



# The influence of meaning in life on anxiety in first-year students

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**Abstract**

The search for- and experience of meaning in life is thought to be as an essential part of human existence. Previous studies have associated MIL and its components negatively with anxiety. Existing MIL interventions helped reducing anxiety in terminally ill patients. One vulnerable group to experience anxiety are university students, who reported high levels of anxiety in various previous studies. This research investigated a possible anxiety reducing effect of two MIL interventions in university students. The interventions were developed to be short and feasible in about 30 minutes. Results showed that anxiety decreased significantly in the total sample (N = 149) of first-year students over the course of one week, however the groups did not significantly differ from one another in their anxiety scores at follow-up. MIL measures were moderately to strongly negatively associated with anxiety scores. Anxiety scores in the university students were in accordance with previous studies quite high. These findings indicate that even brief MIL interventions have the potential to significantly decrease anxiety in students. Limitations and future directions are discussed.

*Keywords:* Meaning in life, MIL intervention, anxiety

### **The influence of MIL on anxiety in first-year students**

Victor Frankl, Austrian psychiatrist, holocaust survivor and founder of the logotherapy stated in one of his major works that “Man's search for meaning is the primary motivation in his life [...]” (Frankl, 2004, p. 106). Also Nietzsche stated the importance of meaning: „If you have your why for life, then you can get along with almost any how” (Nietzsche, 1998). This indicates the important role meaning may have in every human’s life. Meaning is thought to be important to lead a healthy life (King & Hicks, 2021), and experiencing meaning is likely a common human experience (Heintzelman & King, 2014b). Despite this, meaning is still an understudied concept that did not get enough attention in psychological research yet (Shin & Steger, 2014). Therefore, the goal of the current research is to add to the pool of research on meaning in life by investigating the effect of meaning in life on anxiety in first-year students.

### **Defining meaning in life**

Defining the concept of meaning in life (MIL) has been a point of academic debate, as it is no concept with clear outlines and borders. Trying to grasp the essence of the meaning concept many scholars came up with different definitions. Those definitions however share some common features. King et al. (2006, p.180) stated that: „lives may be experienced as meaningful when they are felt to have significance beyond the trivial or momentary, to have purpose, or to have a coherence that transcends chaos.“ In a similar way Steger (2012, p. 165) defined meaning as „the web of connections, understandings, and interpretations that help us comprehend our experience and formulate plans directing our energies to the achievement of our desired future. Meaning provides us with the sense that our lives matter, that they make sense, and that they are more than the sum of our seconds, days, and years.”

### ***Components of meaning in life***

Both these definitions reflect the currently widely adopted tripartite view of MIL. Accordingly, MIL consists out of three main components: Coherence/comprehension, purpose

& significance/mattering (George & Park, 2016, 2017; Heintzelman & King, 2014a; King & Hicks, 2021; Martela & Steger, 2016). Others however proclaim a quadripartite view and add internal value as a fourth component (Li et al., 2021), or identified four different dimensions of MIL: coherence, meaningfulness, belonging and orientation (Schnell, 2020). To add to the confusion in some past studies to meaning in life purpose and meaning have been used interchangeably (King & Hicks, 2021). This shows the importance to untangle the single components from each other and come up with clear definitions for each of them. The current research will focus on the tripartite view of MIL as „it has the most comprehensive theoretical backing in the current literature“ (Martela & Steger, 2016, p. 540), allows for a comparison between different components of MIL and can be measured reliably (George & Park, 2017). The emphasis of this study lied on two of the subcomponents of MIL, comprehension and purpose.

**Comprehension/Coherence.** Humans tend to be motivated to understand their lives and the world around them (Yalom, 1980). Comprehension is the component of meaning in life that captures this motivation (Heintzelman & King, 2014a). Comprehension is the feeling that arises when a person has the feeling to “get it”. With experiencing comprehension, life makes sense (Baumeister & Vohs, 2002), things feel clear, fit well together and are as they should be (George & Park, 2016). Following this definition, comprehension should be low when people find themselves in new or unknown situations or after their worldview has been shattered, for example by a traumatic experience. The absence of comprehension, the inability to understand one`s environment, is in general believed to cause considerable psychological distress (Pyszczynski & Taylor, 2016). People who are involved in daily routines tend to comprehend themselves and their lives better and therefore report higher levels of MIL (Heintzelman & King, 2019). This effect of comprehension is one reason why a lot of people report their life as being meaningful (Heintzelman & King, 2014b).

For university students perceived incoherence of study content (Schnell, 2020) might lower levels of comprehension, and might therefore be lower in first-year students than purpose.

**Purpose.** Purpose refers to the degree to which individuals experience their lives as being motivated and guided by valued life goals (McKnight & Kashdan, 2009). George and Park, (2016 p. 206) came up with the following explanation of purpose:

„Individuals experiencing purpose have a clearer sense of direction in their lives and the ends toward which they are striving. Their commitment to their life goals provides them with a sense of engagement with life, and they feel pulled and directed toward their goals. Individuals experiencing low purpose have a sense of aimlessness, and nothing in the future seems worthwhile to them.”

An important part of purpose are therefore goals that are valuable to oneself. Individuals without such goals or aims will experience less purpose and vice versa. Purpose enhances the feeling of being involved in life (Scheier et al., 2006), and can provide reasons to get up in the morning (Ryff, 1989). It therefore has been termed the motivational component of MIL (King & Hicks, 2021).

Because the purpose subconstruct captures the extent to which individuals are pursuing valued goals (George & Park, 2017) first-year students might experience more purpose than comprehension as a lot of students choose their studies with a specific goal in mind, for example the opportunity to learn a certain profession.

**Mattering/Significance.** Mattering can be defined as the extent to which individuals feel that their existence has and will have lasting impact on the world (King & Hicks, 2021). This component of MIL can be seen as slightly problematic when assessed through self-report as reporting that one's life will have an impact even in the far future might be seen as profoundly narcissistic (Shaw, 2000). On the other hand, mattering is also referred to as

significance. Living a life that is significant to me, and others is possible without having to have a lasting impact on the world.

