

# Does stimulating various coping strategies alleviate loneliness? Results from an online friendship enrichment program

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## Abstract

Loneliness stems from a mismatch between the social relationships one has and those one desires. Loneliness often has severe consequences for individuals and society. Recently, an online adaptation of the friendship enrichment program (FEP) was developed and tested to gain insight in its contribution to the alleviation of loneliness. Three loneliness coping strategies are introduced during the program: network development, adapting relationship standards, and reducing the importance of the discrepancy between actual and desired relationships. Data were collected among 239 participants aged 50–86. Loneliness was measured four times using a multi-item scale, and on various days with a single, direct question. Loneliness assessed with the scale declined during and after the program. Scores on loneliness assessed for a specific day, however, are more ambiguous. Despite the immediate positive effect of conducting assignments, we did not observe a decline in the single loneliness item score over the course of the program. The online FEP seems to reduce loneliness in general, but these effects are not visible on today's loneliness. Nevertheless, the online intervention to reduce loneliness is a valuable new contribution to the collection of loneliness interventions.

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Persistent loneliness is often accompanied by serious mental and physical health problems such as anxiety, depression, sleep disturbance, lack of energy (Luanaigh & Lawlor, 2008), more rapid physical decline with age (Hawkey & Cacioppo, 2007), and a greater likelihood of early mortality (Holwerda et al., 2012). Loneliness is a subjective, negative experience, caused by a discrepancy between actual and desired relationships (Peplau & Perlman, 1982). A distinction between emotional and social loneliness is often made (Weiss, 1973). Emotional loneliness refers to a lack of intimacy, for example, with a partner or close friend; social loneliness refers to missing a wider social network for companionship. While it is generally believed that loneliness is a problem that mainly affects older adults, it actually affects all ages. Approximately, 40% of all Dutch adults experience feelings of loneliness (RIVM, 2013) at any time. However, with increasing age, the number of risk factors for loneliness, such as widowhood and physical disabilities, also increase (Aartsen & Jylhä, 2011), which explains a higher prevalence of loneliness among very old people. Given the negative consequences of loneliness, it is important to look for potential solutions.

Not all feelings of loneliness persist over a longer period of time (Dykstra, van Tilburg, & De Jong Gierveld, 2005; Jylhä, 2004; Newall, Chipperfield, & Ballis, 2014). Temporary loneliness does not require attention. For persistent loneliness, intervention programs may be helpful (Schoenmakers, 2013). However, reviews indicate that only a few interventions are effective (Cattan, White, Bond, & Learmouth, 2005; Fokkema & Van Tilburg, 2007; Masi, Chen, Hawkey, & Cacioppo, 2010). Interventions that address maladaptive social cognition are more successful than interventions focusing on creating opportunities to meet others, teaching social skills, or increasing social support (Masi et al., 2010). In the cognitive approach to loneliness (Perlman & Peplau, 1982), the discrepancy between actual and desired relations is central. Therefore, it makes sense to focus not only on creating opportunities for lonely people to socialize but also to offer them ways to both work on their actual relationships and their desires for or expectation of relationships. Previous studies by Schoenmakers, Van Tilburg, & Fokkema (2012, 2015) focused on the effect of considering the use of different coping strategies on loneliness. The current study builds on this finding and studies the course of loneliness throughout an intervention in which different coping strategies for loneliness are introduced and practiced, while results are evaluated frequently and over short periods.

The loneliness intervention that is central in this study is an online adaptation of the friendship enrichment program (FEP), which is a promising intervention for women aged 55 and over (Stevens, 2001; Stevens, Martina, & Westerhof, 2006). The FEP is not a befriending program in which participants are coupled with a volunteer or another lonely person. Instead, this program encourages participants to become aware of their own social needs and desires, to analyze their existing social network, to reflect on their expectations of friendships, to improve the quality of existing friendships, and to develop new friendships. The program combines social skills training with guided discussions

that give participants the opportunity to become aware of maladaptive social cognitions or social behavior.

For the present study, the FEP was adapted to a self-guided online program (oFEP) for men and women over 50 years of age. The program was designed to collect data during its execution to empirically test the realization of the program's aims. As with the FEP, the oFEP aims to reduce feelings of loneliness by offering various strategies to combat loneliness. This is in line with the definition of loneliness by Perlman and Peplau (1982), which focuses not only on the individual's network but also emphasizes the importance of standards for relationships. The contribution of this study lies in its focus on enlarging the arsenal of effective coping strategies to reduce loneliness rather than merely bringing lonely people into contact with others. It, furthermore, examines whether an existing group intervention based on this approach can be adapted into a self-guided online intervention.

The program stimulates the use of several coping strategies for loneliness. There are various ways to distinguish between coping strategies (Carver, 2013; Folkman & Moskowitz, 2004). In this study, we use the distinction between active coping, engaging in actual behavior to deal with the stressor and regulative coping, and reflecting on the stressor to reduce its effect (Schoenmakers, 2013). We distinguish three loneliness coping strategies, which are practiced during the online program: network development, adapting personal standards, and reducing the importance of the discrepancy between actual and desired relationships. *Network development* focuses on actively maintaining existing friendships and making new contacts. Goals are to improve the quality of existing friendships and to develop new relationships that may become friendships (Peplau & Perlman, 1982). Network development is an active coping strategy (Schoenmakers, Van Tilburg, & Fokkema, 2012), which may contribute to increased satisfaction with one's relationships, and thus a reduction of loneliness.

The regulative coping strategy of *adapting standards* can be useful if the loneliness-provoking situation cannot be altered, and the person needs to adapt his own demands, desires, goals, or norms toward relationships (Stevens, 1989). Adapting standards is achieved by focusing on becoming a better friend and managing expectations in friendship. Participants are encouraged to reflect on their expectations toward friendship and their own behavior as a friend and reevaluate what is desirable and undesirable.

