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심리학석사 학위논문

Indirect Effect of Loneliness on  
Social Anxiety through  
Social Self-efficacy

외로움이 사회적 자기효능감을 통해  
사회불안에 미치는 간접효과

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# Indirect Effect of Loneliness on Social Anxiety through Social Self-efficacy

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# Abstract

Because of the changes in contemporary society, loneliness has become an increasingly important social issue that affects both mental and physical health. Although loneliness appears to have a particularly strong connection to social anxiety, the pathway from loneliness to social anxiety is poorly understood. Thus, this study aimed to not only investigate a pathway between loneliness and social anxiety but also examine how social self-efficacy mediates their relationship. Although a direct relationship between loneliness and social self-efficacy has not been examined in detail, the close relationship between the two variables has been indicated in several studies. Moreover, since the impact social self-efficacy has on social anxiety is evident from previous studies, social self-efficacy is expected to play a role in mediating the pathway between loneliness and social anxiety.

In Study 1, the indirect effect of loneliness on social anxiety was examined by using self-report. Independent impacts loneliness has on subtypes of social anxiety were tested through various scales (SPS-6/ SIAS-6, SAQ). Data analysis showed that, while loneliness showed significant indirect effects to all subtype of social anxiety, social interaction anxiety, compared to other facets of social anxiety, was more strongly associated with loneliness.

In Study 2, an experimental study was designed to examine the causal effects of loneliness on social anxiety. Although existing studies have indicated the impact of loneliness on social anxiety, the relationship between loneliness and social anxiety is still vague. In accordance with previous studies, this study used loneliness

manipulation in a controlled environment to examine the causal role of loneliness in social anxiety. Mediation variable was social self-efficacy as it was in Study 1. The result showed that reduced loneliness predicts higher social self-efficacy, which in turn lowers social anxiety. However, increased loneliness affected neither social self-efficacy nor social anxiety. In bootstrapping analysis, the indirect effect of loneliness on social anxiety was significant at 95% confidence level.

This study contributes to the understanding of the indirect role loneliness has on social anxiety and specifies the pathway using survey and experimental approach. Implications and limitations are also discussed along with suggestions for future studies.

**Keyword:** Loneliness, Social anxiety, Social self-efficacy, Indirect effect

**Student Number:** 2016-20187

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# **Introduction**

Loneliness and the feeling of being unwanted  
is the most terrible poverty.

-Mother Teresa

Belongingness is a human need fundamental for people to feel accepted by others. A large number of previous studies have reported that social relationship is closely linked to physical health, psychiatric morbidity and progress of diseases (Cohen, 2004; MacDonald & Leary, 2005). A recent systematic review (Siette, Cassidy, & Priebe, 2017) showed that supportive emotional relationship improves one's physical and mental health conditions. Similarly, social isolation was correlated with having a severe mental illness (Linz & Sturm, 2013) and worse fitness consequences (Hawkley & Capitano, 2015). In other words, belongingness is a double-edged sword that can either protect or threat individual's health.

Meanwhile, structural changes in our modern society has made people vulnerable to social isolation and loneliness. The world's rapid aging (see Figure 1) has become one of the causes for the increase in the number of isolated older adults, which requires considerable social attention (Dickens, Richards, Greaves, & Campbell, 2011). Although keeping positive relationships amongst older adults has been suggested as a possible solution for this problem (Gabriel & Bowling, 2004; Giummarra, Haralambous, Moore, & Nankervis, 2007), it is hard to overlook other reasons, such as stressful working environments and bereavement, leading to feelings of loneliness that

cannot be solved by simply promoting positive social relationships (Falk, Hanson, Isacsson, & Ostergren, 1992; Hansson & Stroebe, 2007).

Another significant change in today's world is rapidly growing one-person household (Hall, Ogden, & Hill, 1997; Wulff, 2001). In South Korea, due to economic and cultural transformations, the proportion of single-person household that had been 12.7% in 1995 has gradually risen to 27.2% by 2015 (Lee, Noh, & Choi, 2011; Statistics Korea, 2016). According to the report by the KB Financial Group Business Research Center (2017), individuals living alone have reported their most significant concern to be loneliness and psychological stability rather than safety or residential environment. This result indicates that increasing single-person household may connect to increase in people experiencing loneliness, which ultimately may become one of the causes for severe health problems in current society. Emerging research about the impact social relationships has on loneliness could be understood based on this context.

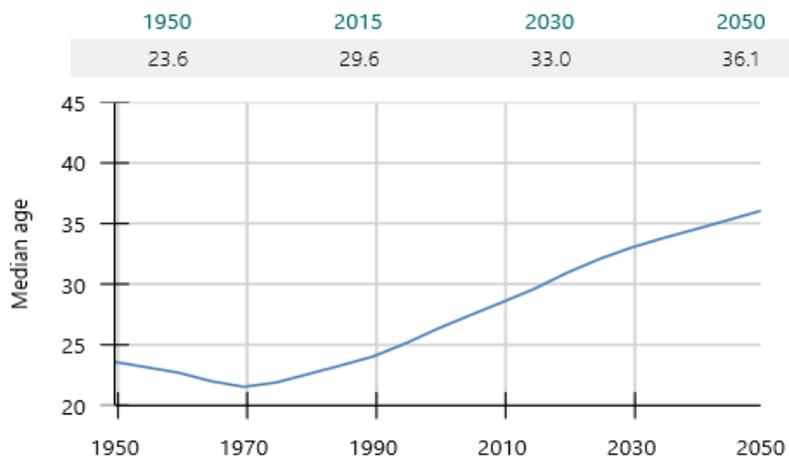


Figure 1. Median age of the population (years)

World population aging 2017 report. (DeSA, U.N., 2017)

Nevertheless, while many previous studies have been focusing on the simple connections between social relationships and various disorders, there has been lack of studies investigating the detailed mechanism (Leigh–Hunt et al., 2017; Ong, Uchino, & Wethington, 2016). A few recent studies attempted to examine the causal effects of loneliness on social isolation, but the developmental pathway is still unclear (Hawkley & Cacioppo, 2003).

## **Social Isolation and Loneliness**

Studies regarding social relationships divide their focus into two discrete concepts: social isolation and feeling of loneliness. While these concepts are closely associated, social isolation and loneliness may be differentiated depending on whether the idea is based on an objective measure or perceived feeling. Loneliness refers to perceived social isolation, which is more associated with the quality of the relationships than the actual numbers of connections (Peplau & Perlman, 1982; Wheeler, Reis, & Nezlek, 1983). A lonely person perceives a gap between one’s social needs and social relationship status and evaluates being alone as negative. On the other hand, even if a person lives a solitary life, one may not feel lonely depending on her social needs (Hawkley & Cacioppo, 2010; Holwerda et al., 2012; Pinqart & Sorensen, 2001).

Then how do objective social isolation and feelings of loneliness function differently? While many previous studies have targeted older adults or adolescents rather than the general population, they may

provide a bridge in understanding the difference in the roles of the two concepts. For example, the study by Cornwell and Waite (2009) showed that despite both objective and subjective social isolation being associated with physical health, only perceived isolation (loneliness) was strongly linked to mental health. Another study showed that loneliness significantly predicts the outcome of diseases whereas living alone does not (Tomaka, Thompson, & Palacios, 2006). In a meta-analytic review (Uchino, Cacioppo, & Kiecolt-Glaser, 1996), perceived social connectedness or support was more strongly linked with better immune system, lower levels of autonomic nervous system activity and lower stress hormones than did actual social exclusion.

In sum, loneliness is regarded as a critical factor in mental disorders and may be considered as a potential risk factor for health. Further studies should investigate the developmental pathway of loneliness for effective prevention and intervention of mental illness.