### **MIL in university students**

Adolescents and university students in particular might experience less meaning than the average population. One reason for this is that the experience of meaning increases slightly with age (Reker, 2005; Steger, Oishi, & Kashdan, 2009). In line with this, Reker et al. (1987) found that purpose is higher in older adults than in younger ones. Especially first-year university students, who are mostly adolescents, might struggle to experience meaning as they often find little meaning in their studies (Schnell, 2015, for a review see Schnell 2020). This can possibly be explained by the knowledge imparted at the beginning of the study programme being perceived as incoherent (Schnell, 2020). A survey in the US asking 112 232 students at 236 colleges and universities about their spiritual lives and concerns found that 76% of them (multiple answers possible) were searching for meaning and purpose in their lives (Astin et al., 2005). It has been shown that the search for meaning is inversely related to the experience of meaning in undergraduate students (Steger et al., 2008), suggesting that these students experience less meaning. Searching for meaning might be typical for traditional age students (i.e. 18- 24 years old) (Adams, 2012). Many young adults are striving to find meaning and purpose in their life (Schultheiss, 2000; Steger, Oishi, & Kashdan, 2009), which might lower their experienced MIL.

Increasing MIL in university students could therefore be beneficial as past research has shown the positive effects that MIL can have on students. For example, students who reported to experience more meaning also reported higher self-acceptance (Ryff, 1989), higher self-esteem (DeWitz et al., 2009; Ryff, 1989; Steger et al., 2006), adaptive coping and adjustment (Park & Folkman, 1997) and academic achievement (DeWitz et al., 2009). Further

a higher sense of meaning in students is associated to life satisfaction and positive affect (King et al., 2006; Steger & Frazier, 2005).

### **Anxiety in university students**

At the same time students are a particularly vulnerable group to experience anxiety. The APA (2022) suggests the following definition for anxiety: “[anxiety is an] emotion characterized by apprehension and somatic symptoms of tension in which an individual anticipates impending danger, catastrophe, or misfortune [...]” Anxiety is probably an innate emotion and can therefore be found in every culture (Ekman, 1988). Anxiety is likely as old as humankind (Levitt, 1987) and in general one of the most studied emotions due to its great importance for humans (Ciompi, 2016). Unlike fear, anxiety does not require a cause and can be a long-lasting state (Krohne, 2010).

Previous studies have shown high rates of anxiety among students all over the world (Bayram & Bilgel, 2008; Rawson et al., 1994; Stewart-Brown et al., 2000; Wong, J. G. W. S. et al., 2006). This could be caused by academic and social demands (Bayram & Bilgel, 2008), but also because they face a double transition: a developmental transition from adolescence to adulthood, and a life transition from one institution (such as high school, or community college) to another, university (Bruffaerts et al., 2018). This means first-year students often report more anxiety and at the same time might experience less MIL, based on the research presented earlier.

While anxiety rates are high among students, anxiety disorders, e.g. generalised anxiety disorder, have one of the highest prevalence rates of all psychological disorders in the total population (Jacobi et al., 2016). It is believed that in very many cases, anxiety in adolescence leads to anxiety and other disorders that persist into adulthood (Cartwright-Hatton et al., 2006). Therefore, it is important to find widely accessible ways to reduce anxiety, especially at a young age,



**MIL and anxiety**

MIL could play an important role in reducing anxiety in university students. In a sample of Dutch university students MIL was considered to be a protective factor against anxiety (Ostafin & Proulx, 2020). Assessing subcomponents of MIL in university students George and Park (2017) found negative relationships between these subcomponents and anxiety, which means that students who experiences more MIL were less anxious. This is consistent with previous findings where anxiety and the presence of meaning showed a negative relationship adult participants of all ages (George & Park, 2016; Yek et al., 2017). In line with this, among smoking cessation patients the experience of MIL demonstrated a moderate (Cohen, 2013) inverse correlation with anxiety (Steger, Mann, et al., 2009). Systematically reviewing 12 articles on MIL interventions Guerrero-Torrelles et al. (2017) found anxiety reducing effects of different MIL interventions in terminally ill patients. Higher purpose has been shown to help patients in hospitals overcoming psychological problems such as anxiety (Kim et al., 2014). Anxiety can be increased through experiential avoidance, which is the unwillingness to remain in contact with aversive thoughts, feelings, and sensations. In a longitudinal study high levels of MIL could prevent experiential avoidance from increasing anxiety over the course of 3-4 months in US citizens (Kelso et al., 2020). Only one pervious study investigated the subcomponents of MIL with regard to anxiety and found equally sized negative correlations between comprehension/purpose and anxiety in university students (George & Park, 2017). It is therefore assumed that both interventions are equally effective in reducing anxiety.

**The present study**

While the experience of MIL is pretty common (Heintzelman & King, 2014b), the research presented suggests that university students might experience below average levels of MIL compared to the general population of adults. Additionally, high rates of anxiety are

common among students and MIL interventions showed the potential to reduce anxiety. Therefore, the aim of the current study is to design effective purpose and comprehension interventions and assess their effect on anxiety in university students. The goal is to investigate not only a correlational but a possible causal relationship. This should be achieved by applying purpose/comprehension enhancing interventions to the test takers and measuring MIL and its subcomponents as well as anxiety at multiple test times. Focusing on comprehension and purpose provides some unique advantages. On the one hand George and Park (2017) pointed out that comparing the subcomponents of MIL to each other and identifying relationships with other psychological variables such as anxiety will help to get a better understanding of the MIL construct and its subcomponents in general. Additionally, Martela and Steger (2016) suggested putting the emphasis on the subcomponents of MIL to better understand how MIL influences psychological health. On the other hand, it also allows a comparison between the effect of comprehension and purpose on anxiety.

### **Research questions and hypotheses**

These considerations lead to the following research questions:

Does the comprehension or the purpose intervention reduce anxiety in first-year students?

Is either of the meaning components more influential on levels of anxiety than the other?

To answer these research questions, two separate MIL interventions were developed, one specifically targeting purpose and the other targeting comprehension.

The study investigates the following predictions:

*Hypothesis 1:* Both the purpose and the comprehension intervention can significantly reduce anxiety in first-year university students compared to the control group.

*Hypothesis 2:* Both interventions are equally effective in reducing anxiety.

*Hypothesis 3:* First-year university students report significantly higher levels of purpose than comprehension at the first assessment.

## Method

### Participants

A total of 164 participants completed the full study. 15 participants who indicated that they were only "somewhat fluent" or "not fluent at all" in English were excluded from the statistical analysis because of doubts about whether they would fully understand the questionnaires and interventions, resulting in total sample of 149 participants. All were first-year psychology students. Most participants were female (69.1%), two (1.3%) reported to be non-binary. The median age was 19 (32.2%), 96% were between 17 and 23 years old. Most participants (60.4%) were from the Netherlands, 25.5% from Germany and 14.1% were from other countries.