Finally, the second regulative coping style, *reducing the importance of the discrepancy*, means that feelings of loneliness are not altered. In fact, they persist, but their importance is reduced (Fokkema & Van Tilburg, 2007) and attention is moved away from the problem. An individual using this coping strategy focuses on accepting that the problem cannot be solved or changed at the moment and seeks ways to occupy him- or herself other than by focusing at the (at that moment) unchangeable problem. In the program, there is attention for being able to enjoy time alone, which is considered an important skill in coping with loneliness (Rook, 1984; Stevens, 2001).

Because the effectiveness of a coping strategy varies depending on an individual's situation, participants are free to choose the order in which they follow lessons, thus in which they receive information on and are invited to practice the three coping strategies. Loneliness has complex causes, and it is unlikely that there is one simple solution. Exposing a person to different strategies enables them to choose the most appropriate one for a certain situation. The oFEP is designed under the assumption that the more strategies

a person can apply to cope with loneliness, the more likely it is that a specific coping strategy is applied that fits with one's problem, and consequently that loneliness declines. We hypothesize that the program helps participants to alleviate loneliness, that is, their loneliness decreases during and after participation in the program (**Hypothesis 1**).

While all three coping strategies aim to alleviate loneliness, their effectiveness in reducing loneliness may vary. Coping by reducing the importance of the discrepancy predominantly results in temporary relief and does not help increase satisfaction with one's social relationships (Thoits, 1995). Adapting standards may be effective if there are unrealistically high expectations of (certain types of) relationships, but it does not change the situation immediately (Lazarus & Lazarus, 2006). However, this strategy may be less effective or even harmful when it involves ignorance of possibilities to expand the network with desired relations, which may also help to reduce loneliness. We hypothesize that promoting engaging in network development is more effective in alleviating loneliness than coping by adapting standards or reducing the importance of the discrepancy (**Hypothesis 2**). The ways of coping are central in consecutive periods in the program.

The methods used to promote the coping styles in the program include reading informative texts, answering on-topic questions, conducting exercises during the lessons, watching animated videos, and conducting assignments. In learning, conducting assignments is generally believed to be essential to achieve the intended outcomes (Biggs, 1996) and it stimulates participants to engage in real life situations, instead of only reading informative texts. Examples of assignments are asking participants to engage in small talk with strangers, to renew contact with someone they have not seen for a long time, and to spend an enjoyable evening alone. We thus hypothesize that conducting the program's assignments contributes to the alleviation of loneliness with an immediate effect on the loneliness intensity assessed in various periods of the program (**Hypothesis 3**).

## Methods

In this section, we first provide a more detailed description of the intervention itself, followed by an elaborate description of the design of the study. A detailed description of how the hypotheses are tested is also provided.

### *Description of the online friendship enrichment program*

The oFEP is a 6-week course and consists of a general introduction on friendship and five weekly lessons. Information about, and access to the program, was provided through a Dutch website. The website and the program itself function on all types of devices (e.g., personal computer, tablet, smartphone). Once participants signed up for the program, they could log in and access the program. Each lesson covers one of five topics (making new contacts, maintaining relationships, spending time alone, becoming a better friend, and expectations in friendship). Each week they were invited by means of e-mail to access a new lesson. Lessons that were already completed remained accessible through the menu. A lesson consists of several of the methods mentioned above (e.g., reading informative text) to facilitate the reflection by participants on the topic. After selection of a specific topic, informative text on the topic is provided to the participant, followed by

questions to stimulate reflection on the topic, and animated videos to illustrate the topic. Most of these questions and examples are followed by exercises in which participants are asked to imagine a specific situation and think about how to react to certain situations. For example, participants are asked to imagine how they would rekindle a contact with someone they have not spoken to in a long time and to write down what they might say to the other person. Another example, taken from the lesson maintaining and improving existing contacts, is that participants are asked to report the name of a person they have not spoken to in a while. Combined with other elements, such as the animated videos, this leads participants step by step to the assignments. For example: “Now that you have thought about who you would like to contact and how, try to contact this person in the next week.”

### *Design of the study*

Participating in the oFEP automatically meant participating in the study; participants gave their consent when signing in. At the start, participants were offered the baseline questionnaire including emotional and social loneliness. After five lessons, they completed a follow-up questionnaire, which was repeated directly after the program and 1 year later. Furthermore, at the end of each day, participants were invited by means of an e-mail to fill out a short evaluative questionnaire including one loneliness question. We refer to this observation as “today”’s loneliness. Hypothesis 1 is tested on all loneliness data derived from the course of the program. For Hypothesis 2, we evaluate the effect of the lesson content—and thus the different coping strategies—on today’s loneliness.

To test Hypothesis 3, an alternative program was developed, which is referred to as the light block. Similar to the original full block, the light block contains five weekly lessons covering the same topics, but it provides limited information and reflection through existing texts and videos on friendship, and there were no assignments. The light block is structured in a fixed order and started with two lessons on network development, followed by the lesson on reducing the importance of the discrepancy, and ended with the lessons on adapting standards. At all times, it was possible to revisit one of the previously completed lessons. After signing up for the oFEP, half of the participants were randomly assigned to the full block, the other half to the light block. Hypothesis 3 can be tested by comparing loneliness between the two groups. Also, we evaluate the effect of conducting the assignment on today’s loneliness. Because we did not want to exclude people from the full intervention, we offered participants of the light block also the full block of 5 weeks after the light block was completed. For comparative reasons, we offered participants who started with the full intervention also the light block after the full block was completed. Data from weeks 6 to 11 are also used to test Hypothesis 3.

