

The Effects of Lack of Meaning on Trait and State Loneliness: Correlational and Experience-
sampling Evidence

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Acknowledgement

Katy Tam and Christian Chan, Department of Psychology, The University of Hong Kong. The authors thank Venus Wong, Suki Cheung, and Cyanea Poon for their help in data collection and analysis.

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Abstract

Do we feel particularly lonely when we find what we are doing as pointless? A two-part study was conducted to examine the association between perceived meaning of an activity and loneliness. Part I was a cross-sectional study with 243 participants ($M_{age} = 19.3$, $SD = 1.66$, 70.8% female). The results demonstrate that meaningful life engagement was negatively associated with trait loneliness ($\beta = -.407$, $p < .001$), controlling for age, gender, and personality. In Part II, 148 participants completed an experience-sampling task ($M_{age} = 19.2$, $SD = 1.75$, 73.0% female). Across seven consecutive days, participants were prompted by a smartphone app to fill out a questionnaire at multiple random time points per day. Results from multilevel modeling indicated that situational meaningfulness was a negative predictor of state loneliness ($B = -.057$, $SE = .026$, $p = .027$), above and beyond age, gender, personality, meaningful life engagement, trait loneliness, day of the week, aloneness, and state boredom. Together these findings suggest there is an association between the meaninglessness of an activity and the feeling of loneliness.

Keywords: loneliness, meaning, life engagement, experience sampling

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1. Introduction

Loneliness is a distressing and unpleasant experience; it is not identical to objective aloneness (i.e., being alone) or social isolation, but rather a result of subjective perceived deficiencies in interpersonal relationships (Peplau & Perlman, 1982). Rokach (1989) further showed that one main antecedent of loneliness is the devoid of relationships that fulfill one's needs for support, intimacy, or belonging. Interpersonal relationship constitutes a core component of one's life, and the lack of fulfilling relationships can give rise to a feeling of loneliness (e.g., Peplau & Perlman, 1982; Rokach, 1989). Given that interpersonal relationship serves as a source of meaning (e.g., Debats, 1999; Schnell, 2009), it is conceivable that there is an association between loneliness and lack of meaning. Yet, most existing literature focuses on chronic loneliness and life meaning (e.g., Bondevik & Skogstad, 2000; Stillman et al., 2009), leaving the relation between loneliness and meaningfulness of activities, specifically moment-to-moment loneliness and meaning appraisal, understudied. The current study aimed to examine this relationship using both correlational and experience-sampling methods. In particular, we were interested in the extent to which the situational meaningfulness of activities predicts state loneliness.

1.1. Loneliness

Taking into account that loneliness is not synonymous with aloneness, cognitive discrepancy models suggest the importance of cognitive processes, or subjective perception, on such deficiency for the experience of loneliness (Peplau, Miceli, & Morasch, 1982). Individuals do not necessarily feel lonely despite being objectively socially isolated, while those being with others can suffer from loneliness.

Loneliness is a transient experience, yet prolonged loneliness can bring debilitating effects on one's physical and mental health. Numerous studies have shown that chronic loneliness is associated with depressive symptoms (Cacioppo et al., 2006; Hawkley, Thisted, & Cacioppo, 2009; Schinka, van Dulmen, Mata, Bossarte, & Swahn, 2013), aggression, increased social skill deficits and suicidal ideation (Schinka et al., 2013), decline in cognitive ability (Gow, Pattie, Whiteman, Whalley, & Deary, 2007), as well as physical activity (Hawkley et al., 2009). Understanding the antecedents and correlates of loneliness may inform ways in which people can respond to them more flexibly and thus curtail the more severe effects of loneliness.

1.2. Loneliness and Meaning

Meaning connects a person with the things that lie beyond oneself (Heine, Proulx, & Vohs, 2006). People have a need to make sense of their situations and maintain a coherent worldview. According to Meaning Maintenance Model (MMM; Heine et al., 2006), if one's sense of meaning is disrupted, the person may be driven to compensate for it to regain a sense of meaning. One might do so by re-affirming alternative meaning framework.