### Measures

#### *Meaning in Life*

The Multidimensional Existential Meaning Scale (MEMS; George & Park, 2017) assesses general meaning as well as all three subcomponents of MIL separately. It consists of 15 items, with 5 items each measuring comprehension, purpose and mattering. The purpose subscale consists of items such as "I have aims in my life that are worth striving for" or "I have certain life goals that compel me to keep going". The comprehension subscale includes items such as "My life makes sense" or "Looking at my life as a whole, things seem clear to me". Responses are rated on a 7-point scale reaching from 1 (very strongly disagree) to 7 (very strongly agree). The authors did not make a recommendation for the calculation of the total scores, however other studies using the MEMS usually calculated sum scores (Gerymski & Krok, 2020; Marco et al., 2022), which is why sum scores are also used in the current study. Both comprehension and purpose subscales have demonstrated good internal consistency (both subscales demonstrated  $\alpha = .88$  in current sample;  $\alpha$ 's between .88 and .90;

George & Park, 2017) and test–retest reliability over a two week period (George & Park, 2017) in three samples of US.-university students, all with a median age of 19.

The Meaning in Life Questionnaire (MLQ; Steger et al., 2006) assesses presence of meaning in life and search for meaning in life. Both subscales consist of 5 items, resulting in a total of 10 items for the entire questionnaire. Only the MLQ-presence subscale was used. Example items of the MLQ-presence subscale are “I understand my life’s meaning” and “I have a good sense of what makes my life meaningful”. Each item is rated on a 7-point scale reaching from 1 (absolutely untrue) to 7 (absolutely true). The total scores are calculated as the sum of all item scores. The MLQ-presence subscale has demonstrated good internal consistency ( $\alpha = .89$  in current sample;  $\alpha$ 's between .82 and .88; Steger et al., 2006) and adequate test–retest reliability over periods from a month to a year (Steger et al., 2006; Steger & Kashdan, 2007) in a sample of US.-university psychology students with a mean age of 19.8.

### *Anxiety*

Anxiety was measured with the Generalized Anxiety Disorder 7 (GAD-7; Spitzer et al., 2006), which is a 7-item scale to assess general anxiety disorder as well as the severity of anxiety. Example items are “Feeling nervous, anxious or on edge” or “Becoming easily annoyed or irritable”. Items are ranked on a 4-point scale reaching from 0 (not at all) to 3 (nearly every day). The total score is calculated by adding up all ratings. Cut off points of 5, 10, and 15 might be interpreted as representing mild, moderate, and severe levels of anxiety (Spitzer et al., 2006). The GAD-7 demonstrated excellent internal consistency ( $\alpha = .87$  in current sample;  $\alpha = .92$ ; Spitzer et al., 2006) and good test-retest reliability (intraclass correlation = 0.83; Spitzer et al., 2006) in a sample of anxiety patients treated in primary care in the US.

## **Procedure**

Convenience sampling was used to obtain the sample as only students from the RUG could take part. All data was collected via the online survey platform Qualtrics (<https://www.qualtrics.com>) between May and June 2021. Participants were informed the study's aim is to observe changes in mental well-being over a week's period. The overall study consisted out of two points of measurement, an initial assessment, and a follow-up assessment one week after the initial assessment. Right after the initial assessment also the interventions as well as the immediate post intervention assessment took place. Participants were free to choose when and where they wanted to participate, the study did not take place in a laboratory. As a compensation participants received study credit for completing the initial assessment as well as the follow-up.

In the beginning of the initial assessment participants gave their consent to take part in the study, were debriefed about content and length of the survey, and informed about where they could reach out for help in case of feeling distressed, as well as about the possibility to terminate participation at any time. After that, participants were randomly allocated to three different groups, a purpose intervention group, a comprehension intervention group, or the control group. First, all groups were surveyed on initial MIL (MEMS & MLQ), and different psychological variables, including anxiety (GAD-7). The intervention groups were then subjected to different interventions. Both interventions were designed to take around 30 minutes. The average participation time for the intervention groups was  $M = 43.3$  minutes, and  $M = 22.1$  minutes for the control group.

## ***Designing the interventions***

Previous research has shown that MIL is something many people experience (Heintzelman & King, 2014b) and that there are many techniques and behaviours that create meaning (King & Hicks, 2021), which can be used to design a MIL intervention.

**Goals.** Goals are often seen as something meaningful per se (Emmons, 2007), however there are a few restrictions to this assumption that must be considered. Goals are only experienced as meaningful if they reflect the values and convictions of a person (Schnell, 2020), and if they are intrinsic goals (Sheldon et al., 2004). Such goals should be realistic long-term goals and mainly enhance the purpose component of MIL (Shin & Steger, 2014).

**Values.** Listing values that oneself holds deeply has been shown to increase the experience of purpose in university students (Ostafin & Feyel, 2019). This effect can be explained by the fact that values provide a certain direction and serve as a maxim for action. It is also important however to not only hold those values but also live by them. The realisation of one's own values in action and experience serves as a source of meaning (Schnell, 2004).

**Passion.** When speaking of values, passion must also be mentioned. Passion refers to what a person likes, and if this is in line with their values it is also important to the person. Schippers and Ziegler (2019) concluded that writing about one's passion is a way to find purpose.

**Life narrative.** Every individual has a unique story and experiences that shaped the person they are today. Cultivating those life narratives could lead to the formation of meaning (McAdams, 1995). Life narratives integrate past experiences into the current life and provide a sense of understanding (Shin & Steger, 2014). Therefore, writing about one's life narrative could increase one's comprehension.

**Self-Knowledge.** Understanding oneself is an important part of comprehension. This can be for example knowing about one's abilities, strengths, weaknesses, or character (Shin & Steger, 2014). Exploring one's identity could make this information more salient and accessible and thereby enhance the comprehension component of MIL.

***Purpose intervention***

The participants should answer several different questions in writing about:

1. How or who they would like to be if they could be anything or anyone.
2. What they would do with their lives if they were completely free, and money was not an issue.
3. What their ideal version of themselves is and how they would get closer to that.
4. Three core values they hold.
5. Their life goals/missions in life and writing three of them down.
6. One related long-term goal and secondly one related short-term goal for each mission.
7. Writing down these aforementioned goals for themselves on paper.
8. A behaviour, time, and place when they would pursue these short-term goals.
9. Finally, participants were asked to keep the paper with their goals and add every evening for the following week, so seven times in total, one activity for the next day that brings them closer to these goals.