### *Participants*

The prerequisites for participation were having access to the Internet, speaking Dutch, and being aged 50 years or older. Participants were recruited by means of an online advertisement on a community website for older people and articles in eight regional newspapers. The advertised goal of the program was to “benefit more from friendship”

and participants were informed that the research was to test program's quality. Because we wanted everyone who wished to improve their friendship network to participate, we specifically avoided the word loneliness in the recruitment. Non-lonely individuals who wish to join the program were welcome to do so, because they too may benefit from investing in friendship.

Participants enrolled in the program between April and July 2013. In total 338 people subscribed, of whom 239 completed the baseline questionnaire, 131 participants were randomly assigned to the full-light group and 108 to the light-full group. Ninety-nine people signed up for the program but never started. Mean age was 61.58 years ( $SD = 7.15$ , range 50–86); 186 (78%) were female; 96 (40%) had a partner; 178 (74%) have children. Most participants, 171 (72%), rated their health as good. The median educational level was 8.0 on a scale ranging from 1 (primary education) to 9 (university).

Of the 239 participants who completed the baseline questionnaire 120 participants completed the follow-up measurement after the first five lessons of the program (dropout 49%) and data from questionnaires after the program and 1 year were obtained from 80 (dropout 66%) and 67 (dropout 72%) participants, respectively. Dropout was somewhat higher in the light-full sequence than in the full-light sequence after the first block of the program ( $\chi^2 = 4.72, p < .05$ ); later dropout did not differ (after the program:  $\chi^2 = 2.87, p > .05$ ; 1 year later:  $\chi^2 = 0.04, p > .05$ ). Participants who completed the follow-up measurement after five lessons ( $n = 120$ ) did not differ from those who dropped out of the study within the first block ( $n = 119$ ) in terms of social loneliness ( $M = 3.88, SD = 1.36$ , and  $M = 3.50, SD = 1.71$ , respectively;  $t_{(237)} = 1.86, p > .05$ ) and emotional loneliness ( $M = 4.44, SD = 1.83$ , and  $M = 4.29, SD = 1.84$ , respectively;  $t_{(237)} = 0.66, p > .05$ ) at baseline. There was no difference between participants who dropped out in the first block and those who completed the follow-up measurement after the first block in terms of gender ( $\chi^2 = 0.02, p > .05$ ). Participants who dropped out were a bit younger ( $M = 60.67, SD = 7.08$ ) than those who stayed in the program ( $M = 62.48, SD = 7.13, t_{(237)} = -1.97, p < .05$ ). Dropout was unrelated to self-rated health ( $\chi^2 = 0.38, p > .05$ ), having a partner or not, ( $\chi^2 = 0.71, p > .05$ ) or having children or not ( $\chi^2 = 2.79, p > .05$ ).

Of the 239 participants that started the program, 208 answered one or more of the daily sent questionnaires ( $M_{\text{questionnaires answered}} = 28.64$  times;  $SD = 20.24$ ; range 2–73;  $n = 208$ ) during the 11 weeks of the program. The number of participants in the course of the study varied, and so did the number of evaluations within the program weeks. For example, in the 4th week, 135 replied and completed on average 3.66 evaluations of a particular day.

## Measurements

*Baseline and follow-up questionnaires:* Included were two loneliness measurements consisting of items not directly referring to loneliness. Social and emotional loneliness were assessed with the De Jong Gierveld Loneliness scale (De Jong Gierveld & Van Tilburg, 1999). Emotional loneliness is assessed by a scale of 6 items, for example, "I experience a general sense of emptiness." Response options were "yes!," "yes," "more or less," "no," and "no!" Item scores were dichotomized, and the first three options were counted as indicator of loneliness (score 1). Scale values range from 0 to 6 with

higher scores reflecting more loneliness. Items scores are dichotomized because this facilitates comparison with previous use of the scale. The rationale for dichotomizing the score is that people are reluctant to admit they are lonely, so given this taboo of admitting loneliness, “more or less” is regarded as an understated confirmation of the (negatively formulated) item (De Jong Gierveld & Kamphuis, 1985). For a more elaborate description of the scale, we refer to the manual by De Jong Gierveld and Van Tilburg (1999). The scale of social loneliness includes five positive formulated items, for example, “There is always someone I can talk to about my day-to-day problems,” with the same response options as the emotional loneliness scale. Again, the item scores were dichotomized, only this time, the last three response options were counted as indicator of loneliness (Score 1). Scale values range from 0 to 5. Loevinger’s coefficient for scale homogeneity  $H$  is 0.57 and 0.60, and reliability  $\rho$  is 0.87 and 0.86 for emotional and social loneliness, respectively. The Spearman’s correlation between the two scales is 0.53 ( $p < .001$ ).

*Today’s evaluation:* We assessed loneliness in the daily sent questionnaires with the question “How did you feel today?”; response options were “lonely” (7) to “not lonely” (1). This measure focuses on a specific day, as opposed to the social and emotional loneliness measures described above, which do not specify a time period. The correlation between today’s loneliness during the introduction week (assessed as the mean of the on average 4.51 today’s evaluations) and social and emotional loneliness at baseline is 0.42 ( $p < .001$ ) and 0.46 ( $p < .001$ ), respectively. Evaluation of assignments was done by asking the participants whether or not they conducted an assignment that day (response categories: yes; no; “no, because there were no assignments in the lesson that I took this week”). If a confirmative answer was given, the participant was asked to indicate which assignment was conducted and to evaluate the assignment as “did not go well,” “went all right,” or “went well.”