## **Loneliness and Mental Disorders**

As the study by Cornwell and Waite (2009) have suggested, loneliness has been found to be a common experience in people with different mental disorders including those with psychotic disorders (O Sündermann, Onwumere, Bebbington, & Kuipers, 2013; Oliver Sündermann, Onwumere, Kane, Morgan, & Kuipers, 2014), dementia (Kuiper et al., 2015), depression (Cacioppo, Hawkey, & Thisted, 2010), social anxiety disorder (Teo, Lerrigo, & Rogers, 2013) and internet use disorder (Ceyhan & Ceyhan, 2008) regardless of

severity (M. H. Lim, Rodebaugh, Zyphur, & Gleeson, 2016). As for suicidal behavior, loneliness was associated with both suicidal ideation and suicide attempts (odds ratio=17.37 past 12-month suicide attempt) even after controlling for common mental disorders such as depressive episodes or anxiety (Stickley & Koyanagi, 2016).

In all, loneliness and mental disorders clearly seem to be related, but the causal effect of loneliness on mental disorders has been not been extensively studied. Fortunately, recent studies have begun to investigate the impact of loneliness on particular mental disorders, providing essential evidence about loneliness as a risk factor for mortality. For example, in a 5-years cross-lagged study in Chicago, USA, loneliness predicted the succeeding changes in depressive symptomatology but not vice versa (Cacioppo et al., 2010). Likewise, a systematic review of longitudinal cohort studies showed that loneliness is a statistically significant risk factor for dementia (Kuiper et al., 2015). In a recent experimental study, impacts of loneliness on paranoia has been revealed (Lamster, Nittel, Rief, Mehl, & Lincoln, 2017).

Nevertheless, many previous studies on the impact of loneliness have been limited to depression; other mental disorders have rarely been subjects of focus (M. H. Lim et al., 2016; Trémeau, Antonius, Malaspina, Goff, & Javitt, 2016). This may be because former studies concluded that it is depression alone that has strong relationship with loneliness. However, recent studies showed loneliness to be more than that. According to a population-based study, loneliness was linked to all mental disorders, and the most associated mental disorder was not depression (odds ratio=19.85) but social anxiety (odds ratio = 11.66) (Meltzer et al., 2013). Moreover, the recent

short-term longitudinal study showed that loneliness plays a momentous role in social anxiety rather than on depression (M. H. Lim et al., 2016). This indicates that the studies on the impact of loneliness on other mental illness, including social anxiety, are necessary.

### **Loneliness and Social Anxiety Disorder**

Social Anxiety Disorder (SAD, i.e., social phobia) is a mental disorder characterized by fear or avoidance of social situations in which the individual may be scrutinized by others (American Psychiatric Association, 2013). The epidemiology study based on Diagnostic and Statistical Manual of Mental Disorders (DSM-5; APA, 2013) found that lifetime prevalence of SAD was 13.0%, showing that SAD is one of the most common disorders after major depressive episode (29.9%) and specific phobia (18.4%) (Kessler, Petukhova, Sampson, Zaslavsky, & Wittchen, 2012). SAD is not only prevalent but also considered a fatal illness, significantly predicting suicide ideation and suicidal attempts (Bentley et al., 2016; Buckner, Lemke, Jeffries, & Shah, 2017), thus requiring clinical attention.

SAD could be understood using two or more dimensions. Early researchers proposed two related but distinct facets of SAD: (1) social anxiety for scrutiny while performing in public and (2) more general fears of social interaction (Leary, 1983; Liebowitz, 1987; Mattick & Clarke, 1998). Based on previous findings, DSM-5 added specifications for SAD (“Performance situations”) diagnosis so that it requires the fear of patient to be restricted only to speaking or

performing in public (APA, 2013).

On the other hand, recent large population (n=18,467) based study (Caballo, Arias, Salazar, Irurtia, & Hofmann, 2015) suggested a five-factor structure of SAD as follows: (1) interactions with strangers, (2) speaking in public/talking with people in authority, (3) interactions with the opposite sex, (4) criticism and embarrassment, and (5) assertive expression of annoyance, disgust, or displeasure. Although more investigation is needed to make multi-dimensions of SAD clear, this classification may allow understanding various types of individual's social anxiety (Caballo et al., 2015).

With all these considerations, then how is loneliness associated with social anxiety and its subtypes? The importance of the interaction between loneliness and social anxiety disorder has been suggested from early studies (Anderson & Harvey, 1988; Cheek & Busch, 1981; Jones, Rose, & Russell, 1990; Leary, 1990), although empirical approach to causal effect of loneliness has been not been paid much attention (Teo et al., 2013). While the influence of loneliness on fear of negative evaluation (Cacioppo et al., 2006) and social anxiety (Lim et al., 2016) has been dealt with, specific pathways are yet vague. Regarding the fatal consequences of loneliness and social anxiety, understanding the pathway from loneliness to social anxiety is in high demand.

Given this background, this study first looked into previous studies to explore how loneliness affect social anxiety. The exploration was done in the following order: 1) common conceptual feature of loneliness and social anxiety, 2) the cognitive model of loneliness and social anxiety, and 3) social self-efficacy

## 1) Common conceptual feature of loneliness and social anxiety

The fact that loneliness and social anxiety share a common ground may not be surprising, given that experiencing a problem in a social situation is the primary concern of both variables (Jones et al., 1990). A lonely person perceives insufficient social belongingness (Peplau & Perlman, 1982), while a person who with social anxiety fears rejection from others (Baumeister & Tice, 1990). This infers that both loneliness and social anxiety are provoked by the difference between one's social need and present status. This common conceptual feature indicates that loneliness has a close relationship with social interaction (de Jong-Gierveld, 1987; Leary, 1990), in that, a number of social anxiety studies have used the social interaction anxiety scale (Fung, Paterson, & Alden, 2017; Lim et al., 2016).

While assuming a close association between loneliness and social interaction anxiety seems reasonable, the relationship of loneliness and different facets of SAD is not clearly understood for two reasons. First, regarding the high correlation between social interaction and social performance anxiety ( $r=.41\sim.89$ ), it is hard to exclude the potential association between loneliness and social performance anxiety (Brown et al., 1997; Heimberg, Mueller, Holt, Hope, & Liebowitz, 1992; Peters, Sunderland, Andrews, Rapee, & Mattick, 2012; Stangier, Heidenreich, Berardi, Golbs, & Hoyer, 1999). Moreover, only a few previous studies have indicated a connection between loneliness and social performance (Storch & Masia-Warner, 2004; Vitkus & Horowitz, 1987). For example, Vitkus and Horowitz (1987) reported that lonely people made lower self-evaluations than people who are

not lonely about themselves in situations requiring social performances. An empirical study investigating the relationship between loneliness and subtypes of social anxiety is further required for a more accurate analysis.

## **2) The similarity between the cognitive models for loneliness and social anxiety.**

While each cognitive models for loneliness and social phobia have been developed separately, the processes for these cognitive models are very similar. In the cognitive model of social phobia (Figure 2), the individual immediately perceives social danger in the social situation after making dysfunctional assumptions about herself and her social world. The cognitive process of loneliness (Figure 3) likewise goes through a perceived social treat step ('perceived social isolation,') at the first level. Furthermore, individuals experiencing either social phobia or loneliness are similar in making attentional or memory biases when reacting in fear against social cues. This has been shown repetitively in previous studies (Bangee, Harris, Bridges, Rotenberg, & Qualter, 2014; Bögels & Mansell, 2004; Cacioppo & Hawkley, 2009; Foa, Gilboa-Schechtman, Amir, & Freshman, 2000; Rapee, McCallum, Melville, Ravenscroft, & Rodney, 1994). These individuals are trapped in the vicious cycle of cognitive bias where they fail to let go of the negative thoughts or behaviors. These similarities between the two cognitive models provide evidence for the strong association between loneliness and social anxiety.