Humans are social beings with a fundamental need to belong (Baumeister & Leary, 1995). Heine et al. (2006) suggested that affiliative need is an alternative meaning framework people seek when there is a threat to meaning. There are some empirical findings supporting this notion. For example, mortality salience, an existential threat, leads to greater willingness to initiate social interactions (Taubman-Ben-Ari, Findler, & Mikulincer, 2002); whereas boredom, a meaning threat, promotes ingroup favoritism (Van Tilburg & Igou, 2011). Both forms of social relationship can be viewed as efforts to re-establish meaning.

Social relationship is suggested to be one of the most important sources of life meaning (Debats, 1999; Hicks & King, 2009; O'Connor & Chamberlain, 1996; Schnell, 2009). People have a natural drive to establish and sustain relationships with others

(Baumeister & Leary, 1995), and the discrepancy between one's desired and actual patterns of relations could result in an experience of loneliness (Peplau & Perlman, 1979). Higher social connectedness is associated with lower level of loneliness (Satici, Uysal, & Deniz, 2016).

Extrapolating the MMM (Heine et al., 2006), we argue that when one's sense of meaning is threatened, the person may turn to reaffirm their needs for belongingness, which serves as a readily-available alternative meaning framework, to re-establish a sense of meaning. Yet, this process of compensation may in fact underscore the discrepancy between actual and desired interpersonal relationships. The awareness of such deficiency may give rise to loneliness. In short, as social relationships can provide meaning, people who experience a sense of meaninglessness would have a desire to reconnect with people so as to re-gain meaning. Such desire would highlight the discrepancy between the relationships they desire and the relationships they have, giving rise to a feeling of loneliness.

Past studies that found a negative association between loneliness and purpose in life focused mainly on overarching life meaning instead of meaningfulness of activities (Bondevik & Skogstad, 2000; Du, Li, Chi, Zhao, & Zhao, 2017; Hicks & King, 2009; Stillman et al., 2009). Since life meaning is a broad, overarching construct that contains multiple domains such as life satisfaction, commitment to goal, values ascribed to activities, and engagement in activities (Brandstätter, Baumann, Borasio, & Fegg, 2012), thus far it is unclear what specific component of life meaning is associated with loneliness. In a recent study using the Daily Reconstruction Method (Anusic, Lucas, & Donnellan, 2017), experience of loneliness was observed to be most evident in activities that were also rated with relatively lower levels of meaningfulness, such as relaxing and watching TV. However, the study did not test the association between state loneliness and situational meaningfulness

explicitly; the constructs were extrapolated from the average loneliness and meaning ratings of all activities.

2. Current Study

Although some studies have suggested a relation between life meaning and loneliness, thus far no empirical study has directly examined the association between engagement in meaningful activities and loneliness. We used data from a larger experience-sampling study (Chan et al., 2017) to conduct a 2-part study to test this relationship. Part I use correlational data to examine this association at the trait level. Specifically, we were interested in the relationship between perceived life engagement, a component of meaning in life (Scheier et al., 2006), and trait loneliness. Part II used experience-sampling data to test the relationship between situational meaningfulness and state loneliness at state level in real-life incidences. We also examined whether this relationship exists above and beyond other factors, including age, gender, personality, meaningful life engagement, trait loneliness, day of the week, aloneness, and state boredom. Personality was also included as a controlled variable because previous studies have suggested that some of the Big Five traits are significantly associated with loneliness (e.g., Cacioppo et al., 2006; Teppers et al., 2013). We hypothesized that meaningfulness of activities predicts loneliness, at both trait (Part I) and state (Part II) levels.

3. Part I

3.1. Method

3.1.1. Participants and design

To test our hypothesis, we analyzed correlational data to examine the relationship between loneliness and engagement in meaningful activities at trait level. A total of 243 participants were recruited from [masked for review] through campus-wide email and participant pool system. Over two-third of the participants were female (70.8%). The mean age was 19.3 years ($SD = 1.66$), ranging from 17 to 30 years. Sample size of above 160 was

determined through a prior power analysis using G*Power to achieve 95% power to detect a medium effect of $f^2 = .15$ at $\alpha = .05$.

3.1.2. Procedure and materials

Participants were invited to the laboratory to fill in a set of online questionnaires, reporting demographic information and trait measures.