***Comprehension intervention***

The comprehension intervention consisted out of several questions and tasks:

1. Taking a few moments to think about their life and who they are today.
2. Writing down their life story in three chapters. Each chapter should have a title and content that describes it. The chapters could be ordered without restrictions, e.g., around important people/experiences or chronologically.
3. Writing down the names and main components of the chapters on a piece of paper.
4. Providing four answers to the question: “Who am I?”, e.g., “I am someone who...” or “I am a...”.

5. Finding connections between the current self and the life lived to far. Participants were asked to provide at least three connections between the live they have lived and the person they are today.
6. Finally, they should add every evening for the following week, so seven times in total, one such a connection on their piece of paper.

### ***Control group***

The control group did not undergo an intervention and went directly to the post intervention step.

### ***Post intervention***

After the interventions, demographic data (age, gender, nationality) and the participants' English language skills were collected from the entire sample. Afterwards, MIL (MEMS, MLQ) was assessed once more, but with the emphasis on the current moment, i.e., “right now” was added in front of every item, resulting in items such as “Right now, my life makes sense”. Finally, participants could indicate how anxious they expect to feel over the next week on a 5-point scale reaching from 1 (not at all) to 5 (a lot).

### ***Follow-up***

Participants were invited to take part in the follow-up assessment via e-mail one week after the initial assessment. First participants had to give their consent to take part in the follow-up study. Afterwards MIL (MLQ, MEMS) was assessed. The main focus laid hereby on the experience of MIL during the last week, which is why “Over the last week...” was added in front of every item, resulting in items such as “Over the last week, my life made sense”. Subsequently anxiety (GAD-7) and the other psychological variables were assessed, with the emphasis on the experience of those variable during the last week, items were adjusted accordingly. Then participants were asked how many days they engaged in their



homework task in case they were part of an intervention group. Finally, participants were asked whether they received any psychological treatment during the last week, and if yes, whether the treatment already started prior to the study.

## Results

### Attrition

The first assessment was completed by 212 participants, the follow up by 164 participants, resulting in an attrition rate of 22%. Differences in completers and non-completers were investigated, because participants who stay in a study might differ from those who drop out and therefore attrition can deteriorate generalizability of findings (Gustavson et al., 2012). No significant differences ( $t(210) = -0.42, p = .676$ ) were found for MIL between completers and non-completers. However, non-completers were significantly ( $t(210) = 2.74, p = .007, d = .46$ ) more anxious than completers at the initial assessment.

### Descriptive Analysis

Table 1 contains the mean values and standard deviations for the relevant variables, split by groups and test times. The percentage of male participants was lower across all groups (range = 21.7% to 31.6%). In each of the intervention groups there was one non-binary person (2.2%). The median age in all groups was 19.

Table 2 contains the correlations between the assessed variables at T1 and Table 3 at T3. The meaning variables all showed strong correlations with each other at both time points, purpose and comprehension showed a moderate negative relationship with anxiety (Cohen, 2013).

At T1 average anxiety in the whole sample was  $M = 6.66 (SD = 4.59)$ , with a minimum of 0 and a maximum of 21. Following the suggestion of Spitzer et al. (2006), 53 (35.6%) participants were experiencing no anxiety, 59 (39.6%) mild, 25 (16.8%) moderate,

and 12 (8.1%) severe levels of anxiety prior to the interventions. At T3 average anxiety was  $M = 5.90$  ( $SD = 5.17$ ) with a minimum of 0 and a maximum of 21. 73 (49.0%) participants were experiencing no anxiety, 45 (30.2%) mild, 17 (11.4%) moderate, and 10 (6.7%) severe levels of anxiety.

### **Manipulation check**

To check whether the interventions indeed increased comprehension/purpose t-tests were conducted for time points T1, T2 and T3, so pre intervention, post intervention as well as at the follow up.

### ***Comprehension***

At T1 there was no significant difference ( $t(101) = 0.12$ ,  $p = .907$ ) between reported comprehension in the control group and in the comprehension intervention group (Table 1). At T3 the t-test also did not show a significant difference ( $t(101) = 0.51$ ,  $p = .611$ ) between the control group and the comprehension intervention group (Table 1), which means that comprehension did not significantly increase in the comprehension intervention group, compared to the control group. Mean differences in in comprehension at T2 were not explored as the mean values (Table 1) do not indicate differences.

### ***Purpose***

At T1 there was no significant difference ( $t(101) = -0.53$ ,  $p = .582$ ) between reported purpose in the control group and in the purpose intervention group (Table 1), neither at T3 ( $t(101) = -0.30$ ,  $p = .763$ ). Mean scores (Table 1) indicate that there might was a significant difference at T2, directly after the main intervention. A t-test comparing purpose in the control- and the purpose intervention group at T2 did not find significant differences ( $t(101) = -0.26$ ,  $p = .201$ ).

The intervention groups did not significantly differ from the control group in terms of comprehension or purpose at any point in the study, which means that the interventions did not significantly enhance purpose or comprehension.

### **Analysis of hypotheses**

The first hypothesis was that both the comprehension - as well as the purpose intervention can significantly reduce anxiety in first-year students. Even though the interventions did not significantly raise comprehension or purpose over the course of one week, Figure 1 suggests a decrease in anxiety means in the intervention groups, but not in the control group, over the course of one week.

A two-way repeated measures ANOVA was conducted to explore these mean differences. Sphericity was checked with Mauchly's test of sphericity. It did not show a result because there were only two levels of repeated measures, therefore, as recommended for unknown sphericity, the Greenhouse–Geisser adjustment was used to correct for possible violations of sphericity (Girden, 2003). The standard Levene's tests were significant for T3 but not for T1, suggesting inhomogeneity of variance at T3. However, multivariate tests tend to be fairly robust against inhomogeneity of variance when they have equal or fairly equal sample sizes. (Pituch & Stevens, 2015) suggested a ratio largest  $n$  / smallest  $n < 1.5$  as still acceptable. The largest  $n$  to smallest  $n$  ratio in the present groups is  $57/46 = 1.24 < 1.5$  and thus lies within this ratio.

There was no significant interaction effect between group and time,  $F(2, 146) = 2.850, p = .061, \eta^2 = .038$ . However, the main effect of time on anxiety was significant  $F(1, 146) = 6.555, p = .011, \eta^2 = .043$ . The other main effect of intervention group on anxiety was not statistically significant,  $F(2, 146) = 1.364, p = .259, \eta^2 = .018$ . To check whether the interaction effect was non-significant due to a too small sample size, a post-hoc power analysis as well as an analysis of the required sample size were carried out with G\*Power

(Faul et al., 2009). The reached test power was  $\beta = 0.992$ . Therefore, a sample size of  $n = 147$  would have been needed to reach a significant effect. Since the actual total sample size was  $n = 149$ , this result suggests that the statistical analysis should have found a significant difference in anxiety as a function of group and time if there was indeed an effect.