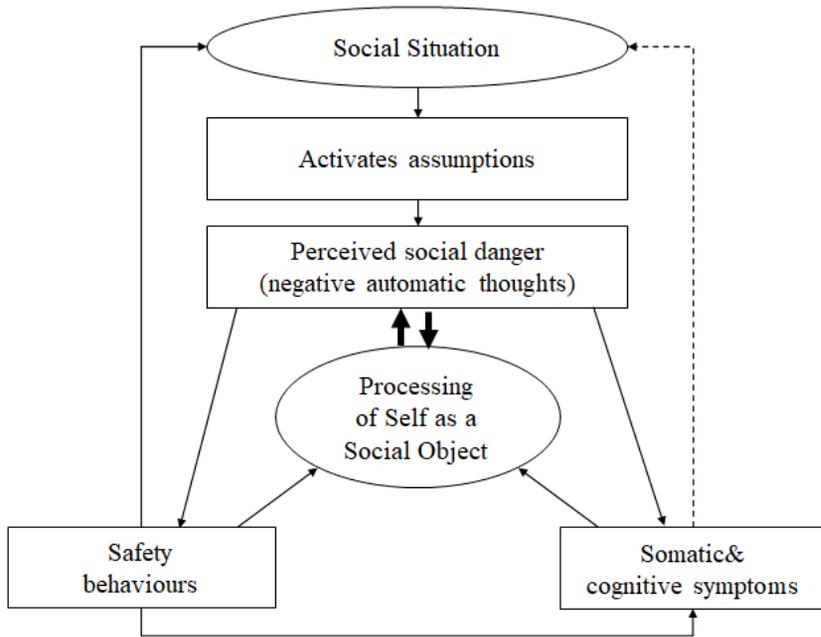


Figure 2. A model of the processes that are hypothesized to occur when social phobic enters a feared social situation (Clark & Wells, 1995).

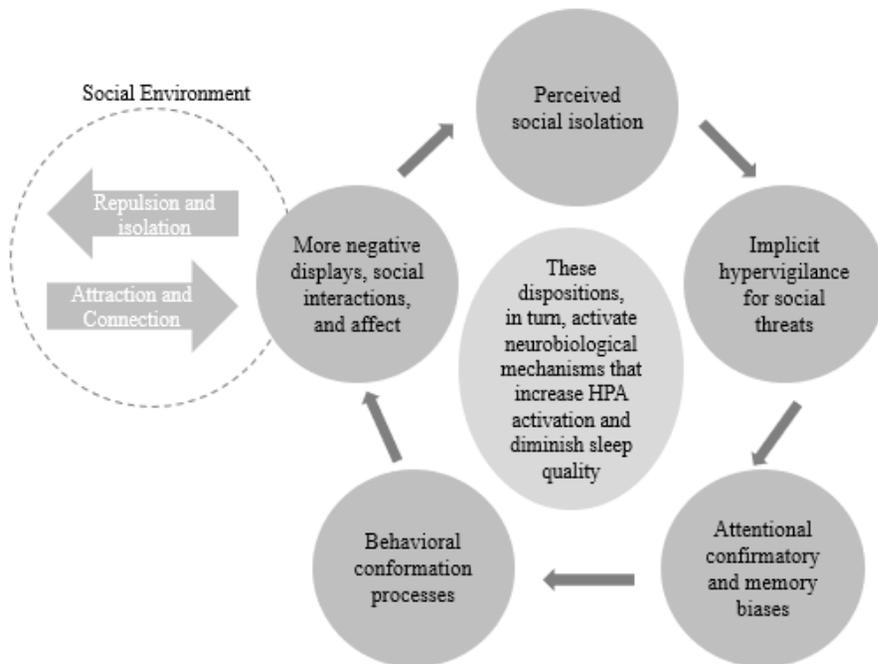


Figure 3. The effects of loneliness on human cognition (Cacioppo & Hawkey, 2009).

Meanwhile, the effect loneliness can have on individuals' cognition could also be presumed to underlie the two cognitive models. If an individual feels lonely and becomes more hypervigilant to social threats, the individual might be easily subjected to negative automatic thoughts that result in social anxiety. (This may occur vice versa and may also explain the interaction effects between the two variables.)

### **3) Social Self-efficacy**

Another potential variable that can explain the pathway from loneliness to social anxiety is social self-efficacy. According to the social-cognitive theory of Bandura (1977, 1986), self-efficacy is a belief whether an individual can act to get an expected goal, and it shapes in persisting behaviors of the individual. Similarly, social self-efficacy refers to individual's self-efficacy in a social situation that influences developing new friendships as well as setting social contacts (Gecas, 1989). It gives confidence to the individual and allows for the individual to conjure the proper social impression she desires to convey.

Based on these definitions, previous studies have investigated the effects of social self-efficacy, including its negative relationship with loneliness and social anxiety (Goldin et al., 2012; Leary, 1983; Lim, Lee, & Choe, 2004). Leary and Atherton (1986) suggested that low self-efficacy expectancies result in heightened social anxiety and vice versa. Although not as thoroughly studied as social anxiety, negative correlation between loneliness and social self-efficacy has was also

indicated (Wei, Russell, & Zakalik, 2005). In intervention studies, successful loneliness intervention influenced lower self-efficacy (Blazer, 2002), while higher self-efficacy predicted lower social anxiety (Maddux & Kleiman, 2012). The concept of social efficacy and social self-efficacy were somewhat mixed in loneliness and social anxiety studies. However, considering that both variables are social emotion, related studies could be understood within an umbrella.

Therefore, social self-efficacy has important implications in that it could not only explain various behavioral outcomes of individuals in social situations but also is expected to clarify the distinction between loneliness and social anxiety. Considering that reduced loneliness affects increased social self-efficacy and that higher social self-efficacy predicts lower social anxiety, it can be hypothesized that loneliness affects social anxiety through social self-efficacy. However, studies that have investigated the relationship between three variables are absent to date.

### **Purpose of the Present Study**

In terms of socio-cultural-economic changes in our modern society, loneliness is getting attention as an important social issue. Rapid aging and steeply increasing single person household are making people become more vulnerable to loneliness. Studying loneliness is also important in a clinical aspect because loneliness is known to have significant associations with health, especially for mental illness.

Nevertheless, although complicated and strong relationships between loneliness and mental illness are seen evident, the specific pathways explaining how loneliness affects mental illness has been underexamined. Particularly, the pathway from loneliness to social anxiety is little understood despite them having one of the strongest relationships among mental disorders. This highlights the importance of providing additional explanations for effective prevention and treatment of social anxiety.

Therefore, this study aimed to specify the causal role of loneliness to social anxiety by focusing on the mediation process. Correlation between loneliness and subtypes of social anxiety was investigated first to understand the concrete relationship between the two variables. Social self-efficacy was postulated as one of the important mediation variables, as it gives shape to the indirect effect of loneliness,

Accordingly, Study 1 was designed to investigate the correlation and mediation effect between loneliness and subtypes of social anxiety using survey. This self-report study has an advantage in efficiently comparing the subtypes of social anxiety. Moreover, it allows us to statistically test the discriminative mediation role of social self-efficacy on subtypes of social anxiety.

In Study 2, an experimental paradigm was conducted to examine the indirect effects of loneliness on social anxiety. The mediative role of social self-efficacy was same as that of Study 1, but loneliness manipulation in the controlled environment was expected to reveal the causal effect of loneliness. After manipulating loneliness, participants were asked to engage in a social situation to test whether their social self-efficacy and anticipated social anxiety changed by

the manipulation.

# **Study 1. Relationship between loneliness and subtypes of social anxiety: The mediation effect of social self-efficacy**

Study 1 is a survey research designed to test the indirect effect of loneliness on social anxiety. To understand the relationship between loneliness and social anxiety, exploring the discriminative role of loneliness in correlation with social anxiety subtypes would be a fundamental step. Furthermore, testing the indirect effect of loneliness has an importance that could reveal the path from loneliness to social anxiety. While there are emerging evidences of the impact of loneliness on social anxiety (Cacioppo et al., 2006; M. H. Lim et al., 2016), how loneliness develops social anxiety is still unclear. For efficient prevent and treatment of social anxiety, investigating specific path from loneliness to social anxiety is required.