3.1.2.1. Trait loneliness

Trait loneliness was measured with the 20-item UCLA Loneliness Scale (Version 3) developed by Russell (1996). Items were rated on a 5-point Likert scale, ranging from 1 (*never*) to 5 (*very often*). Sample items include “how often do you feel that there is no one you can turn to?” and “how often do you feel isolated from others?”. Higher total scores indicate higher level of loneliness ($\alpha = .92$).

3.1.2.2. Meaningful life engagement

Meaning was assessed by the Life Engagement Test (LET). The LET is a 6-item self-administered scale developed by Scheier et al. (2006) to assess purpose in life, which was defined as the extent to which people engage in activities that are personally meaningful. We adopted this scale because it specifically measures one’s current state of life, whether one is engaging in activities that are valued. It helps to test our hypothesis pertaining to meaningfulness of activities. The scale adopts a 5-point Likert Scale, ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). Sample items include “to me, the things I do are all worthwhile” and “I value my activities a lot” ($\alpha = .78$).

3.1.2.3. Big five personality

The 10-item Big Five Personality Inventory (BFI-10; Rammstedt & John, 2007) was used to measure participants’ personality. It contains five dimensions of personality constructs with two items each, assessing neuroticism, extraversion, openness to experience, agreeableness, and conscientiousness. Participants rated the items on a 7-point Likert-type

scale (1 = *strongly disagree*, 7 = *strongly agree*). Inter-item correlation coefficients ranged from $r = .12$ to $.43$.

3.1.3. Statistical analysis

All data were analyzed using R 3.5.0 software (R Core Team, 2018). In testing our hypothesis, a multiple regression was carried out to determine whether meaningful life engagement was associated with trait loneliness, controlling for age, gender, and personality. The analysis was performed using the lavaan package (version 0.6-1; Rosseel, 2012). The amount of missing data at item level was 4.4%; we used full information maximum likelihood estimation (FIML).

3.2. Results

Means, standard deviations, and correlations are presented in Table 1. Meaningful life engagement was significantly negatively associated with trait loneliness, $r = -.548$, $p < .001$. In the multiple regression model, trait loneliness was predicted from meaningful life engagement (centered), controlling for age, gender, and personality (centered). Overall, the regression model accounted for 40.1% of the variance in trait loneliness. Meaningful life engagement was negatively associated with trait loneliness, $\beta = -.407$, $p < .001$, 95% CI [-1.579, -.836]. Extraversion ($\beta = -.166$, $p = .004$, 95% CI [-1.838, -.338]) and agreeableness ($\beta = -.179$, $p = .002$, 95% CI [-2.406, -.559]) were negatively, and neuroticism ($\beta = .191$, $p = .001$, 95% CI [.429, 1.787]) positively, associated with trait loneliness.

Table 1

Part I: Means, Standard deviations and Correlations

	<i>M (SD)</i>	1.	2.	3.	4.	5.	6.
1. Meaningful Life							
Engagement	21.4 (3.82)	-					
2. Trait Loneliness	54.7 (11.5)	-.55***	-				
3. Extraversion	5.78 (1.72)	.22**	-.32***	-			
4. Agreeableness	7.21 (1.39)	.27***	-.36***	.09	-		
5. Conscientiousness	5.86 (1.67)	.32***	-.18**	.08	.18**	-	
6. Neuroticism	6.52 (1.94)	-.31***	.37***	-.29***	-.18**	-.09	-
7. Openness	6.76 (1.84)	.17*	-.09	.20**	.03	-.08	-.03

Note. * $p < .05$; ** $p < .01$; *** $p < .001$.

3.3. Discussion

The results revealed a small-to-medium effect of meaningful life engagement on trait loneliness. Participants were less lonely if they had higher level of life engagement in activities that were personally found meaningful. We also found that this relationship existed above and beyond age, gender, as well as personality factors. However, whether this relationship also exists at state level, or whether situational meaninglessness registers a sense of loneliness in any given moment, still remained unclear. We conducted Part II to investigate this question.