To further explore in which groups anxiety decreased between T1 and T3 paired t-tests were conducted. There was a significant reduction ( $t(45) = 3.62, p < .001, d = .53$ ) in anxiety in the purpose intervention group. The mean anxiety differences in the comprehension intervention group were non-significant ( $t(45) = 1.58, p < .122, d = .23$ ).

The third hypothesis claimed that first-year students would report significantly higher purpose than comprehension at T1. To explore those possible mean differences at T1 a t-test was conducted. The result showed that T1 purpose was significantly higher ( $t(148) = 6.32, p < .001, d = 0.52$ ) in the total sample than T1 comprehension.

### **Follow-up subgroup analysis**

As the interventions could not significantly increase purpose or comprehension for the entire intervention groups over the course of one week between T1 and T3, adjustments need to be done to further test the hypotheses. It could be that the anxiety-reducing effect of the interventions was higher among participants whose purpose/comprehension increased after the interventions. Only participants for whom the interventions have worked are included in the secondary analysis. The interventions are regarded as successful if the following formula applies:  $T3 \text{ comprehension/purpose} - T1 \text{ comprehension/purpose} > 0$ , i.e., if the relevant MIL subconstruct did indeed increase. Table 4 provides the descriptive statistics of the variables of interest for this subgroup. Figure 2 shows the development of anxiety between T1 and T3 for this subgroup.

Standard Levene's tests of homogeneity of variance were significant for anxiety both at T1 and T3, suggesting a violation of the homogeneity assumption. The n ratio for this group is  $57/13 = 4,38 > 1,5$ . Following Pituch and Stevens (2015) interpreting the results of a two-way repeated measures ANOVA can lead to wrong conclusions with such a n-ratio and inhomogeneity of variance. Therefore, a non-parametric test was chosen to test whether anxiety levels differ significantly between groups, as non-parametric tests do not rely on these restrictive assumptions. A Kruskal-Wallis H-test found no significant differences ( $\chi^2(2) = 3.53, p = .171, df = 2$ ) for mean total anxiety over both test dates between the groups. The test revealed no significant effect for anxiety at T3 ( $\chi^2(2) = 4.84, p = .089, df = 2$ ), which does not allow for a post-hoc comparison of the groups. These results show that no group is significantly different from another group in terms of their anxiety at any time point.

Even though the subgroups did not differ in anxiety, anxiety might still have decreased in the sub intervention groups. In both sub intervention groups there were no outliers and the differences between the T1 and T3 anxiety scores were normally distributed, as assessed by the Shapiro-Wilk test ( $p$  range = .223 to .304). A paired t-test found a significant decrease ( $t(12) = 3.23, p = .007, d = .90$ ) in anxiety in the sub purpose intervention group between T1 and T3, as well as in the sub comprehension intervention group ( $t(18) = 2.41, p = .027, d = .55$ ).

## Discussion

Previous studies showed that MIL can be a protective factor against anxiety (Ostafin & Proulx, 2020) and MIL interventions have shown to lower anxiety in patients with advanced diseases (Guerrero-Torrelles et al., 2017). Therefore, the goal of the current research was to investigate if MIL interventions can effectively reduce anxiety in first-year students, a particularly vulnerable group to experience anxiety (Bayram & Bilgel, 2008; Rawson et al., 1994; Stewart-Brown et al., 2000; Wong, J. G. W. S. et al., 2006).

**Did the interventions reduce anxiety?**

First, in accordance to previous results (George & Park, 2017), MIL as well as its subcomponents comprehension and purpose showed moderate to strong (Cohen, 2013) negative relationships with anxiety. This means people who experience more MIL are less anxious. Hypothesis 1 (H1) claimed that both the comprehension - and the purpose intervention can significantly reduce anxiety in first-year students, compared to the control group. The results of the statistical analysis do not support this hypothesis, because the intervention groups did not differ significantly in anxiety from the control group over the course of one week. Therefore, H1 must be rejected based on the statistical analysis.

However, this described effect between time and group did only slightly not reach the pre-set level of significance. This implies that there might be an effect which was too small to reach significance. The effect size indicates a small effect (Cohen, 2013), which supports this claim. Figure 1 shows this non-significant effect. While it cannot be claimed that the intervention groups differed significantly from the control group in anxiety over the course of one week, there was a significant reduction in anxiety between T1 and T3 in the total sample. This means that participants were generally less anxious after taking part in the study than before. This reduction in anxiety was likely caused by the interventions, as Figure 1 indicates that anxiety means stayed the same in the control group, while they decreased in the intervention groups between T1 and T3. Even though the effect between time and group was too small to reach significance it could still be relevant given the reduction of anxiety in the total sample and the short duration and convenience of the interventions, compared to previous studies investigating the effect of MIL on anxiety (Breitbart et al., 2010; Breitbart et al., 2018).

Results of previous research are mixed. While MIL interventions could not decrease anxiety in late-stage cancer patients over the course of two months in a group setting

(Breitbart et al., 2010), they could decrease anxiety in the same period in an individual setting with a medium effect size (Breitbart et al., 2018). A major difference of the present study to the studies of (Breitbart et al., 2018) was that the present study only used brief MIL interventions unlike months of meaning-centred psychotherapy, which might account for the smaller effect size in the present study. Given the high prevalence rates of anxiety among university students (Bayram & Bilgel, 2008; Stewart-Brown et al., 2000) such brief and available MIL interventions might still have their use.

In the current study the MIL interventions did not increase MIL or its subcomponents. Instead, anxiety decreased in the total sample, even though the interventions could not substantially increase comprehension/purpose. It therefore seems as if MIL interventions can still have a positive effect on psychological variables such as anxiety, even if they do not increase MIL. Studies that did find benefits of MIL interventions in end stage cancer patients on several outcome variables such as anxiety did not measure MIL (Breitbart et al., 2018; V. Lee et al., 2006), therefore it is unclear whether those interventions actually increased MIL. Guerrero-Torrelles et al. (2017) found that out of 12 studies, using 9 different MIL interventions, only one study treated MIL as an outcome variable. In said research, MIL, measured through the Purpose in Life Test (Crumbaugh & Maholick, 1964), increased significantly in 12 terminally ill patients after receiving 6 sessions of logotherapy (Zuehlke & Watkins, 1975). It is therefore well documented that MIL interventions can be beneficial to patients in lowering distress, but not that they can actually increase MIL.