Participants’ activity pattern in the program was described with two parameters: (1) the number of lessons followed and (2) the tempo with which the program was followed. The number of lessons followed indicates the number of coping strategies to which participants were exposed. The variable is generated by the management system of the program. The count variable ranges from 0 to 10, with 0 being the period between the introduction and the first lesson. The tempo in which the program was followed is assessed as the number of days of the program divided by the number of days it took the participant to reach that point in the program. A value close to 1 indicates that the participant followed the program at the scheduled pace, a value closer to 0 indicates the participant took longer than scheduled to complete the program.

## Procedure

Hypothesis 1, that is, participating in the program alleviates loneliness, is tested in two ways. First, the alleviation of social and emotional loneliness is tested by comparing baseline levels of social and emotional loneliness with social and emotional loneliness after five lessons, directly after the program (i.e., the 11th program week) and 1 year later. Second, we assume that loneliness may be immediately affected, which is reflected in fluctuations in today’s loneliness. Therefore, we examined loneliness throughout the

program by studying the fluctuations in today's loneliness in response to a direct question about how participants feel. The predictive value of both the number of lessons taken and the tempo at which the program was completed on today's loneliness was estimated.

Hypothesis 2 (network development is more effective than other coping strategies) and Hypothesis 3 (conducting assignments alleviates loneliness) were tested by looking at the changes in today's loneliness. To test Hypothesis 2, we evaluated the effect of content of the lesson that participants are engaged in at the moment they reported on today's loneliness. The lesson content in a particular week represents one of the three coping styles. Lessons focusing on making new contact and maintaining relationships are related to active coping, becoming a better friend and expectations of friendship, and spending time alone involve regulative coping. Hypothesis 3 is evaluated with the measure regarding the evaluation of the assignments that were conducted. Three dummy variables were created: the assignment was evaluated as going well, going all right, or going not so well. Not having conducted an assignment serves as the reference category in the model. All models were controlled for tempo, age, and sex. We controlled for tempo because this gives an indication of how engaged the participants were with the program. Participants who are more on track in the program might benefit more from the program. We further controlled for age and sex to take into account potential differences between males and females and older and younger participants in adherence to the program and level of loneliness.

The data gathered at several observations are nested within participants and therefore analyses were conducted with the linear mixed models procedure in SPSS version 21. Because of the fixed order of lessons in the light block multicollinearity between the variable "number of lessons taken" (Hypothesis 1) and the variables for lesson topic (Hypothesis 2) was expected. Therefore, Hypothesis 1 and Hypothesis 2 were tested in separate models. We also added the variable "number of lessons followed" to the model of Hypothesis 3, because of its higher tolerance. Furthermore, because the full-light and the light-full group differ in the sequence of program, components the analyses are split by group and block.

## Results

At baseline, the average score on the social loneliness scale is 3.69 (range 0–5;  $SD = 1.55$ ;  $n = 239$ ) and on the emotional loneliness scale 4.36 (range 0–6;  $SD = 1.83$ ;  $n = 239$ ). These can be considered as rather high scores (De Jong Gierveld & Van Tilburg, 1999). At baseline, there were no differences in social loneliness between the full and light groups ( $M_{\text{full-light}} = 3.67$ ,  $SD = 1.55$ ,  $M_{\text{light-full}} = 3.71$ ,  $SD = 1.56$ ,  $t_{(237)} = 0.20$ ,  $p > .05$ ) and emotional loneliness ( $M_{\text{full-light}} = 4.45$ ,  $SD = 1.89$ ,  $M_{\text{light-full}} = 4.26$ ,  $SD = 1.78$ ,  $t_{(237)} = -0.80$ ,  $p > .05$ ). Table 1 provides an overview of the means and standard deviations of social and emotional loneliness on the four observations. Participants without a partner are lonelier than those with a partner (social loneliness:  $M_{\text{without partner}} = 3.91$ ,  $SD = 1.48$ ;  $M_{\text{with partner}} = 3.37$ ,  $SD = 1.60$ ;  $t_{(237)} = 2.70$ ,  $p < .01$ ; emotional loneliness:  $M_{\text{without partner}} = 4.73$ ,  $SD = 1.62$ ,  $M_{\text{with partner}} = 3.82$ ,  $SD = 2.00$ ,  $t_{(174.1)} = 3.70$ ,  $p < .001$ ). There are no differences between males and females in terms of baseline levels of social loneliness ( $t_{(237)} = 0.54$ ,  $p > .05$ ) or emotional loneliness ( $t_{(237)} = -0.88$ ,  $p > .05$ ). Participants who rated their health as good were less lonely than participants who rated



**Table 1.** Descriptive statistics for social and emotional loneliness over time for the two groups.

	Full-light group		Light-full group	
	<i>n</i>	Mean ( <i>SD</i> )	<i>n</i>	Mean ( <i>SD</i> )
<b>Social loneliness (0–5)</b>				
Baseline	131	3.67 (1.55)	108	3.71 (1.56)
After program week 5	74	3.39 (1.82)	46	3.85 (1.38)
After program week 10	50	3.10 (1.98)	30	3.17 (1.80)
1 year after baseline	36	2.83 (1.92)	31	3.16 (1.63)
<b>Emotional loneliness (0–6)</b>				
Baseline	131	4.45 (1.78)	108	4.26 (1.90)
After program week 5	74	4.03 (1.97)	46	4.48 (1.74)
After program week 10	50	3.82 (2.01)	30	4.03 (1.67)
1 year after baseline	36	3.33 (2.26)	31	3.06 (2.13)

Note. *SD*: standard deviation.

**Table 2.** Regression of social and emotional loneliness on time in intervention (*N* respondents = 239, *N* observations = 506).