4. Part II

4.1. Method

4.1.1. Participants and design

We used data from a seven-day experience-sampling study to examine the relationship of loneliness and meaningfulness at state level. The sample of this study was a

subset of the sample of Part I. All participants in Part I were invited to proceed to participate in Part II, and 148 of them (60.9%) agreed to proceed ($M_{age} = 19.2$, $SD = 1.75$, 73.0% female). Maas and Hox (2005) suggested that when the sample size of the highest level of the model is above 50, the estimates of regression coefficients, variance components and standard errors become stable. To be conservative and to account for possible attrition, we collected a sample approximately three times of this size ($N = 148$). A sample of this size is adequate for detecting medium to large effects (see Scherbaum & Ferreter, 2009).

4.1.2. Procedure and materials

Following the completion of Part I, participants were instructed to install a smartphone app called Personal Analytics Companion (PACO; Baxter, Avrekh, & Evans, 2015). They were then, over seven consecutive days, prompted by the app to fill out a brief questionnaire at least five times a day at random time intervals between 10 a.m. to 8 p.m. Specifically, the questionnaire asked about their state loneliness (i.e., to what extent they are feeling lonely right now), state boredom, whether they were alone, what activity they were engaging in immediately before responding to the survey, and perceived meaningfulness of that activity. Aloneness was a binary selection (i.e., “alone” or “with people”), while state loneliness, state boredom, and perceived meaningfulness were rated on a 7-point Likert scale (1 = *not at all*, 7 = *extremely*).

4.1.3. Statistical analysis

Analyses were conducted using R (R Core Team, 2018). Given that our data represents a two-level structure in which 3,023 data points (Level 1) are nested within 148 participants (Level 2), we applied multilevel modeling (MLM) in our data analysis using lme4 (version 1.1-17; Bates, Maechler, Bolker, & Walker, 2014) and lmerTest packages (version 3.0-1; Kuznetsova, Brockhoff, & Christensen, 2017).

In the multilevel model, state loneliness was predicted from situational meaningfulness. We included age, gender, personality, trait loneliness, and meaningful life engagement as covariates at Level 2, as well as weekend (vs. weekday), alone (vs. being with people), and state boredom as covariates at Level 1. Both trait loneliness and meaningful life engagement were entered as covariates as we would like to examine the association between situational meaning and state loneliness, independent of the effects of trait loneliness and global perception of meaningfulness of activities in life. Also, state boredom was controlled for as previous study showed a significant association between situational meaninglessness and state boredom (Chan et al., 2018). Thirty-three participants (22.3%) were excluded due to missing baseline data, resulting in 115 participants in the final analysis. We specified a maximal model with random intercept and random slopes for all Level 1 predictors (see Barr, Levy, Scheepers, & Tily, 2013). The following is the 2-part equation of the model:

$$\begin{aligned} \text{Level 1: } StateLoneliness_{ij} = & B_{0j} + B_{1j} (Meaningfulness)_{ij} + B_{2j} (Weekend)_{ij} \\ & + B_{3j} (Aloneness)_{ij} + B_{4j} (StateBoredom)_{ij} + B_5(Age)_j + B_6(Gender)_j \\ & + B_7(Extraversion)_j + B_8(Agreeableness)_j + B_9(Conscientiousness)_j \\ & + B_{10}(Neuroticism)_j + B_{11}(Openness)_j + B_{12}(TraitLoneliness)_j \\ & + B_{13}(MeaningfulLifeEngagement)_j + \varepsilon_{ij} \end{aligned}$$

$$\text{Level 2: } B_{0j} = \gamma_0 + \mu_{0j}$$

$$B_{1j} = \gamma_1 + \mu_{1j}$$

$$B_{2j} = \gamma_2 + \mu_{2j}$$

$$B_{3j} = \gamma_3 + \mu_{3j}$$

$$B_{4j} = \gamma_4 + \mu_{4j}$$

In the equation, $StateLoneliness_{ij}$ is state loneliness, our dependent variable, for time i on participant j . The γ s represent the fixed regression coefficients, whereas μ s are the residual between participants. B_{0j} is the intercept of the regression equation, with $(\gamma_0 + \mu_{0j})$ denoting

that the intercept is varied across participants; B_{1j} is the slope of the regression equation, with $(\gamma_1 + \mu_{1j})$ indicating that the slope is varied across participants; ε_{ij} is the residual within participants.