For the first step, this study used correlation analysis to explore the relationship between loneliness and subtypes of social anxiety. Based on their common conceptual feature, previous studies have suggested a strong association between loneliness and social interaction anxiety (Jones et al., 1990), but there is no evidence that how loneliness is associated with other subtypes of social anxiety.

Social self-efficacy has been taken into account as a mediation variable for testing the indirect pathway of loneliness on social anxiety. Social self-efficacy refers personal belief of how well one can deal with prospective social situation and effects on individual's real behavior (Bandura, 1986). It is also known to be influenced by

loneliness and has negative impacts on social anxiety (Blazer, 2002; Maddux & Kleiman, 2012; Tsai, Wang, & Wei, 2017). In other words, the potential mediation effect of social self-efficacy has been indicated.

Given the background, Study 1 hypotheses are as follows.

#### Hypothesis 1

Loneliness would be more positively associated with social interaction anxiety than social performance anxiety (in case of SAQ, interaction related subtypes, F1 and F3, would be more positively associated than that of other types)

#### Hypothesis 2.

Loneliness would have a positive indirect effect on social anxiety through social self-efficacy even after controlling depression.

# Method

## Participants

A total of 240 participants from Seoul National University (SNU) undergraduate students who received psychology course credit took part in. Students were informed and completed the online survey through the R-point system. R-point is a research participation system managed by the department of psychology at SNU. Three people of the sample were identified as outliers and excluded. The remaining 237 participants ranged in age from 17 to 26 ( $M= 19.70$ ,  $SD=1.63$ ), with 54% males and 46% females (males:  $N=130$ , females:  $N=107$ ). All procedure of the study were performed under an approved IRB protocol(1703/002-003) at SNU.

## Measures

### Revised UCLA Loneliness Scale (RULS)

This is the Korean version of Revised UCLA Loneliness Scale, a 20-item self-report measure assessing general loneliness (O. S. Kim, 1997; Russell, Peplau, & Cutrona, 1980) Each item of RULS has a 4-point Likert-type scale ranging from 1 (never) to 4 (often). In this study, the internal consistency for RULS was excellent ( $\alpha = .93$ ).

### Social Phobia Scale-6 (SPS-6)/Social Interaction Anxiety Scale-

## 6(SIAS-6)

The SPS-6 and SIAS-6 are a companion set questionnaire assessing two types of social anxiety disorder (Kim, Yoon, & Kwon, 2013; Mattick & Clarke, 1998; Peters et al., 2012). The scales consist 6-items of each and using the 5-point Likert-type scale. Score range from 0 (not at all characteristic or true of me) to 4 (Extremely characteristic or true of me).

SPS/SIAS was initially developed as a 40-item length scale (Mattick & Clarke, 1998), but Peters et al. (2012) have modified to the short form, named SPS-6/SIAS-6, for reducing respondent burden. Korean version of SPS-6 and SIAS-6 were translated and validated by S. J. Kim et al. (2013), and the scales demonstrated the excellent shortened forms of SPS/SIAS with minimizing validity sacrifice.

In this study, the internal consistency of SPS-6 ( $\alpha = .81$ ) and SIAS-6 ( $\alpha = .80$ ) were acceptable.

## Social Anxiety Questionnaire (SAQ)

This is the Korean version of SAQ, the 30-item self-report scale assessing social anxiety for adults (Caballo et al., 2015; J. Lee, 2017). SAQ has five subtypes, indicating the specific social situation that an individual feels anxiety. The factors were marked: 1) Interactions with strangers (F1), 2) Speaking in public/talking with people in authority (F2), 3) Interactions with the opposite sex (F3), 4) Criticism and embarrassment (F4), and 5) Assertive expression of annoyance, disgust or displeasure (F5). In this study, these five subtypes are expected to discriminate the specific social anxiety

circumstances that a lonely individual could experience.

For each item, participants are asked to answer the level of unease or nervousness about each social situation. Items of SAQ were rated on a 5-point Likert-type scale, ranging from 1 (not at all) to 5 (very high or extremely high). The internal consistency was .92 in the data from this study.

### **Social Self-Efficacy Scale (SSES)**

This SSES (Cho & Lee, 2001) is a 13-item scale, modified version of the Self-efficacy Scale for Social Interaction (Cho & Won, 1997). The original version consisted 8-items that composed of social interaction only, but Cho and Lee (2001) reformed the scale by adding five social performance situation for general social anxiety research. Participants are asked to report that how much confidence they have in dealing with the specific social condition (e.g., a meeting with teacher or professor). Each item has an 11-point Likert-type scale from 0 (I can not do it at all) to 10 (I can do it very well). The internal consistency of the SSES was excellent ( $\alpha = .92$ ).

### **Center for Epidemiological Studies-Depression scale (CES-D)**

This Korean version of CES-D is a 20-item self-report questionnaire, measuring the frequency of depressive symptoms during the past week (Jeon, Choe, & Yang, 2001; Radloff, 1977). Participants are asked to respond on a 4 point Likert-type scale ranging from 0 (rarely: less than 1 day) to 3 (most or all of the time: 5-7 days). The internal consistency of the questionnaires was

excellent in this study ( $\alpha = .93$ ).

## Data Analysis

Descriptive statistics were calculated for all the variables. Pearson's  $r$  correlation was used to investigate the discriminative relation between loneliness and subtypes of social anxiety. For comparison of correlation coefficients, Z-test was conducted. Moreover, the indirect effect of loneliness was tested (H2), using the PROCESS Macro (Hayes, 2013) with 10,000 bias-corrected bootstrap samples.

Baron and Kenny (1986)'s causal step approach is the general method many researchers use. However, previous studies have shown that procedures of Baron and Kenny lead to the lowest in power among the intervening variable methods (Fritz & MacKinnon, 2007; MacKinnon, Lockwood, Hoffman, West, & Sheets, 2002). Another criticism of the causal step approach is that it does not truly measure the indirect effect, in turn, increases a probability of a decision error (Hayes, 2009; MacKinnon, Fairchild, & Fritz, 2007).

Sobel (1982, 1986) proposed Sobel's test which has more power than the approach of Baron and Kenny, but it also has flaws because of its normality assumption. If the sample is skewed or has a small size to have a normal distribution, a probability of Type II error would be inclined.

Hayes's PROCESS is a non-parametric test using bootstrap method thereby redeeming defects of previous approaches. A resampling technique bootstrapping is not violated by normal

assumption and high in power compared to the Sobel's test (Preacher & Hayes, 2008). In this study, 95% confidence interval was used for examining the indirect effect. Statistical analyses were performed using IBM SPSS statistics 23.

## Results

Table 1 presented means and standard deviations for loneliness, social anxiety, and social self-efficacy. Depression was measured for effective control.

Table 1. *Mean and Standard Deviation of Each Variable (N=237).*

	Mean	SD
RULS	37.12	9.82
SPS-6/SIAS-6	9.03	6.52
SPS-6	4.36	3.60
SIAS-6	4.66	3.82
SAQ	77.32	17.33
F1	13.68	4.60
F2	13.37	4.64
F3	13.77	4.70
F4	18.86	4.43
F5	16.65	4.64
SSES	77.64	21.67
CES-D	16.46	10.77

*Note.* RULS= Revised UCLA Loneliness Scale; SPS-6=Social Phobia Scale 6; SIAS-6= Social Interaction Anxiety Scale-6; SAQ=Social Anxiety Questionnaire; F1=Interactions with strangers; F2=Speaking in public/talking with people in authority; F3=Interactions with the opposite sex; F4=Criticism and embarrassment; F5=Assertive expression of annoyance, disgust or displeasure; SSES=Social Self-Efficacy Scale; CES-D=Center for Epidemiological Studies-Depression scale

## Correlation between variables

Pearson's correlation coefficient was computed to assess the relationship between observed variables, displayed in Table 2. All correlations were statistically significant at  $p < .05$ . As predicted, loneliness was more strongly related to social interaction anxiety (SIAS;  $r = .61$ ,  $p < .01$ ) than social performance anxiety (SPS;  $r = .27$ ,  $p < .01$ ). In SAQ, the correlation of interaction related subtypes such as F1 ( $r = .51$ ,  $p < .01$ ) and F3 ( $r = .48$ ,  $p < .01$ ) were higher than criticism or assertion related subtypes (F4;  $r = .17$ ,  $p < .01$ ; F5;  $r = .19$ ,  $p < .01$ ).