However, the question remains why the interventions seem to have had an anxiety-reducing effect without increasing the subcomponents of MIL. In the purpose intervention participants focused on meaningful goals. Focusing on especially meaningful goals, may lead to a perception that these goals can be accomplished and that a meaningful life can actually be constructed (Feldman & Snyder, 2005), without necessarily enhancing MIL. The authors

accounted this perception for the effect of MIL on anxiety (Feldman & Snyder, 2005). In the same manner thinking about valued life goals or about former life experiences might make this information more salient without directly increasing MIL. This might have helped the participants realising which goals they have already achieved and what challenges they have already overcome, and thereby influenced their levels of anxiety.

To address the issue of not treating MIL as an outcome and to check whether in the current study an increase in the subcomponents of MIL decreased anxiety, a post-hoc subgroup analysis was conducted. In the subgroup analysis, only participants from the intervention groups were included who reported an increase of purpose/comprehension over the course of one week. Although only these subgroups were investigated, there was no difference in anxiety between the groups at follow-up. Looking at the mean scores at T3 (Table 3), anxiety scores decreased in the sub intervention groups compared to T1, yet stayed the same in the control group, just as for the total sample, however this difference was non-significant, likely due to the small sample size in the sub intervention groups. T-tests showed that participants in the sub intervention groups were significantly less anxious at follow-up than at the initial assessment, while the anxiety scores for the control group did not differ significantly.

In summary, in the present study, it made no discernible difference to the reduction in anxiety whether the interventions actually increased the subcomponents of MIL or not. It remains unclear whether this is a shared feature with other MIL interventions or not.

### **Effectiveness of the interventions**

The second hypothesis (H2) was that the comprehension and the purpose intervention reduce anxiety equally effective. Since the statistical analysis did not find significant anxiety differences between the groups over the course of a week, there is statistical support for this hypothesis. However, further analysis showed that mean differences in anxiety between T1



and T3 were only significant for the purpose-, but not the comprehension intervention. Therefore, it cannot be claimed that the comprehension intervention actually reduced anxiety and H2 has to be rejected.

Previous studies on MIL were not differentiating between subcomponents of MIL but could also find anxiety reducing effects of general MIL interventions (Guerrero-Torrelles et al., 2017). In the current sample, comprehension showed a stronger negative correlation with anxiety than purpose (Table 3). This is consistent with previous findings (George & Park, 2017) and could be a hint, that an increase in comprehension might potentially lower anxiety more effectively than an increase in purpose. Also, as hypothesised (H3), T1 comprehension means were significantly lower in the total sample than T1 purpose means (Table 1). This is partly consistent with previous findings (Besika et al., 2022), in other studies purpose and comprehension were equally distributed (Costin & Vignoles, 2020). A possible explanation for this result might be that the participants just started studying and therefore might have clear short and long-term goals related to their studies, which is an important part of purpose (King & Hicks, 2021), and therefore might experience higher levels of purpose. Additionally, first-year students comprehension might be lower, as they probably have to get used to a new environment (like university instead of school, or a new city) and have to learn many new things in their studies which's meaning and purpose only become clear to them as they gain an overview of the subject (Schnell, 2020).

### **Anxiety in current sample**

About two-thirds of all the participants reported at least mild levels of anxiety prior to the interventions, based on the cut-off values suggested by (Spitzer et al., 2006). Almost one third suffered from moderate or severe anxiety. Such high levels of anxiety are clinically relevant and treatment should be considered (Spitzer et al., 2006). This is not the first study finding such concerning results. Using the GAD-7, high levels of anxiety in first-year students

have also been found in China (Lu et al., 2015), Korea (B. Lee & Kim, 2019) and the US (Noel et al., 2021). According to the latest survey from the Association for University and College Counselling Centre, anxiety is the top presenting concern among American college students (LeViness et al., 2019). This shows again the relevance of widely available anxiety-reducing interventions for university students.

### **Strength and limitations**

A strength of the current study was the separate assessment of the subcomponents of MIL. This allows for a better understanding how MIL influences health variables like anxiety (Martela & Steger, 2016), and thereby develops the understanding of the construct MIL further.

Another strength was with the MLQ and the MEMS the use of two independent instruments, both of which have been shown to measure MIL (George & Park, 2017; Steger et al., 2006). Previous MIL intervention studies often suffered from unclear definitions for MIL and use instruments that do not only measure MIL, but also well-being variables or spirituality (Park et al., 2019).

The study has several limitations that need to be taken into account. Two of the participants reported to be non-binary. While there was no sound reason to exclude them from the analysis it must be considered that the questionnaires for anxiety and MIL are only validated for men and women. However, this probably did not have a major impact on the results, as this concerned only two out of 149 participants.

A major limitation was the attrition between the initial assessment and the follow up. Participants who quit after the first assessment were significantly more anxious than those who continued. This might lead to an underestimation of the anxiety rates at the follow-up.

Additionally, the attrition reduces the generalisability of the results, as some particularly anxious participants dropped out and were not part of the analysis (Gustavson et al., 2012).

Another limitation was that anxiety was not assessed right after the interventions but only prior to the interventions and at the follow up. This did not allow for an investigation of a possible short-term effect of the interventions on anxiety.

A general limitation was also the online setting of the survey. It cannot be checked whether the participants are not being distracted and put their full attention on the survey (Nayak & Narayan, 2019). Additionally, the conditions for the test-takers are not standardised. Participants can take part in the study at any time of the day and can take quite different lengths of time for the completion of the survey. On the other hand, participants might feel more comfortable participating in a time and place of their choice rather than in a laboratory which could also be considered a strength.

Lastly the surveys language was a limitation. The vast majority of the participants were not native English speakers. While individuals without sufficient English skills were excluded from the analysis, it can still not be guaranteed that the content and meaning of the questions were fully understood by all participants, which might lead in some cases to misunderstandings or wrong interpretations and therefore different answers.

### **Practical implications and future research**

The current study has several implications from which students and universities could profit. Firstly, it has been shown that the prevalence of anxiety is concerningly high among first-year students. A simple MIL intervention that did not take longer than 30 minutes and could be done from home could significantly reduce this anxiety over the course of one week. Since anxiety is a common problem among university students, universities could therefore consider offering such MIL interventions to their students, as they do not consume many

resources and can still be an effective tool. Future research on the other hand should explore how long those positive effects last, investigate the effect of MIL interventions on other common variables among students, such as depression or stress (Bayram & Bilgel, 2008), and investigate the relationship between effort and benefit of MIL interventions, i.e., how long do interventions need to be in order to be optimally effective.

