.14  0.44 -0.14  0.25  0.04 0.32 0.68 2.1
## Q5_19  0.30  0.11  0.34  0.15  0.10 0.48 0.52 2.8
## Q5_20 -0.02 -0.02 -0.01 -0.01  0.79 0.61 0.39 1.0
##
```

```
##                        ML2  ML5  ML1  ML3  ML4
## SS loadings           7.83 7.27 7.06 3.91 1.94
## Proportion Var        0.14 0.13 0.12 0.07 0.03
## Cumulative Var        0.14 0.26 0.38 0.45 0.48
## Proportion Explained  0.28 0.26 0.25 0.14 0.07
## Cumulative Proportion 0.28 0.54 0.79 0.93 1.00
##
##  With factor correlations of
##      ML2  ML5  ML1  ML3  ML4
## ML2 1.00 0.43 0.33 0.31 0.10
## ML5 0.43 1.00 0.62 0.25 0.17
## ML1 0.33 0.62 1.00 0.30 0.20
## ML3 0.31 0.25 0.30 1.00 0.06
## ML4 0.10 0.17 0.20 0.06 1.00
##
## Mean item complexity =  1.7
## Test of the hypothesis that 5 factors are sufficient.
##
## df null model =  1653  with the objective function =  38.9 with Chi Square =  12870.7
## df of  the model are 1373  and the objective function was  8.33
##
## The root mean square of the residuals (RMSR) is  0.04
## The df corrected root mean square of the residuals is  0.04
##
## The harmonic n.obs is  352 with the empirical chi square  1829.65  with prob <  1.3e-
## The total n.obs was  352  with Likelihood Chi Square =  2727.58  with prob <  4.9e-92
##
```

```
## Tucker Lewis Index of factoring reliability =  0.853
## RMSEA index =  0.053  and the 90 % confidence intervals are  0.05 0.056
## BIC =  -5323.18
## Fit based upon off diagonal values = 0.99
## Measures of factor score adequacy
##                                                    ML2  ML5  ML1  ML3  ML4
## Correlation of (regression) scores with factors   0.98 0.96 0.96 0.92 0.89
## Multiple R square of scores with factors          0.97 0.92 0.93 0.84 0.79
## Minimum correlation of possible factor scores     0.93 0.84 0.85 0.69 0.57

## Factor Analysis using method =  ml
## Call: fa(r = efaDF %>% select(efa_loadings %>% filter(keep == 1) %>%
##     pull(question)), nfactors = 5, rotate = "oblimin", fm = "ml")
## Standardized loadings (pattern matrix) based upon correlation matrix
##         ML1   ML2   ML3   ML5   ML4    h2   u2 com
## Q2_1   0.16  0.16  0.15  0.35  0.15 0.450 0.55 2.8
## Q2_2  -0.02  0.50  0.08  0.24  0.17 0.545 0.45 1.8
## Q2_3   0.01  0.84  0.02 -0.04 -0.01 0.699 0.30 1.0
## Q2_4   0.15  0.54  0.13  0.16 -0.14 0.583 0.42 1.6
## Q2_7   0.12  0.17  0.27  0.19 -0.14 0.324 0.68 3.8
## Q2_8  -0.03  0.03  0.94 -0.08  0.03 0.846 0.15 1.0
## Q2_9   0.01  0.01  0.85  0.01  0.01 0.747 0.25 1.0
## Q2_11  0.63  0.13  0.05 -0.01  0.08 0.555 0.45 1.1
## Q2_12  0.92  0.00 -0.06  0.00  0.00 0.809 0.19 1.0
## Q2_13  0.08 -0.04  0.12 -0.04  0.47 0.252 0.75 1.2
## Q2_15  0.00  0.83  0.03 -0.15  0.02 0.635 0.37 1.1
## Q2_16  0.03  0.84  0.07 -0.07 -0.05 0.742 0.26 1.0
## Q2_17  0.93  0.00  0.02 -0.05  0.00 0.844 0.16 1.0
```