Table 2. *Pearson's Correlation Coefficient  $r$  Between Variables ( $N = 237$ )*

	1	2	3	4	5	6	7	8	9	10	11
1. RULS	-										
2. SPS-6 /SIAS-6	.50**	-									
3. SPS-6	.27**	.87**	-								
4. SIAS-6	.61**	.89**	.54**	-							
5. SAQ	.47**	.71**	.54**	.70**	-						
6. F1	.51**	.64**	.43**	.69**	.83**	-					
7. F2	.42**	.60**	.47**	.59**	.81**	.69**	-				
8. F3	.48**	.54**	.39**	.56**	.73**	.57**	.51**	-			
9. F4	.17**	.41**	.38**	.34**	.70**	.45**	.43**	.30**	-		
10. F5	.19**	.47**	.38**	.44**	.70**	.39**	.41**	.34**	.47**	-	
11. SSES	-.48**	-.52**	-.35**	-.56**	-.60**	-.62**	-.68**	-.46**	-.25**	-.24**	-
12. CES-D	.61**	.35**	.21**	.40**	.34**	.32**	.35**	.26**	.17*	.18**	-.31**

*Note.* RULS= Revised UCLA Loneliness Scale; SPS-6=Social Phobia Scale 6; SIAS-6= Social Interaction Anxiety Scale-6; SAQ=Social Anxiety Questionnaire; F1=Interactions with strangers; F2=Speaking in public/talking with people in authority; F3=Interactions with the opposite sex; F4=Criticism and embarrassment; F5=Assertive expression of annoyance, disgust or displeasure; SSES=Social Self-Efficacy Scale; CES-D=Center for Epidemiological Studies-Depression scale; \*\* $p < .01$ , \* $p < .05$

The subtype F2, containing both performance and interaction social anxiety, showed an intermediate level of the correlation coefficient ( $r=.42, p<.01$ ) which is higher than that of F4 and F5 but slightly lower than that of F1 and F3.

Feeling of loneliness was associated with greater social anxiety regardless its subtypes ( $r=.17\sim.61, p<.01$ ) and less social self-efficacy ( $r=-.48, p<.01$ ). Social self-efficacy was also negatively correlated with social anxiety questionnaires (SPS-6/SIAS-6;  $r=-.52, p<.01$ , SAQ;  $r=-.60, p<.01$ ). Increased depression (CES-D) was correlated with greater loneliness ( $r=.61, p<.01$ ), more social anxiety, (SPS/SIAS-6;  $r=.35, p<.01$ , SAQ;  $r=.34, p<.01$ ) and less social self-efficacy ( $r=-.31, p<.01$ ).

Comparison of correlation coefficients, presented in Table 3, showed that the correlation of loneliness and social interaction anxiety (SIAS-6) was significantly higher than that of social performance anxiety (SPS-6) ( $z=-4.67, p<.01$ ).

Table 3. Comparison of correlation coefficients (z score) between loneliness and subtypes of Social anxiety (N=237)

	1	2	3	4	5	6	7
1. SPS-6	-						
2. SIAS-6	-4.67***	-					
3. F1	-3.09**	-1.58	-	.			
4. F2	-1.84 <sup>+</sup>	-2.82**	-1.24	.-			
5. F3	-2.66**	-2.01*	-0.43	-0.81	-		
6. F4	1.14	-5.81***	-4.23***	2.98**	3.80***	-	
6. F5	0.91	5.59***	-4.01***	2.76**	3.58***	-0.22	-

Note. SPS-6=Social Phobia Scale 6; SIAS-6= Social Interaction Anxiety Scale-6; F1=Interactions with strangers; F2=Speaking in public/talking with people in authority; F3=Interactions with the opposite sex; F4=Criticism and embarrassment; F5=Assertive expression of annoyance, disgust or displeasure; \*\*\* $p<.001$  \*\* $p<.01$ , \* $p<.05$ , <sup>+</sup> $p<.1$

In SAQ, F4 and F5 revealed a significantly lower relationship with loneliness than other subtypes. However, the correlation coefficient of F2 was not significantly different from that of interaction related subtypes, F1 and F3 (see Table 3).

### **Indirect effect**

The primary goal of this study was to examine whether social self-efficacy mediates the effects of loneliness on social anxiety. It was hypothesized that this would be the case even after controlling for depression. Following the statistical approach by Hayes (2013), unstandardized coefficients and standard errors of the indirect models were shown in Table 4. Effects of indirect models were provided in Table 5 with 95% biased-corrected confidence interval.

As can be seen in Table 5, *Figure 4*, and *Figure 5*, the results showed that estimated indirect effect of loneliness was all significant at 95% confidence level. Because zero did not fall between the lower and upper confidence intervals, it could be concluded that the models revealed the indirect effect of loneliness regardless of social anxiety subtypes.

Although all indirect effects of loneliness and social anxiety subtypes were significant, direct effects of loneliness and SPS-6, F2, F4, and F5 were not significant. There was no evidence that loneliness influenced those dimensions of social anxiety of its effect on social self-efficacy.

Table 4. *Coefficients and Standard Errors of the Indirect Model (SE in Parentheses; N=237)*

Outcomes (Social anxiety)	Effects of social self- efficacy on Outcome(b)	Direct effect (c')	Total effect (c)
SPS-6/SIAS-6	-.11*** (.02)	.19** (.05)	.31*** (.05)
SPS-6	-.05*** (.01)	.03 (.03)	.08 <sup>+</sup> (.03)
SIAS-6	-.06*** (.01)	.17*** (.03)	.23*** (.03)
SAQ	-.39*** (.05)	.36** (.12)	.75*** (.13)
F1	-.10*** (.03)	.13** (.03)	.23*** (.03)
F2	-.13*** (.01)	.24 (.03)	.16*** (.04)
F3	-.07*** (.01)	.18*** (.04)	.24*** (.03)
F4	-.04** (.01)	.02 (.04)	.05 (.04)
F5	-.04** (.02)	.02 (.04)	.07 (.04)

*Note.* Effects: unstandardized coefficient; RULS== Revised UCLA Loneliness Scale; SPS-6=Social Phobia Scale 6; SIAS-6= Social Interaction Anxiety Scale-6; SAQ=Social Anxiety Questionnaire; F1=Interactions with strangers; F2=Speaking in public/talking with people in authority; F3=Interactions with the opposite sex; F4=Criticism and embarrassment; F5=Assertive expression of annoyance, disgust or displeasure; \*\*\* $p < .001$  \*\* $p < .01$ , \* $p < .05$ , <sup>+</sup> $p < .1$

Table 5. *Indirect Effects of Loneliness on Social Anxiety through Social Self-efficacy*

Outcomes (Social anxiety)	Indirect Effect	95% Biased-corrected Confidence Interval
SPS-6/SIAS-6	.11	.06 to .17
SPS-6	.05	.02 to .14
SIAS-6	.06	.11 to .21
SAQ	.39	.12 to .60
F1	.11	.07 to .15
F2	.13	.08 to .19
F3	.07	.03 to .11
F4	.04	.02 to .08
F5	.04	.01 to .08

*Note.* 10,000 bootstrap samples. SPS-6=Social Phobia Scale 6; SIAS-6= Social Interaction Anxiety Scale-6; SAQ=Social Anxiety Questionnaire; F1=Interactions with strangers; F2=Speaking in public/talking with people in authority; F3=Interactions with the opposite sex; F4=Criticism and embarrassment; F5=Assertive expression of annoyance, disgust or displeasure.