It remains unclear through which mechanism the MIL interventions reduced anxiety in the participants, as they could not increase either of the subcomponents of MIL. This is not only a problem of the current study but of the majority of studies investigating MIL interventions, which do not treat MIL as an outcome variable. In previous research it has therefore been shown that MIL interventions can be effective, especially in reducing suffering in terminally ill patients, but not that they can increase MIL. Future research should therefore focus on treating MIL as an outcome variable and investigate the reasons why MIL interventions can be effective.

## **Conclusion**

The study has shown that also in the Netherlands anxiety is a common experience among university students. Participating in a study using brief MIL interventions could significantly reduce anxiety scores over the course of one week. This suggests that MIL interventions can be a simple, widely accessible and resource-efficient tool to help university students feel less anxious. This study adds to the growing body of literature that points to the importance of MIL as a well-being factor.

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Table 1. Means and Standard Deviation of Variables

Time point	Control (N=57)			CI (N=46)			PI (N=46)		
	T1	T2	T3	T1	T2	T3	T1	T2	T3
Presence of meaning	24.68 (6.17)	24.51 (6.16)	23.88 (6.31)	23.35 (6.28)	23.57 (5.82)	22.78 (6.74)	24.15 (5.85)	24.72 (6.09)	24.22 (5.53)
MIL	67.51 (14.56)	67.23 (14.85)	68.75 (12.82)	65.87 (11.56)	66.07 (13.89)	65.96 (15.94)	67.07 (13.94)	69.65 (15.84)	66.87 (12.98)
Comprehension	23.35 (5.54)	22.89 (6.00)	23.44 (4.91)	23.13 (4.25)	22.78 (5.61)	22.89 (5.98)	22.83 (5.69)	23.89 (6.21)	22.41 (5.18)
Purpose	25.68 (5.53)	25.88 (5.54)	25.46 (4.48)	24.78 (4.55)	24.80 (5.21)	23.78 (6.35)	26.20 (3.84)	27.17 (4.45)	25.72 (3.91)
Anxiety	6.79 (5.18)	-	6.95 (5.94)	6.89 (4.83)	-	5.91 (5.64)	6.26 (3.53)	-	4.59 (3.00)

*Note.* Numbers presented: Mean (SD). CI = Comprehension intervention. PI = Purpose intervention. T1: pre intervention. T2: post intervention. T3: follow up one week after T1/T2. MIL = Meaning in life (MEMS)

Table 2. Means (M), Standard Deviation (SD) and Pearson Correlations of Variables at T1

Variable	M	SD	1	2	3	4	5
1. Presence of meaning	24.11	6.09	-				
2. MIL	66.87	13.44	.88*	-			
3. Comprehension	23.08	5.16	.86*	.88*	-		
4. Purpose	25.56	4.76	.83*	.86*	.76*	-	
5. Anxiety	6.66	4.59	-.38*	-.39*	-.46*	-.36*	-

Note. N=149. \* Correlation is significant at the 0.01 level (2-tailed). T1: pre intervention. MIL = Meaning in life (MEMS)



Table 3. Means (M), Standard Deviation (SD) and Pearson Correlations of Variables at T3

Variable	M	SD	1	2	3	4	5
1. Presence of meaning	23.64	6.20	-				
2. MIL	67.31	13.86	.83*	-			
3. Comprehension	22.95	5.32	.83*	.86*	-		
4. Purpose	25.02	5.14	.74*	.85*	.71*	-	
5. Anxiety	5.90	5.17	-.39*	-.35*	-.45*	-.33*	-

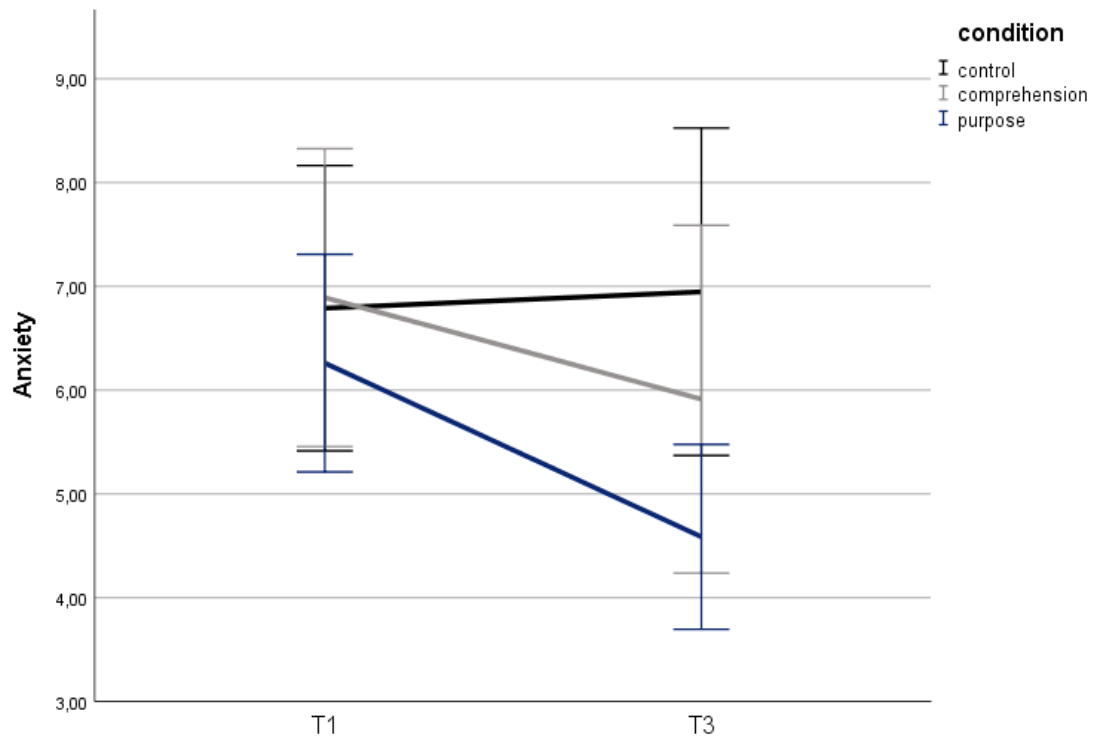
Note. N=149. \* Correlation is significant at the 0.01 level (2-tailed). T3: follow up. MIL = Meaning in life (MEMS)