```
## Q2_18  0.76  0.14  0.00  0.00  0.05 0.695 0.31 1.1
## Q2_19  0.15 -0.04  0.25  0.47 -0.11 0.437 0.56 1.9
## Q2_20 -0.06  0.18  0.43  0.25 -0.08 0.447 0.55 2.1
## Q4_1  -0.01  0.27  0.45  0.16 -0.01 0.522 0.48 1.9
## Q4_2  -0.02  0.33  0.14  0.25  0.03 0.341 0.66 2.3
## Q4_3   0.00  0.31  0.11  0.32 -0.05 0.353 0.65 2.3
## Q4_5  -0.06  0.38  0.06  0.33  0.19 0.454 0.55 2.6
## Q4_6   0.25  0.24  0.15  0.27 -0.10 0.445 0.56 3.9
## Q4_7  -0.19  0.17 -0.20  0.30  0.37 0.260 0.74 3.6
## Q4_8   0.00  0.01  0.06  0.37  0.28 0.281 0.72 1.9
## Q4_9   0.16  0.31  0.15  0.28  0.15 0.532 0.47 3.6
## Q4_10  0.05  0.50  0.04  0.16  0.20 0.500 0.50 1.6
## Q4_11  0.00 -0.04  0.11 -0.06  0.58 0.331 0.67 1.1
## Q4_13  0.36  0.08  0.04  0.17  0.10 0.300 0.70 1.8
## Q4_14  0.50  0.09  0.06  0.08 -0.12 0.341 0.66 1.3
## Q4_17  0.44  0.10  0.05 -0.08  0.35 0.438 0.56 2.1
## Q4_18  0.01 -0.04 -0.02  0.04  0.74 0.549 0.45 1.0
## Q4_19  0.95 -0.10  0.02  0.01 -0.03 0.838 0.16 1.0
## Q5_1   0.79  0.05 -0.05  0.08 -0.02 0.672 0.33 1.0
## Q5_2   0.85 -0.01  0.03  0.01 -0.01 0.742 0.26 1.0
## Q5_4   0.26  0.13  0.23  0.29  0.02 0.476 0.52 3.3
## Q5_5  -0.02  0.04  0.03  0.11  0.05 0.027 0.97 2.2
## Q5_9   0.05  0.59  0.01  0.24 -0.02 0.576 0.42 1.3
## Q5_10  0.82 -0.06 -0.01 -0.02  0.08 0.674 0.33 1.0
## Q5_12  0.16 -0.01  0.00 -0.06  0.61 0.434 0.57 1.2
## Q5_15  0.09 -0.01  0.55  0.26  0.02 0.544 0.46 1.5
## Q5_17  0.14 -0.05  0.25  0.47  0.04 0.452 0.55 1.8
```

```
## Q5_18  0.17 -0.09  0.11  0.47  0.10 0.357 0.64 1.6
## Q5_19  0.30  0.37 -0.08  0.28  0.02 0.483 0.52 3.0
## Q5_20 -0.05  0.14 -0.03  0.14 -0.05 0.041 0.96 2.6
##
##                        ML1  ML2  ML3  ML5  ML4
## SS loadings           7.26 5.24 3.67 3.14 2.26
## Proportion Var        0.17 0.12 0.09 0.07 0.05
## Cumulative Var        0.17 0.29 0.38 0.45 0.50
## Proportion Explained  0.34 0.24 0.17 0.15 0.10
## Cumulative Proportion 0.34 0.58 0.75 0.90 1.00
##
##  With factor correlations of
##      ML1  ML2  ML3  ML5  ML4
## ML1 1.00 0.36 0.35 0.34 0.29
## ML2 0.36 1.00 0.56 0.44 0.15
## ML3 0.35 0.56 1.00 0.44 0.08
## ML5 0.34 0.44 0.44 1.00 0.18
## ML4 0.29 0.15 0.08 0.18 1.00
##
## Mean item complexity =  1.8
## Test of the hypothesis that 5 factors are sufficient.
##
## df null model =  903  with the objective function =  27.79 with Chi Square =  9333.35
## df of  the model are 698  and the objective function was  4.52
##
## The root mean square of the residuals (RMSR) is  0.04
## The df corrected root mean square of the residuals is  0.05
```

```
##
## The harmonic n.obs is  352 with the empirical chi square  1021.68  with prob <  1.3e-
## The total n.obs was  352  with Likelihood Chi Square =  1504.09  with prob <  3.9e-61
##
## Tucker Lewis Index of factoring reliability =  0.875
## RMSEA index =  0.057  and the 90 % confidence intervals are  0.053 0.061
## BIC =  -2588.72
## Fit based upon off diagonal values = 0.99
## Measures of factor score adequacy
##                                                    ML1  ML2  ML3  ML5  ML4
## Correlation of (regression) scores with factors   0.98 0.96 0.96 0.89 0.89
## Multiple R square of scores with factors          0.96 0.92 0.92 0.80 0.79
## Minimum correlation of possible factor scores     0.93 0.84 0.84 0.59 0.58

## Factor Analysis using method =  ml
## Call: fa(r = efaDF %>% select(efa_loadings_2 %>% filter(keep == 1) %>%
##     pull(question)), nfactors = 5, rotate = "oblimin", fm = "ml")
## Standardized loadings (pattern matrix) based upon correlation matrix
##         ML1   ML3   ML2   ML5   ML4   h2   u2 com
## Q2_1   0.12  0.23  0.12  0.31  0.15 0.44 0.56 3.1
## Q2_2  -0.03  0.56  0.07  0.17  0.16 0.53 0.47 1.4
## Q2_3   0.00  0.86 -0.01 -0.04 -0.01 0.70 0.30 1.0
## Q2_4   0.14  0.56  0.11  0.15 -0.15 0.58 0.42 1.5
## Q2_8   0.00 -0.01  0.95 -0.06  0.02 0.85 0.15 1.0
## Q2_9   0.02 -0.01  0.84  0.04  0.00 0.74 0.26 1.0
## Q2_11  0.65  0.13  0.08 -0.06  0.07 0.55 0.45 1.2
## Q2_12  0.92  0.00 -0.07  0.02  0.00 0.82 0.18 1.0
## Q2_13  0.06 -0.03  0.10 -0.01  0.48 0.26 0.74 1.1
```