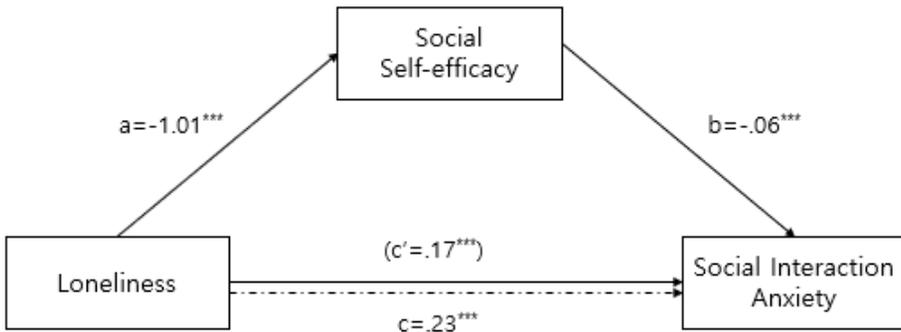


Figure 4. Indirect effect of loneliness on social interaction anxiety (SIAS-6) through social self-efficacy.

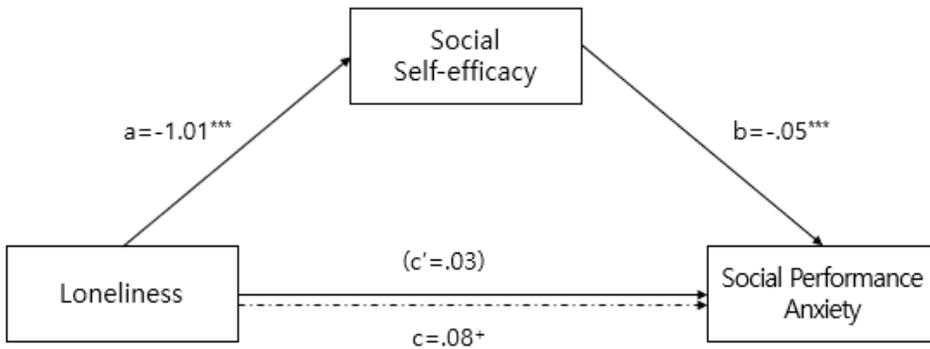


Figure 5. Indirect effect of loneliness on social performance anxiety (SPS-6) through social self-efficacy.

## Discussion

In Study 1, correlation and indirect effect between loneliness and social anxiety were investigated by the self-report scale. First, the correlation coefficients between loneliness and subtypes of social anxiety were all statistically significant. As hypothesized, subtypes of social interaction anxiety showed a higher correlation with loneliness than that of other subtypes. This result supported the suggestion of previous studies based on the conceptual definition.

The intriguing findings were different correlation levels of social phobia scale (SPS-6) and Factor 2 (F2; Speaking in public/talking with people in authority) of SAQ. Although both subtypes were characterized as social performance anxiety, F2 showed higher correlation coefficient ( $r=.42$ ) with loneliness whereas SPS-6 revealed lower correlation coefficient ( $r=.27$ ) with loneliness. In the analysis of comparing correlation coefficients, the correlation of F2 was not statistically different from that of interaction related anxiety, but SPS-6 revealed significant difference.

This distinction between the two types might result from the difference of each item. For instance, items of SPS-6 are more closed to measuring nervous of being attention in public (e.g., I get nervous that people are staring at me as I walk down the street, I worry I might do something to attract the attention of other people.). On the other hand, items of F2 tend to reflect feelings of individual in simple speaking or that of in public (e.g., speaking in public, participating in a meeting with people in authority). This indicates that loneliness might be differently associated with social anxiety depending on the characteristic of social situation.

Similarly, other subtypes of social anxiety, F4 (Criticism and embarrassment) and F5 (Assertive expression of annoyance, disgust or displeasure) suggested a relatively weak relationship between loneliness and shame/arguing in a social situation. Since feeling of shame and arguing are secondary emotion, this result support that loneliness is more strongly associated with social interaction situation itself rather than feeling shame or nervous.

Next, in mediation analysis using PROCESS macro (Hayes, 2013), the indirect effect of loneliness on subtypes of social anxiety were all statistically significant even after controlling for depression. This result was consistence with hypotheses and showed the probability that loneliness might predict social anxiety regardless its types. On the other hand, SPS-6, F2, F4, and F5 were not significant for direct effect, indicating that non-interaction social anxiety is impacted by loneliness not directly, but indirectly.

In sum, social interaction anxiety was more highly related with loneliness than other subtypes of social anxiety including secondary emotion (e.g., embarrassment, assertion, nervous to being attention). Moreover, the indirect effect of loneliness on social anxiety via social self-efficacy was indicated.

## **Study 2. Indirect effect of loneliness on social anxiety through social self-efficacy: An experimental approach**

Study 2 was an experimental study to test whether loneliness has an indirect effect on social anxiety through social-self efficacy. The same prediction was tested in Study 1, but it has a limitation that the survey study at the single point in time could not explain the causal effect of loneliness on social anxiety. Therefore, Study 2 employed an experimental procedure to examine the role of loneliness against social self-efficacy and social anxiety in the controlled laboratory.

A number of laboratory methods were considered to increase or decrease loneliness. Cacioppo et al. (2006) used hypnosis for an experimental paradigm, but it was hard to adapt to this study because of lack of the professional requirement.

Manipulating future loneliness paradigm with false feedback was suggested by Baumeister, Twenge, and Nuss (2002) but provoking future aloneness was not appropriate for investigating loneliness effect on social anxiety. In addition, this paradigm is used for both social exclusion and loneliness studies and it makes unclear whether the paradigm produces objective social exclusion or feeling of loneliness (Rozek, 2013; Snyder, 2014; Twenge, Baumeister, Tice, & Stucke, 2001). Cyberball game (Williams, Cheung, & Choi, 2000) paradigm was also excluded because its interpersonal ostracism is more closed to objective exclusion rather than loneliness.

To the best of knowledge, an experimental paradigm designed by Lamster and Wildschut was considered to be the most appropriate

method for loneliness manipulation without professionalism (Lamster et al., 2017; Wildschut, Sedikides, Arndt, & Routledge, 2006). Wildschut et al. (2006) originally suggested this paradigm with modified loneliness scale and false feedback. It was initially designed for two groups (high loneliness group, and control group), but Lamster et al. (2017) extended it by adding a low loneliness group after a decade. Each previous studies investigated the impact of loneliness on nostalgia (Wildschut et al., 2006) and paranoia (Lamster et al., 2017)

As a result, this study used experimental paradigm by Lamster et al. (2017) and added anticipating social situation procedure for provoking anticipated social anxiety. For measuring social self-efficacy in an experimental environment, 1-item state social self-efficacy was added. Because existing social self-efficacy scale is asking about general self-efficacy in various situation, another scale that suits in the experimental situation was required.

Study 2 hypothesis were as follows.

Hypothesis 1. Induction of loneliness would decrease state social self-efficacy and increase anticipated social anxiety.

Hypothesis 2. Reduction of loneliness would increase state social self-efficacy and decrease anticipated social anxiety.

Hypothesis 3. Induction or reduction of loneliness would have a positive indirect effect on anticipated social anxiety through state social self-efficacy.

# Method

## Participants

Participants, 75 Seoul National University (SNU) undergraduate students, were drawn from in three different ways. First, 35 students were recruited through the research participation system of SNU Psychology department (R-point system). They received psychology course credit as a reward. Another 22 students were recruited via the advertisement in SNU online community (SNULife) and paid 7,000 won for their participation. Lastly, 18 students of Study 1 were recruited by mobile text message. These students had previously agreed to participate in Study 2 and provided their contact number to the researcher. The reward for Study 1 participants was the same as that of SNULife participants. Age of participants ranged from 18 to 25 ( $M = 20.64$ ,  $SD = 2.01$ ) and showed equilibrium gender ratio (males:  $N = 38$ , females:  $N = 37$ ).