	Social loneliness (range 0–5)				Emotional loneliness (range 0–6)			
	Full-light group		Light-full group		Full-light group		Light-full group	
	B	SE B	B	SE B	B	SE B	B	SE B
Intercept (baseline)	3.67	0.15***	3.71	0.15***	4.45	0.16***	4.26	0.18***
After program week 5	−0.34	0.15*	−0.11	0.18	−0.40	0.17*	−0.02	0.18
After program week 10	−0.53	0.17**	−0.76	0.21**	−0.49	0.19*	−0.36	0.21
1 year after baseline	−0.70	0.20***	−0.50	0.21*	−0.86	0.22***	−0.99	0.21***
Model fit: AIC	1028.5		751.2		1087.3		784.8	

Note. AIC: Akaike information criterion; SE: standard error.

\* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$ .

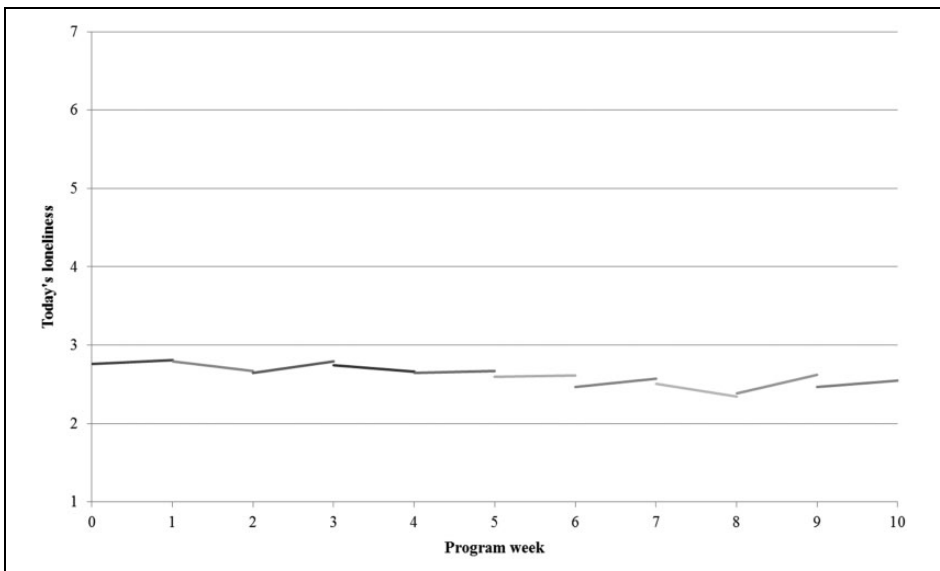
their health as poor (social loneliness:  $M_{\text{good health}} = 3.55$ ,  $SD = 1.58$ ;  $M_{\text{poor health}} = 4.04$ ,  $SD = 1.41$ ,  $t_{(237)} = 2.36$ ,  $p < .05$ ; emotional loneliness:  $M_{\text{good health}} = 4.185$ ,  $SD = 1.91$ ;  $M_{\text{poor health}} = 4.82$ ,  $SD = 1.53$ ,  $t_{(153.3)} = 2.47$ ,  $p < .05$ ). Participants who have children do not differ in terms of social ( $t_{(237)} = -0.01$ ,  $p > .05$ ) or emotional loneliness ( $t_{(237)} = -0.75$ ,  $p > .05$ ) from those who do not have children.

Table 2 presents results of the regression of social loneliness (left panel) and emotional loneliness (right panel) on time in the program. Hypothesis 1 is supported by the data. According to the negative estimates for 6 and 11 weeks and 1 year later, loneliness intensity decreases after baseline for both the full-light and the light-full group of respondents and for both loneliness types. The decline is small in some periods, for example, in the light-full group for both social and emotional loneliness, the decline is not significant after five lessons (in contrast to the significant declines in the other group). The estimates suggest that among participants in the full-light group the decline in the 1st weeks is greater than among participants in the light-full group (i.e.,  $-0.34$  vs.  $-0.11$  for social and  $-0.40$  vs.  $-0.02$  for emotional loneliness). However, testing of

**Table 3.** Frequencies of today's evaluations per program week.

Program week	0	1	2	3	4	5	6	7	8	9	10	Total
Full-light group	470	424	380	342	287	360	295	258	207	214	223	3460
Light-full group	439	372	295	284	207	237	175	138	129	119	102	2497
Total	909	796	675	626	494	597	470	396	336	333	325	5957
N	201	204	169	150	135	128	114	98	90	84	77	208
Mean per person	4.51	3.90	3.99	4.17	3.66	4.66	4.12	4.04	3.73	3.96	4.22	
SD	2.29	1.81	1.82	1.80	1.72	2.16	2.22	1.79	1.81	2.12	1.88	
Range	1–23	1–8	1–7	1–8	1–9	1–9	1–17	1–8	1–9	1–12	1–9	

Note. SD: standard deviation.

**Figure 1.** Mean today's loneliness per program week.

equality of parameters between the groups by means of z-scores did not reveal differences for both types of loneliness (results not shown). Participants who stayed in the program and responded to the questionnaire after 1 year had on average 13% (from 3.71 to 3.21) to 23% decline (from 3.71 to 2.85) in their loneliness scores.

We now turn to the results for today's loneliness. Overall, the average score on the single question "How did you feel today" was 2.73 ( $SD = 1.65$ ;  $N = 5612$  observations) on the scale from 1 to 7; Table 3 provides frequencies and means per program week. Figure 1 shows the mean of today's loneliness per week. We conducted *t*-tests of the paired means of consecutive weeks (results not shown) which shows that only in week 8 loneliness decreases significantly compared to week 7. Results of multilevel regression (Table 4) do not show convincing support for Hypothesis 1. In the full-light group,

**Table 4.** Regression of today's loneliness (range 1–7) on number of lessons ( $N$  respondents = 208,  $N$  observations = 5612).