4.2. Results

Means, standard deviations, and correlations are reported in Table 2. In the unconditional model, the intra-class correlations (ICCs) for state loneliness and perceived meaningfulness were $r = .43$ and $r = .33$. As ICC represents the variability within Level 2 (i.e., between-person variability) in relation to total variability of the outcome variable, these values thus suggested that 57% of the variability in state loneliness and 67% of the variability in perceived meaningfulness existed within persons and were attributable to situational contexts.

Table 2

Part II: Means, Standard deviations and Correlations

	<i>M (SD)</i>	1.	2.	3.	4.	5.	6.	7.	8.	9.
1. Meaningful Life Engagement	21.6 (3.66)	-								
2. Trait Loneliness	54.6 (11.9)	-.54***	-							
3. Extraversion	5.79 (1.73)	.15	-.33***	-						
4. Agreeableness	7.25 (1.42)	.36***	-.41***	.12	-					
5. Conscientiousness	5.91 (1.64)	.19*	-.19*	.10	.29***	-				
6. Neuroticism	6.58 (1.96)	-.34***	.38***	-.21*	-.23**	-.10	-			
7. Openness	6.77 (1.99)	.19*	-.11	.29***	.06	-.09	-.03	-		
8. State Boredom ^a	2.96 (1.10)	-.15	.14	.11	-.21*	-.13	.00	-.05	-	
9. State Loneliness ^a	2.50 (1.06)	-.16	.33***	.07	-.16	-.17	.03	-.05	.49***	-
10. Perceived Meaningfulness ^a	4.32 (0.90)	.08	-.06	.03	.03	.16	-.03	.23**	-.16***	-.09***

Note. ^aCorrelations are aggregated daily means within participant except between state loneliness, state boredom, and perceived meaningfulness;

* $p < .05$; ** $p < .01$; *** $p < .001$.

In the random intercept and random slope model (Table 3), perceived meaningfulness, $B = -.057$, $SE = .026$, $p = .027$, 95% CI [-.108, -.006], was a significant negative predictor of state loneliness. Trait loneliness, $B = .023$, $SE = .007$, $p = .002$, 95% CI [.008, .038], state boredom¹, $B = .250$, $SE = .023$, $p < .001$, 95% CI [.203, .297], and aloneness (dummy coded “1” for “alone” and “0” for “with others”), $B = .499$, $SE = .074$, $p < .001$, 95% CI [.352, .647], significantly predicted state loneliness. Gender (dummy coded “1” for male and “0” for female), $B = .428$, $SE = .146$, $p = .004$, 95% CI [.136, .724], and extraversion, $B = .141$, $SE = .044$, $p = .002$, 95% CI [.053, .231], were also significant predictors of state loneliness.

Table 3

Part II: Random Intercept and Random Slope Model from MLM

Predictor	<i>B</i>	<i>SE</i>	<i>p</i>	95% <i>CI</i>
Intercept	-1.160	1.120	.303	[-3.448, 1.130]
Trait variables (Level 2)				
Age	.022	.037	.555	[-.054, .098]
Gender	.428	.146	.004	[.136, .724]
Extraversion	.141	.044	.002	[.053, .231]
Agreeableness	.017	.053	.747	[-.092, .129]
Conscientiousness	-.029	0.41	.480	[-.112, .053]
Neuroticism	.038	.038	.315	[-.038, .115]
Openness	-.024	.038	.526	[-.107, .056]
Trait Loneliness	.023	.007	.002	[.009, .038]
Meaningful Life Engagement	.006	.022	.777	[-.039, .052]

Situational variables (Level 1)

Weekend (vs. weekday)	.069	.061	.256	[-.051, .190]
Aloneness (vs. with others)	.499	.074	<.001	[.352, .647]
State Boredom	.250	.023	<.001	[.203, .297]
Perceived Meaningfulness	-.057	.026	.027	[-.108, -.006]

From this experience-sampling study, we found a negative association between perceived meaningfulness of a situation and state loneliness. This association existed above and beyond age, gender, personality traits, trait loneliness, meaningful life engagement, aloneness, day of the week, as well as state boredom.