To conceal the experimental manipulation to potential participants, Study 2 was advertised as a revised loneliness scale development research. Participants were asked to response questionnaire and to have videotaped discussion as a part of validating the scale.

All participants signed informed consent, and the study is conducted under an approved IRB protocol (1703/002-003) at SNU.

## Measures

### Social Phobia Scale-6 (SPS-6), Social Interaction Anxiety Scale-6 (SIAS-6)

The scale used in Study I assessed again. The internal consistency of each subtype was good (SPS-6  $\alpha = .87$ , SIAS-6  $\alpha = .85$ )

### Loneliness manipulation check item.

This is a 1-item question, a modified Korean version of loneliness manipulation check item, designed to assess state loneliness to check whether the individual's loneliness has been increased or decreased. The original version item was "Right now I feel a bit lonely (Lamster et al., 2017; Wildschut et al., 2006).", However, an underlined part of the item has been removed because of confusing connotation in Korean (i.e., "Right now I feel lonely."). It was rated on a 10-point Likert-type scale ranging from 1 (I strongly disagree) to 10 (I strongly agree).

### Social Self-Efficacy Scale-Trait (SSES-T)

The scale used in Study 1 assessed again. This scale named as social self-efficacy scale-trait (SSES-T) in Study 2 to discriminate from the state social self-efficacy scale below. The internal consistency was excellent (at time1:  $\alpha = .93$ , time2:  $\alpha = .94$ ),

### Social Self-Efficacy Scale-State (SSES-S)

The SSES-S is a 1-item question which is assessing the individual's perceived level of self-confidence for the discussion in

the experiment (e.g., how well you think you cope with the discussion after a while?). Participants were asked to respond on a nine Likert-type scale ranging from 0 (I can not do it at all) to 8 (I can do it very well)

### **State Anxiety Inventory Form Y (STAI-Y)**

This Korean version of STAI-Y is a 20-item self-report questionnaire designed to measure state anxiety in the specific circumstance (Hahn, Lee, & Chon, 1996; Spielberger, Gorsuch, & Lushene, 1970). For each item, a 4-point Likert-type scale was used ranges from 1 (not at all) to 4 (very high or extremely high). In this study, STAI-Y was used for measuring anticipated social anxiety, and the internal consistency of the STAI-Y was excellent at both time 1 and time 2 (at time1:  $\alpha = .92$ , time2:  $\alpha = .92$  )

### **Design and procedure**

This experimental design is based on previous loneliness studies (Lamster et al., 2017; Wildschut et al., 2006) that examined the impact of loneliness using manipulation. To investigate the effect of loneliness on anticipated social anxiety, a procedure notifying participants to have social situation was added. Although the participants would not be involved in the real social situation, this announcement is expected to provoke anticipated social anxiety to them. The experimental processes of Study 2 are depicted in *Figure 6*, and an average time for completion of the experiment was 25 minutes.

Details of the experiment for each step were as follows:

### **Baseline assessment**

All participants are asked to complete questionnaires including socio-demographic data, SPS-6/SIAS-6 (social anxiety scale), state Loneliness, SSES-S (social self-efficacy scale-state), SSES-T (social self-efficacy scale-trait), and STAI-Y (state anxiety scale).

### **Random assignment**

75 participants were randomly assigned to the three group; High Loneliness Group (HL, n=25) Low Loneliness Group (LL, n=25), and Control Group (CG, n=25). The randomization list was generated by free computer algorithm (<http://www.random.org>)

### **Manipulating Loneliness**

Loneliness manipulation was assessed in three steps.

#### ① Modified RULS test

Individuals were asked to complete the Revised UCLA Loneliness Scale (Russell et al., 1980) items which were modified for each group. HL individuals received questions that were phrased to induce high loneliness score. For example, the original item “I feel in tune with the people around me.” was turned into “I always feel in tune with the people around me.” with adding an adverb. This modification was expected not only result in a high sum of loneliness score but also make the individual be more persuaded to the experimenter’s false feedback at the next stage. The item for

LL is likewise modified such as “I sometimes feel in tune with the people around me.” and were expected to result in the low sum of loneliness. The individuals of CG received the original version of RULS items.

② Manipulated Feedback

After the first step, the experimenter gave artificially shaped feedback paper to the participants regarding their level of loneliness. The paper presented *t* score and percentages of loneliness with the plot, and short interpretation containing the following information;

HL: Compared to 237 persons of your age, gender, and education level, you had a very high score for loneliness. Your loneliness score is in top 12% of loneliness distribution. It means that you are less satisfied with your social contacts, friends and romance relationship compared to others who have a lower score.

Interpretation for LL was against that of HL. For CG, a neutral feedback based on the data of Study 1 was provided.

③ Write down about the Feedback

This step is used to strengthening the loneliness manipulation. Participants are asked to write down the reason about their loneliness score with specific examples in their daily life as many as possible.

## Social situation noticed

After manipulating loneliness, participants were notified that they would have videotaped discussion designed to provoke whether for social interaction anxiety or social performance anxiety. Experimenter told participants that the debate would be held at the next room for 3 minutes and participant's eye contacts, the tone of voice, physical reaction, errors of logic will be scored by two investigators during the discussion. A discussion topic was not given to participants.

## Post-assessment

Participants were asked to answer the post assessments (state Loneliness, SSES-S (social self-efficacy scale-state), SSES-T (social self-efficacy scale-trait), and STAI-Y (state anxiety scale) which were masked as "baseline assessment for the discussion stage."

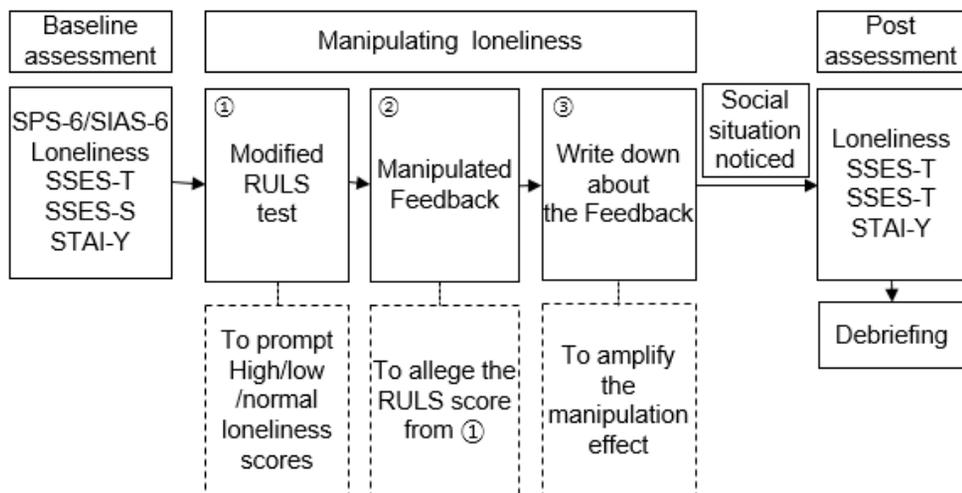


Figure 6. Experimental procedures for each participant.

## **Debriefing**

Lastly, Participants were fully clarified on the purpose of the study and told that there would be no discussion session. The experimenter apologized to the participants for the deception within the experiment.

## **Data Analysis**

Chi-square test and one-way ANOVA were undertaken to examine the difference of social demographics and baseline assessment at Time 1. If distribution did not satisfy a normality assumption, Kruskal-Wallis test was performed.

To test the loneliness manipulation as well as to assess the effects of loneliness on social self-efficacy and state anxiety (H1 and H2), the paired t-tests or Wilcoxon signed rank tests were conducted. For each analysis, baseline and post scores of the variables were compared.