	Full-light group				Light-full group			
	Full block program weeks 1–5		Light block program weeks 6–10		Light block program weeks 1–5		Full block program weeks 6–10	
	B	SE B	B	SE B	B	SE B	B	SE B
Intercept	4.41	1.15***	4.79	1.54**	4.42	1.28***	4.37	1.69*
Number of lessons taken	0.03	0.02	0.04	0.02	–0.06	0.02**	0.06	0.03*
Tempo (0–1)	–0.42	0.56	–0.73	0.85	1.38	0.56*	1.97	0.82*
Age (50–86)	–0.01	0.02	–0.03	0.02	–0.03	0.02	–0.05	0.03
Female (vs. male)	–0.66	0.32*	–0.08	0.45	–0.76	0.33*	–0.87	0.43*

Note. SE: Standard error

\* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$ .

**Table 5.** Regression of today's loneliness (range 1–7) on lessons topics ( $N$  respondents = 208,  $N$  observations = 5612).

	Full-light group				Light-full group			
	Full block program weeks 1–5		Light block program weeks 6–10		Light block program weeks 1–5		Full block program weeks 6–10	
	B	SE B	B	SE B	B	SE B	B	SE B
Intercept	4.42	1.15***	5.15	1.54**	4.18	1.28**	4.94	1.68***
Topic "Making new contacts"	–0.05	0.09	–0.17	0.09	0.21	0.10*	–0.14	0.14
Topic "Maintaining relationships"	0.16	0.09	–0.02	0.09	0.09	0.10	–0.12	0.14
Topic "Spending time alone"	0.04	0.09	–0.23	0.09*	0.14	0.10	–0.09	0.14
Topic "Becoming a better friend"	–0.06	0.09	0.01	0.09	–0.13	0.11	–0.12	0.14
Tempo (0–1)	–0.41	0.55	–0.73	0.85	1.39	0.56*	1.96	0.82*
Age (50–86)	–0.01	0.02	–0.03	0.02	–0.03	0.02	–0.05	0.03
Female (vs. male)	–0.67	0.32*	–0.09	0.45	–0.75	0.33*	–0.88	0.43*

Note. SE: Standard error. Topic 'Expectations in friendship' serves at category of reference.

\* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$ .

today's loneliness is not affected by the number of lessons that were taken in either block of the program. In the light-full group, today's loneliness decreased slightly in the light block (program weeks 1–5) as indicated by the negative estimate for the number of lessons but increased in the subsequent full block (program weeks 6–10).

Hypothesis 2 proposes that being involved in network development is more effective than being involved in adapting standards or reducing the importance of the discrepancy. The regression results (Table 5) show that there were hardly any differences in loneliness between involvement in the lessons on either type of coping in both groups, indicating that the hypothesis is not supported. The two significant parameters indicate—contrary

**Table 6.** Frequencies of assignments from today's evaluations.

	Full-light group	Light-full group	Total
Did conduct an assignment	815 (28%)	168 (8%)	983 (20%)
Evaluated as "Did not go well"	79 (3%)	25 (1%)	104 (2%)
Evaluated as "Went all right"	296 (10%)	64 (3%)	360 (7%)
Evaluated as "Went well"	440 (15%)	79 (4%)	519 (10%)
Did not do an assignment	1765 (60%)	443 (22%)	2208 (44%)
No assignment available (during light-lessons)	353 (12%)	1436 (70%)	1789 (36%)
Total	2933 (100%)	2047 (100%)	4980 (100%)

to the hypothesis—that being involved in regulative coping was more effective in the alleviation of today's loneliness than active coping.

Table 6 shows the frequencies of assignments conducted. Note that participants were not asked to conduct an assignment every day, which means that evaluations were not available for all assignments every day. A great majority (90%) of those who conducted an assignment and reported on it ( $n = 815$ ), evaluated it positively. We checked if participants who evaluated assignments as not going well ( $n = 104$ ) were more likely to dropout of the program. No differences were found in dropout in the first 6 weeks ( $\chi^2 = 1.48, p > .05$ ) or 11 weeks ( $\chi^2 = 0.83, p > .05$ ). In the full-light group, participants reported that they did an assignment and evaluated it positively (15%) more often than in the light-full group (4%). Table 7 shows the results of the regression models used to test Hypothesis 3. Because the participants in the light-full sequences had no assignments in the first (i.e., light) block of the program, only three models were examined. The hypothesis stating that conducting the program's assignments alleviates loneliness is partially supported by the results. Participants starting with the full block (program weeks 1–5) who evaluated the results of an assignment positively reported lower loneliness (assignment evaluated as went well:  $-0.22$  and assignment evaluated as "went all right":  $-0.20$ , respectively, on the scale with range 1–7). When they continued in the program and arrived at the light block (program weeks 6–10), they were still able to conduct assignments. The alleviating effect on loneliness is also shown here: when they evaluated the results of an assignment positively they reported lower loneliness ( $-0.32$ ). Participants starting with the light block were not asked to conduct assignments in program weeks 1–5. When they arrived at the full block and when they evaluated the results of an assignment as going well, they reported lower levels of loneliness ( $-0.40$ ). This result is similar to the full-light group. When the assignment did not go well, they reported higher levels of loneliness (the estimate is positive and indicates the comparison to participants who did not conduct the assignment). It appears that practicing is more effective than just reading about coping strategies or viewing videos, however, primarily when the exercise went well.

**Table 7.** Regression of today's loneliness (range 1–7) on the evaluation of assignments (N respondents = 208, N observations = 5612).