```
## Q2_15 -0.01  0.82  0.00 -0.10  0.02 0.61 0.39 1.0
## Q2_16  0.02  0.84  0.05 -0.05 -0.04 0.74 0.26 1.0
## Q2_17  0.92 -0.01  0.03 -0.04  0.00 0.84 0.16 1.0
## Q2_18  0.76  0.15  0.02 -0.05  0.06 0.69 0.31 1.1
## Q2_19  0.10  0.03  0.20  0.46 -0.09 0.40 0.60 1.6
## Q2_20 -0.06  0.20  0.43  0.18 -0.09 0.43 0.57 2.0
## Q4_1   0.00  0.29  0.45  0.09  0.01 0.51 0.49 1.8
## Q4_2  -0.01  0.37  0.16  0.11  0.05 0.30 0.70 1.6
## Q4_8  -0.04  0.08 -0.01  0.42  0.21 0.27 0.73 1.6
## Q4_9   0.13  0.35  0.12  0.26  0.13 0.52 0.48 2.8
## Q4_10  0.06  0.54  0.06  0.06  0.19 0.48 0.52 1.3
## Q4_11 -0.02 -0.03  0.08 -0.01  0.60 0.35 0.65 1.0
## Q4_13  0.34  0.11  0.01  0.18  0.07 0.29 0.71 1.9
## Q4_14  0.53  0.09  0.11 -0.03 -0.12 0.34 0.66 1.3
## Q4_18 -0.02  0.00 -0.04  0.04  0.75 0.57 0.43 1.0
## Q4_19  0.94 -0.10  0.02  0.02 -0.02 0.84 0.16 1.0
## Q5_1   0.78  0.07 -0.06  0.10 -0.02 0.68 0.32 1.1
## Q5_2   0.85 -0.01  0.03  0.02 -0.01 0.74 0.26 1.0
## Q5_9   0.02  0.65 -0.03  0.23 -0.02 0.57 0.43 1.3
## Q5_10  0.82 -0.06 -0.01  0.00  0.07 0.67 0.33 1.0
## Q5_12  0.13  0.01 -0.02 -0.03  0.63 0.45 0.55 1.1
## Q5_15  0.07  0.02  0.50  0.29 -0.01 0.54 0.46 1.7
## Q5_17  0.03  0.01  0.10  0.70  0.01 0.60 0.40 1.0
## Q5_18  0.07 -0.02 -0.04  0.67  0.05 0.48 0.52 1.0
##
##                        ML1  ML3  ML2  ML5  ML4
## SS loadings           6.42 4.68 3.00 2.41 1.88
```

```
## Proportion Var        0.19 0.14 0.09 0.07 0.06
## Cumulative Var        0.19 0.34 0.43 0.50 0.56
## Proportion Explained  0.35 0.25 0.16 0.13 0.10
## Cumulative Proportion 0.35 0.60 0.77 0.90 1.00
##
##  With factor correlations of
##      ML1  ML3  ML2  ML5  ML4
## ML1 1.00 0.37 0.33 0.43 0.30
## ML3 0.37 1.00 0.59 0.42 0.13
## ML2 0.33 0.59 1.00 0.50 0.08
## ML5 0.43 0.42 0.50 1.00 0.22
## ML4 0.30 0.13 0.08 0.22 1.00
##
## Mean item complexity =  1.3
## Test of the hypothesis that 5 factors are sufficient.
##
## df null model =  528  with the objective function =  21.69 with Chi Square =  7357.73
## df of  the model are 373  and the objective function was  2.17
##
## The root mean square of the residuals (RMSR) is  0.03
## The df corrected root mean square of the residuals is  0.03
##
## The harmonic n.obs is  352 with the empirical chi square  300.78  with prob <  1
## The total n.obs was  352  with Likelihood Chi Square =  727.35  with prob <  4.3e-25
##
## Tucker Lewis Index of factoring reliability =  0.926
## RMSEA index =  0.052  and the 90 % confidence intervals are  0.046 0.058
```

```
## BIC =  -1459.79
## Fit based upon off diagonal values = 0.99
## Measures of factor score adequacy
##                                                    ML1  ML3  ML2  ML5  ML4
## Correlation of (regression) scores with factors   0.98 0.96 0.96 0.90 0.88
## Multiple R square of scores with factors          0.96 0.92 0.92 0.81 0.77
## Minimum correlation of possible factor scores     0.93 0.84 0.83 0.61 0.55
```

- take the final version of each “best model”
- get down to 5 items each or whatever is left (best loading and theoretical)
- look at the fit indices to tell which may be best

Discussion

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