5. Discussion and General Discussion

Across two studies, we found that meaningfulness of activities was associated with loneliness, at both trait (Part I) and state (Part II) levels. These relationships were found to be above and beyond age, gender, and big-five personality constructs. Part I suggests that meaningful life engagement was negatively associated with trait loneliness. This result is consistent with past studies (Bondevik & Skogstad, 2000; Du et al., 2017; Hicks & King, 2009; Stillman et al., 2009) and further suggests that a specific construct of life meaning, i.e., engagement in activities that are valued, is negatively related to trait loneliness. Part I goes beyond the findings of Anusic et al. (2017) by directly establishing the link between situational meaningfulness and state loneliness.

Disruption to one's meaning framework, such as being in a meaningless situation, motivates people to reaffirm alternative meaning framework (Heine et al., 2006). As people have inherent social needs to feel connected, they have a natural drive to establish and maintain a sense of belongingness (Baumeister & Leary, 1995). The empirical findings that relationship provides a source of life meaning (Debats, 1999; Hicks & King, 2009; O'Connor & Chamberlain, 1996; Schnell, 2009), coupled with the theoretical framework proposed by

Heine et al. (2006), suggest that needs for belongingness can be an alternative meaning framework which people turn to when their sense of meaning is impeded. This process of compensation may bring the discrepancy in one's ideal and achieved patterns of relationship into awareness, resulting in a sense of loneliness. In other words, people who find the current situation meaningless would have a desire to reconnect with people so as to re-establish a sense of meaningfulness. Such desire makes salient the discrepancy between the desired and actual interpersonal relationships, contributing to loneliness. This can help explain why participants who perceived their current situation as meaningless tended to feel lonely (Part II). Also, those who held a global perception that their lives had less meaningful engagement tend to feel lonelier (Part I).

Furthermore, we found a significant positive association between state boredom and state loneliness in Part II. This finding can also be interpreted within the context of MMM. Previous studies suggested that, people tend to feel bored in meaningless situation (Chan et al., 2018), and boredom drives them to search for meaning (Van Tilburg & Igou, 2011). Following the MMM theoretical framework, when they search for meaning, register social relationship as their source of meaning, and realize the discrepancy between their desired and actual relationships, they would experience a sense of loneliness. It should be noted that situational meaning predicted state loneliness even without controlling for state boredom in the model.¹ Therefore, although our findings showed a relationship between state boredom, state loneliness, and meaning, how the three constructs relate with one another requires future studies to unpack.

Apart from our main findings, Part II showed that people tended to feel lonely when they were alone. This result is consistent with a previous experience-sampling study (Van Roekel, Scholte, Engels, Goossens, & Verhagen, 2015) which found that adolescents experienced higher state loneliness when they were alone, in comparison to being with

others. Aloneness is an objective state of not being with anyone whom has a relationship with, whereas loneliness is a subjective unpleasant state due to perceived deficiency in interpersonal relationships. As aloneness is an absence of social interaction, it may encourage the subjective perception of the deficiency in relationship, and thus elicit a sense of loneliness.

The findings, however, have to be considered within the context of several limitations in our study. First, our studies are correlational in nature, that we can neither draw a causal link between meaningfulness and loneliness nor rule out the possibility that the relationship may be bidirectional and dynamic. Future studies can adopt an experimental approach or cross-lagged panel analysis to further look into this relationship. Second, a meta-analysis (Perlman, 1990) and a review study (Qualter et al., 2015) suggested that loneliness is most prevalent in young adulthood among all age groups. Given that the majority of our samples was young adults, the generalizability of our results may be limited. Third, some dimensions of the BFI-10 had a relatively low internal consistency. We chose the BFI-10 over other measures for its brevity. The scale was suggested to have acceptable psychometric properties with adequate test-retest reliability and validity (Rammstedt & John, 2007). Consistent with past studies (e.g., Lovik, Verbeke, & Molenberghs, 2017; Tackman & Srivastava, 2016), the brief version can be expected to have a lower internal consistency than full-length scales. Future studies might consider using an alternative measure.

6. Conclusion

Loneliness can be a distressing feeling. Experiencing it chronically is associated with a range of aversive physical and psychosocial outcomes. Our studies suggest a negative association between meaning and loneliness at both trait and state level. At trait level, people who hold a global perception that their activities in life are meaningless tend to be lonelier.

At state level, people tend to feel lonely when they perceive their current activity is meaningless.