	Full-light group				Light-full group	
	Full block program weeks 1–5		Light block program weeks 6–10		Full block program weeks 6–10	
	B	SE B	B	SE B	B	SE B
Intercept	4.52	1.13***	4.70	1.51**	4.48	1.62**
Number of lessons taken	0.03	0.02	0.04	0.02	0.05	0.03
Lesson did not include assignment	–		0.00		–	
Assignment not conducted	0.00		–		0.00	
Assignment evaluated as “Did not go well”	0.17	0.16	0.44	0.22	1.00	0.25***
Assignment evaluated as “Went all right”	–0.22	0.10*	–0.12	0.11	0.31	0.16
Assignment evaluated as “Went well”	–0.20	0.09*	–0.32	0.09***	–0.40	0.14**
Tempo (0–1)	–0.22	0.55	–0.75	0.84	2.06	0.79*
Age (50–86)	–0.01	0.02	–0.03	0.02	–0.05	0.02
Female (vs. male)	–0.68	0.32*	–0.07	0.45	–0.91	0.41*

Note. SE: Standard error. The category of reference differs across the models. B = 0.00 refers to the category of reference effective in the model. A dash indicates a category not relevant under the condition.

\* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$ .

In all regression models (Tables 4, 5, and 7), we took into account the effect of tempo, age, and gender. From the estimates, it appears that fluctuations in today's loneliness were not associated with the tempo at which people follow the program in the full-light sequence. In the light-full sequence, however, a higher tempo (indicating being more on track) was associated with higher levels of today's loneliness. Today's loneliness did not differ by age. Women in the full-light sequence report lower levels of today's loneliness in the full block (program weeks 1–5), but there is no difference between men and women in the light block (program weeks 6–10). In the light-full sequence, women report lower today's loneliness throughout the entire program.

Given the baseline differences in loneliness on some of the demographic characteristics (partner and health), additional analyses were conducted to check if the effectiveness of the program also differs for these participants. Linear regression analyses were performed with loneliness directly after the program as dependent variable, and baseline loneliness and the five demographic characteristics as predictors. As can be seen in Table 8, no effects were found of age, gender, partner, children, or health.

## Discussion

This study builds on the cognitive approach to loneliness, in which loneliness is defined as a discrepancy between actual and desired relationships. In this study, we assessed three loneliness coping strategies in an online intervention for adults aged 50 and over. The aim of the study was to gain more insight in how engaging in different loneliness coping strategies alleviates loneliness.

**Table 8.** Linear regression of baseline social and emotional loneliness and demographic characteristics on loneliness directly after the program ( $N = 80$ ).

	Social loneliness (range 0–5)		Emotional loneliness (range 0–6)	
	B	SE B	B	SE B
Constant	1.84	1.88	2.44	1.70
Baseline social loneliness	0.84	0.13***	–	–
Baseline emotional loneliness	–	–	0.73	0.09***
Age (50–86)	–0.00	0.03	–0.02	0.02
Partner (yes/no)	0.35	0.37	0.18	0.34
Female (vs. male)	–0.75	0.47	–0.60	0.40
Children (yes/no)	0.22	0.46	–0.27	0.40
Health (good/poor)	–0.39	0.39	–0.14	0.33

Note. SE: Standard error. Social loneliness:  $F_{(6, 73)} = 19.37, p < .001; R^2 = .41$ ; emotional loneliness:  $F_{(6, 73)} = 14.98, p < .001, R^2 = .55$ .

\* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$ .

The FEP is a loneliness intervention that has demonstrated positive effects (Stevens et al., 2006). To gain a better understanding of how an intervention focused on friendship might contribute to the alleviation of loneliness and to attract a wider audience and, we adapted it into a self-guided online program (oFEP) and tested it among 239 men and women over age 50. The program started with a block of 5 weeks with full lessons, containing exercises and assignments, followed by a block of 5 weeks with less information and no assignments (light lessons). A second group of participants followed the program in the reversed sequence.

The program is based on the assumption that training people to apply various strategies to cope with loneliness helps them to alleviate loneliness. This hypothesis was supported by the data collected at baseline, at follow-ups after the first block and the entire program, and 1 year after baseline. Both social and emotional loneliness, assessed with scales of items not directly referring to loneliness, declined over the course of the study. In contrast to the loneliness that was assessed using scales, the course of loneliness assessed with a single, direct question in more frequent evaluation, did not demonstrate a clear decrease. We can only speculate about this difference in results. According to Victor, Grenade, and Boldy (2005), the answer on a direct question presents a public account of a person's loneliness to others and to one's self. At baseline rather high social and emotional loneliness scores on the loneliness questionnaire were observed, but the score on a single loneliness item was relatively low. People were less likely to admit that they felt lonely despite high levels of loneliness, which make a significant decrease less likely.

We also observed a difference between the two intervention groups: in the full-light group, no changes in today's loneliness were observed when they were in the program longer. In contrast, in the light-full group, today's loneliness decreased in program weeks 1–5 and increased in the weeks afterward. A possible explanation is that dropout was selective in the sense that people who started with the full content of the program were less susceptible for dropout than people who received the light block first. When the light block did not meet participants' expectations, the more skeptical participants were more

likely to dropout, leaving a group of participants with higher expectations of the program while entering the full-block. These higher expectations may not have been fulfilled by the program, leading to disappointment and perhaps stronger feelings of today's loneliness; the public account in this direct measurement might be more sensitive to disappointment than the item scales.