Table 4. *Subgroup Means and Standard Deviation of Variables*

Time point	Control (N=57)			SCI (N=19)			SPI (N=13)		
	T1	T2	T3	T1	T2	T3	T1	T2	T3
Presence of meaning	24.68 (6.17)	24.51 (6.16)	23.88 (6.31)	24.47 (5.12)	24.32 (5.00)	27.21 (3.84)	21.77 (5.23)	22.69 (5.59)	25.23 (3.63)
MIL	67.51 (14.56)	67.23 (14.85)	68.75 (12.82)	66.95 (9.13)	68.37 (11.75)	75.79 (8.49)	62.46 (13.40)	65.38 (14.49)	69.15 (13.16)
Comprehension	23.35 (5.54)	22.89 (6.00)	23.44 (4.91)	22.58 (2.65)	23.21 (4.63)	25.58 (3.13)	21.08 (4.96)	22.08 (5.69)	23.46 (5.41)
Purpose	25.68 (5.53)	25.88 (5.54)	25.46 (4.48)	26.47 (3.85)	26.21 (4.70)	27.79 (3.81)	23.77 (3.88)	25.62 (4.43)	27.00 (3.61)
Anxiety	6.79 (5.18)	-	6.95 (5.94)	5.11 (3.81)	-	3.16 (1.86)	6.62 (2.66)	-	4.92 (2.87)

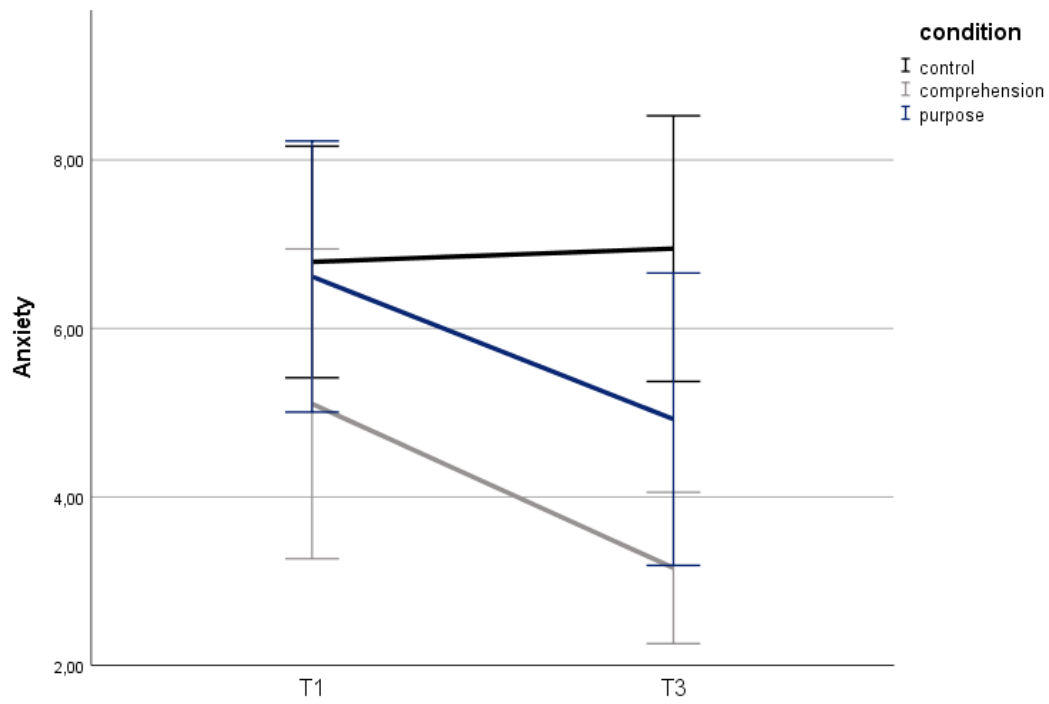
*Note.* Mean (SD). SCI = Successful comprehension intervention. SPI = Successful purpose intervention. T1: pre intervention. T2: post intervention. T3: follow up one week after T1/T3. MIL = Meaning in life (MEMS)

Figure 1. Development of anxiety means by group between T1 and T3



Note. T1: pre intervention. T3: follow up one week after T1. Error bars are 95% CI.

Figure 2. Development of anxiety means by subgroup between T1 and T3



Note. T1: pre intervention. T3: follow up one week after T1. Error bars are 95% CI.

## Appendix

**The Multidimensional Existential Meaning Scale (MEMS)**

Please read the following items carefully. Using the response scale listed next to each item indicate the extent to which you agree or disagree with that statement.

1. My life makes sense
2. There is nothing special about my existence
3. I have aims in my life that are worth striving for
4. Even a thousand years from now, it would still matter whether I existed or not
5. I have certain life goals that compel me to keep going
6. I have overarching goals that guide me in my life
7. I know what my life is about
8. I can make sense of the things that happen in my life
9. I have goals in life that are very important to me
10. I understand my life
11. Whether my life ever existed matters even in the grand scheme of the universe
12. My direction in life is motivating to me
13. I am certain that my life is of importance
14. Looking at my life as a whole, things seem clear to me
15. Even considering how big the universe is, I can say that my life matters

Item 2 is reverse-coded

Responses are rated on a 7-point scale (very strongly disagree, strongly disagree, disagree, neither disagree nor agree, agree, strongly agree, very strongly agree)

Comprehension = 1, 7, 8, 10, 14

Purpose = 3, 5, 6, 9, 12

Mattering = 2, 4, 11, 13, 15

**MLQ-Presence subscale**

Please take a moment to think about what makes your life feel important to you. Please respond to the following statements as truthfully and accurately as you can, and also please remember that these are very subjective questions and that there are no right or wrong answers. Please answer according to the scale below:

1. I understand my life's meaning.
2. My life has a clear sense of purpose.
3. I have a good sense of what makes my life meaningful.
4. I have discovered a satisfying life purpose.
5. My life has no clear purpose.

Item 5 is reverse-coded

Responses are rated on a 7-point scale (absolutely untrue, mostly untrue, somewhat untrue, can't say true or false, somewhat true, mostly true, absolutely true)

**Generalized Anxiety Disorder 7 (Gad-7)**

Over the last two weeks, how often have you been bothered by the following problems?

1. Feeling nervous, anxious or on edge
2. Not being able to stop or control worrying
3. Worrying too much about different things
4. Trouble relaxing
5. Being so restless that it is hard to sit still
6. Becoming easily annoyed or irritable
7. Feeling afraid as something awful might happen

Responses are rated on a 4-point scale (not at all, several days, more than half the days, nearly every day)