References

- Anusic, I., Lucas, R. E., & Donnellan, M. B. (2017). The validity of the day reconstruction method in the German socio-economic panel study. *Social Indicators Research, 130*(1), 213-232.
- Barr, D. J., Levy, R., Scheepers, C., & Tily, H. J. (2013). Random effects structure for confirmatory hypothesis testing: Keep it maximal. *Journal of Memory and Language, 68*(3), 255-278.
- Bates, D., Maechler, M., Bolker, B., & Walker, S. (2014). Lme4: Linear mixed-effects models using eigen and S4 (R package version 1).
- Baumeister, R. F., & Leary, M. R. (1995). The need to belong: desire for interpersonal attachments as a fundamental human motivation. *Psychological Bulletin, 117*(3), 497-529.
- Baxter, K. K., Avrekh, A., & Evans, B. (2015). Using Experience Sampling Methodology to Collect Deep Data about Your Users. In *Proceedings of the 33rd Annual ACM Conference Extended Abstracts on Human Factors in Computing Systems* (pp. 2489-2490). ACM.
- Bondevik, M., & Skogstad, A. (2000). Loneliness, religiousness, and purpose in life in the oldest old. *Journal of Religious Gerontology, 11*(1), 5-21.
- Brandstätter, M., Baumann, U., Borasio, G. D., & Fegg, M. J. (2012). Systematic review of meaning in life assessment instruments. *Psycho-Oncology, 21*(10), 1034-1052.
- Cacioppo, J. T., Hawkley, L. C., Ernst, J. M., Burleson, M., Berntson, G. G., Nouriani, B., & Spiegel, D. (2006). Loneliness within a nomological net: An evolutionary perspective. *Journal of Research in Personality, 40*(6), 1054-1085.

- Chan, C. S., Van Tilburg, W. A. P., Igou, E. R., Poon, C. Y. S., Tam, K. Y. Y., Wong, V. U., & Cheung, S. K. (2018). Situational meaningfulness and state boredom: Cross-sectional and experience-sampling findings. *Motivation and Emotion, 42*(4), 555-565.
- Debats, D. L. (1999). Sources of meaning: An investigation of significant commitments in life. *Journal of Humanistic Psychology, 39*(4), 30-57.
- Du, H., Li, X., Chi, P., Zhao, J., & Zhao, G. (2017). Meaning in life, resilience, and psychological well-being among children affected by parental HIV. *AIDS care, 1-7*.
- Gow, A. J., Pattie, A., Whiteman, M. C., Whalley, L. J., & Deary, I. J. (2007). Social support and successful aging: Investigating the relationships between lifetime cognitive change and life satisfaction. *Journal of Individual Differences, 28*(3), 103-115.
- Hawkey, L. C., Thisted, R. A., & Cacioppo, J. T. (2009). Loneliness predicts reduced physical activity: cross-sectional & longitudinal analyses. *Health Psychology, 28*(3), 354-363.
- Heine, S. J., Proulx, T., & Vohs, K. D. (2006). The meaning maintenance model: On the coherence of social motivations. *Personality and Social Psychology Review, 10*(2), 88-110.
- Hicks, J. A., & King, L. A. (2009). Positive mood and social relatedness as information about meaning in life. *The Journal of Positive Psychology, 4*(6), 471-482.
- Kuznetsova, A., Brockhoff, P. B., & Christensen, R. H. B. (2017). lmerTest package: tests in linear mixed effects models. *Journal of Statistical Software, 82*(13). DOI: 10.18637/jss.v082.i13
- Lovik, A., Verbeke, G., & Molenberghs, G. (2017). Evaluation of a very short test to measure the Big Five Personality Factors on a Flemish. *Journal of Psychological & Educational Research, 25*(2), 7-17.