In Hypothesis 2, we proposed that being involved in network development is more effective than being involved in adapting standards or reducing the importance of the discrepancy. We did not find support for this hypothesis when we tested the association between the topic of the lesson in a particular program week and the reports on today's loneliness. Furthermore, we started under the assumption that the today's levels of loneliness were directly influenced by the content of the lessons. We, however, conclude that this assumption does not hold. Participating in a lesson on a specific topic does not unconditionally mean that the participant applied that specific content on the day they filled out the evaluation. Besides, all participants eventually followed all lessons with different contents.

We found support for Hypothesis 3 indicating that conducting assignments contributes to greater alleviation of loneliness. The results for social and emotional loneliness showed that the decline in loneliness in the 1st weeks was not different for participants in the full-light group (i.e., starting with a more intensive program) compared to those in the light-full group. At first sight, this suggests that we should reject Hypothesis 3. However, a more detailed understanding can be derived from the analysis of today's loneliness. Practicing coping strategies by doing assignments was indeed more effective than just reading course materials and watching videos. However, an important requirement for a positive effect is that the participant indicated that the exercise went well. If the participant reported that the exercise did not go well, it did not help to reduce today's loneliness—in fact, it increased.

In order to gain more insight in the reason why the program affects loneliness and for whom the program is more effective, we additionally checked whether demographic characteristics influence the effectiveness of the program. None of the demographic characteristics influences loneliness indicating that a decrease in loneliness is not caused by demographic factors.

### *Limitations and directions for future research*

This study has several limitations. We acknowledge that fluctuations in the number of today's evaluations that were filled out limit the conclusions we can draw from this data. Participants were asked to fill out a large number of evaluations. This could have led to reluctance to fill in questionnaires and thus contributed to lower perseverance in the later weeks of the program. Most daily evaluation studies focus on a 2-week period (Nezlek, 2012). We assumed that missed observations for daily sent questionnaires were missing at random and therefore did not lead to biased conclusions. However, participants who fill out more daily sent questionnaires are most likely the ones who carry on, not only in adherence to the program but also in their efforts to change their lives and might have benefitted the most from the program. This selection may have contributed to a difference in results from assessing today's loneliness and assessing loneliness at three follow-up observations.

The large dropout limits the strength of the conclusions that we can draw from this study. We do not know to what extent the program is effective for the participants who did not complete it. Although poor adherence is quite common in (self-guided) online interventions (Kelders, Kok, Ossebaard, & Van Gemert-Pijnen, 2012), this is an issue that deserves additional attention in future revisions of the program. As the field of online interventions develops this is a topic that is receiving more attention and it is argued that adherence might be improved by more focus on specific design of the interventions (Ludden, Van Rompay, Kelders, & Van Gemert-Pijnen, 2015).

Because the study uses a convenience sample, the generalizability of the results is limited. We do, however, want to emphasize that we were explicitly interested in people who feel the need to do something about their social situation and want to cope with loneliness.

The program may benefit from some improvements. For example, this first version of the oFEP is a self-guided, online adaptation of an existing group program. There might be additional value when guidance is included (Baumeister, Reichler, Munzinger, & Lin, 2014), for example, by a coach who stimulates adherence to the program, and in particular to conduct the assignments. In the current design, the program did not facilitate giving feedback on participants' actions. A coach might focus on these real-life exercises and provide feedback to make the program more effective in reaching the intended outcomes (Bangert-Drowns, Kulik, Kulik, & Morgan, 1991).

Hypothesis 2 tested the differences in effectiveness between the different coping strategies incorporated in the oFEP. From week to week, one strategy is followed by another, making it difficult to assess the effects of a specific strategy. An alternative is to develop separate programs for the three coping strategies, respectively. However, this contradicts our idea that stimulating people to use different coping strategies equips them optimally to deal with their loneliness. A future study can measure more directly the coping strategy participants engage in on a specific day in order to gain insight in the differential effect of the strategies.

It would prove valuable to have more fine-grained assessments of how participants valued each lesson and components of the lessons. It would also be interesting to have more detailed descriptions of how participants conducted the assignments, for example, with qualitative interviews. More fine-grained assessments would allow for more substantive interpretation of the results which helps to develop the program content wise in order to improve its effectiveness.

## **Conclusion**

Overall, we found that the oFEP helps to alleviate loneliness. The average decline in social and emotional loneliness was significant, although the average loneliness scores at the follow-up observations indicate that many participants are still lonely after the course. Stimulating engagement in the program's exercises is an essential element the oFEP, and when conducted successfully these are associated with a decline in loneliness. We conclude that in line with the FEP, the oFEP is a promising intervention technique for the alleviation of loneliness. Results suggest that an online approach, combined with



attention to multiple loneliness coping strategies and activating assignments, is a contribution to the already existing loneliness interventions.

There are many advantages of this online approach to a loneliness intervention. To our knowledge, Internet interventions to reduce loneliness are limited to either training people's computer skills in order to increase opportunities for online contact (Choi, Kong, & Jung, 2012; Seepersad, 2015) or reducing loneliness by getting people involved in online contacts such as e-mail, chat rooms, or forums (Horgan, McCarthy, & Sweeney, 2013; Seepersad, 2015; Stewart, Barnfather, Magill-Evans, Ray, & Letourneau, 2011). In contrast, the oFEP is unique because it aims to encourage people to engage in new contacts, maintain existing contacts, but also pays attentions to their expectations in friendship, and encourages them to examine whether or not these are problematic or not. Indirectly, there is thus attention for maladaptive social cognitions, which, according to Masi et al. (2010), is the most promising tactic for loneliness interventions. This first study shows that the oFEP, a broadly focused, self-guided, online program, contributes to the alleviation of loneliness. The program reached a large group of (lonely) participants to whom the program offers knowledge of different loneliness coping strategies to equip them to take action on or reevaluate their situation.

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