- Maas, C. J., & Hox, J. J. (2005). Sufficient sample sizes for multilevel modeling. *Methodology, 1*(3), 86-92.
- O'Connor, K., & Chamberlain, K. (1996). Dimensions of life meaning: A qualitative investigation at mid-life. *British Journal of Psychology, 87*(3), 461-477.
- Peplau, L. A., Miceli, M., & Morasch, B. (1982). Loneliness and self-evaluation. *Loneliness: A sourcebook of current theory, research and therapy, 135-151.*
- Peplau, L. A., & Perlman, D. (1982). Perspectives on loneliness. *Loneliness: A sourcebook of current theory, research and therapy, 1-20.*
- Peplau, L. A., & Perlman, D. (1979). Blueprint for a social psychological theory of loneliness. In *Love and attraction: An interpersonal conference* (pp. 101-110). Pergamon Press New York.
- Perlman, D. (1990). *Age differences in loneliness: A meta-analysis*. Paper presented at the 98th annual convention of the American Psychological Association, Boston, MA.
- Qualter, P., Vanhalst, J., Harris, R., Van Roekel, E., Lodder, G., Bangee, M., ... & Verhagen, M. (2015). Loneliness across the life span. *Perspectives on Psychological Science, 10*(2), 250-264.
- R Core Team (2018). R: A language and environment for statistical computing. R Foundation for Statistical Computing.
- Rammstedt, B. & John, O. P. (2007). Measuring personality in one minute or less: A 10-item short version of the Big Five Inventory in English and German. *Journal of Research in Personality, 41*, 203-212.
- Rokach, A. (1989). Antecedents of loneliness: A factorial analysis. *The Journal of Psychology, 123*(4), 369-384.
- Rosseel, Y. (2012). "lavaan": An R package for structural equation modeling. *Journal of Statistical Software, 48*, 1-36.

- Russell, D. (1996). UCLA Loneliness Scale (Version 3): Reliability, validity, and factor structure. *Journal of Personality Assessment, 66*, 20–40.
- Satici, S. A., Uysal, R., & Deniz, M. E. (2016). Linking social connectedness to loneliness: The mediating role of subjective happiness. *Personality and Individual Differences, 97*, 306-310.
- Scheier, M. F., Wrosch, C., Baum, A., Cohen, S., Martire, L. M., Matthews, K. A., ... & Zdzienicka, B. (2006). The life engagement test: Assessing purpose in life. *Journal of Behavioral Medicine, 29*(3), 291-298.
- Scherbaum, C. A., & Ferriter, J. M. (2009). Estimating statistical power and required sample sizes for organizational research using multilevel modeling. *Organizational Research Methods, 12*(2), 347-367.
- Schinka, K. C., van Dulmen, M. H., Mata, A. D., Bossarte, R., & Swahn, M. (2013). Psychosocial predictors and outcomes of loneliness trajectories from childhood to early adolescence. *Journal of Adolescence, 36*(6), 1251-1260.
- Schnell, T. (2009). The Sources of Meaning and Meaning in Life Questionnaire (SoMe): Relations to demographics and well-being. *The Journal of Positive Psychology, 4*(6), 483-499.
- Stillman, T. F., Baumeister, R. F., Lambert, N. M., Crescioni, A. W., DeWall, C. N., & Fincham, F. D. (2009). Alone and without purpose: Life loses meaning following social exclusion. *Journal of Experimental Social Psychology, 45*(4), 686-694.
- Tackman, A. M., & Srivastava, S. (2016). Social responses to expressive suppression: The role of personality judgments. *Journal of Personality and Social Psychology, 110*(4), 574-591.

- Taubman-Ben-Ari, O., Findler, L., & Mikulincer, M. (2002). The effects of mortality salience on relationship strivings and beliefs: The moderating role of attachment style. *British Journal of Social Psychology, 41*(3), 419-441.
- Teppers, E., Klimstra, T. A., Damme, C. V., Luyckx, K., Vanhalst, J., & Goossens, L. (2013). Personality traits, loneliness, and attitudes toward aloneness in adolescence. *Journal of Social and Personal Relationships, 30*(8), 1045-1063.
- Van Roekel, E., Scholte, R. H., Engels, R. C., Goossens, L., & Verhagen, M. (2015). Loneliness in the daily lives of adolescents: An experience sampling study examining the effects of social contexts. *The Journal of Early Adolescence, 35*(7), 905-930.
- Van Tilburg, W. A., & Igou, E. R. (2011). On boredom and social identity: A pragmatic meaning-regulation approach. *Personality and Social Psychology Bulletin, 37*(12), 1679-1691.

Footnotes

1. Perceived meaningfulness predicted state loneliness even without controlling for state boredom.