Moreover, to test whether differences of loneliness provoke increase or decrease of social self-efficacy and state anxiety, one-way ANOVA with change score (e.g., difference score or gained score) was conducted instead of using repeated ANOVA. The change score analysis focuses on the difference between baseline and post-assessment, whereas repeated ANOVA focuses on the posttest differences between the groups while controlling pretest differences (Becker, 2000). Since the aim of this step is investigating the difference of between the groups, change score analysis could be preferable as Rogosa, Brandt, and Zimowski (1982) recommended for individual change with two data points. Kruskal-Wallis analysis

was conducted when the normality assumption had not satisfied, For the post hoc tests, Tukey's HSD was used in normal distribution data otherwise Dunn-Bonferroni test(also called Duun's test) was used. The Kolmogorov-Smirnov test was conducted to examine normality.

Subsequently, the indirect impact of loneliness on state anxiety through social self-efficacy(H3 and H4) was assessed using MEMORE Macro(Montoya & Hayes, 2017) which is optimal for analysis two-condition within-participant mediation model. Based on the causal approach of Judd, Kenny, and McClelland (2001), Montoya and Hayes (2017) extended the previous study by the path-analytic framework with bootstrapping and Monte Carlo confidence interval. Unlike Judd et al. (2001) MEMORE does not require conditional processes of mediation and focuses on the direct and indirect effect. Effects are calculated by difference scores of the mediating variables, different scores of the dependent variables, and centered means of the mediators. Using path-analytic method makes more power than the original causal steps with direct comparison of the indirect effect.

Following recommendations by Montoya and Hayes (2017), the statistical analysis using MEMORE Macro for IBM SPSS 23 was performed with 10,000 bootstrap samples and 95% confidence interval.

## Results

### Baseline differences between the groups

Table 6 presents mean scores and standard deviations for sociodemographic data. There was no difference between the three groups (HL, LL, and CG) of the participants at the baseline test regarding age ( $F(2, 74)=0.622, p=0.54$ ), gender ( $\chi^2(2)=.107, p=0.95$ ), a number of people who can give you help when you are difficult ( $F(2, 74) = 0.477, p=0.62$ ). Moreover, the three groups were comparable in the baseline scores of state loneliness ( $H(2)=1.4405, p=0.49$ ), SIAS-6/SPS-6 ( $H(2)=.17894, p=.0.91$ ); SPS-6 ( $H(2)=.578, p=0.75$ ); SIAS-6 ( $H(2)=.533, p=0.77$ ), STAI-Y ( $F(2,72) = .544, p=0.58$ ), SSES-S ( $H(2)=2.4275, p=0.30$ ) and SSES-T ( $F(2, 72)=.454, p=0.64$ ). This indicates that at least the sample is not biased in terms of baseline characteristics. Mean, standard deviation, as well as effect size for baseline, post assessment, and change scores were presented in Table 7.

Table 6. *Sociodemographic Data of Each Group.*

	HL (N=25)		LL (N=25)		CG (N=25)		F ( $\chi^2$ )
	Mean	(SD)	Mean	(SD)	Mean	(SD)	
Age	20.32	(1.84)	20.64	(2.12)	20.93	(2.11)	.62
Gender (male/female ratio)	12/13	-	13/12	-	13/12	-	.95 <sup>a</sup>
People who can give you help <sup>b</sup>	7.40	(4.70)	8.08	(5.04)	8.96	(6.97)	.48

*Note.* HL: High Loneliness Group; LL: Low Loneliness Group; CG: Control group; <sup>a</sup>:  $\chi^2$  coefficient, <sup>b</sup>: The original questionnaire was ‘number of people who can give you help when you are difficult.’

Table 7. Mean and Standard Deviation (in brackets), and Effect Size for the Scales in Experimental Conditions.

	High Loneliness group (N=25)				Low Loneliness group (N=25)				Control Group (N=25)			
	BL	Post	Change	ES	BL	Post	Change	ES	BL	Post	Change	ES
Loneliness	3.88 (1.79)	5.00 (1.85)	1.12*** (1.30)	.67	4.24 (1.99)	3.04 (1.70)	-1.20*** (1.00)	.81	4.56 (1.96)	4.56 (2.06)	0.00 (1.35)	.00
SSES-S	5.52 (1.45)	5.60 (1.29)	0.08 (0.70)	.06	4.84 (1.52)	5.44 (1.33)	0.60** (0.76)	.60	5.00 (1.32)	5.08 (1.15)	0.08 (0.70)	.11
SSES-T	89.48 (19.42)	87.84 (17.6)	-1.64 (5.60)	.10	87.80 (25.81)	89.48 (25.48)	1.68 (8.11)	.07	83.56 (22.23)	84.28 (23.45)	0.72 (4.94)	.03
State												
Anxiety (STAI-Y)	41.68 (7.48)	42.44 (8.98)	0.76 (6.26)	.09	40.84 (9.69)	38.36 (8.2)	-2.48*** (3.16)	.28	43.28 (7.88)	41.44 (7.36)	-1.84* (3.80)	.25
SPS-6	11.04				10.80				10.00			
/SIAS-6	(1.60)				(1.59)				(1.41)			
SPS-6	5.44 (5.00)				4.36 (3.95)				4.44 (3.96)			
SIAS-6	5.60 (4.07)				6.44 (4.50)				5.56 (3.80)			

Note. BL: baseline assessment; Post: post assessment; Change: (mean)pre-post change score ES: effect size for the change score (using Cohen's d or r depending on normality). STAI-Y: State Anxiety Inventory Form Y; SSES-S: Social Self-Efficacy Scale-State, SSES-T: Social Self-Efficacy Scale-State-Trait, SPS-6: Social Phobia Scale-6; SIAS-6; Social Interaction Anxiety Scale-6 \*\*\* $p < 0.001$ , \*\* $p < 0.01$ , \* $p < 0.05$ .

## Manipulation check

Wilcoxon Signed-Ranked test was conducted to assess whether the loneliness score was differed by manipulation in an expected way. As can be seen in Table 7 and *Figure 7*, the experimental manipulation effects were largely successful. From the baseline (Time1) to post (Time2) assessment, loneliness score was significantly increased in HL ( $T=30$ ,  $p=.000$ ,  $r=.67$ ) and significantly decreased in LL ( $T=210$ ,  $p=.000$ ,  $r=.81$ ). Score difference in CG was not significant ( $T=14$ ,  $p=1$ ,  $r=0$ ) as predicted.

## Impacts of loneliness on social self-efficacy and state anxiety.

To test causal impacts of loneliness, Paired T-test and Wilcoxon Sign-Rank tests were performed depending on normality. As hypothesized, reduced loneliness in LL condition increased state social self-efficacy ( $T=0$ ,  $p=.002$ ,  $r=.60$ , large effect) and decreased social anxiety ( $t(24)=3.92$ ,  $p=.000$ , Cohen's  $d=.28$ , small effect) (see Table 7 and *Figure 7*). However, HL condition showed no significant difference with state social self-efficacy ( $T=18$ ,  $p=.61$ ,  $r=.06$ , little effect) and state anxiety ( $t(24)=-.61$ ,  $p=.55$ ,  $r=.09$ , little effect). On the other hand, in CG, a change of state self-efficacy was not significant ( $T=10.5$ ,  $p=.58$ ,  $r=.11$ , little effect) but state anxiety showed a significant difference at  $p<.05$  ( $t(24)=2.42$ ,  $p=.02$ , Cohen's  $d=.25$ , small effect). Trait social self-efficacy did not significantly change within all groups (HL:  $t(24)=1.46$ ,  $p=.16$ , Cohen's  $d=.10$ ; LL:  $t(24)=-1.04$ ,  $p=.31$ ,  $d=.07$ ; CG:  $t(24)=-0.74$ ,  $p=.46$ , , Cohen's

$d=.03$ ).

### (MEAN)PRE-POST CHANGE

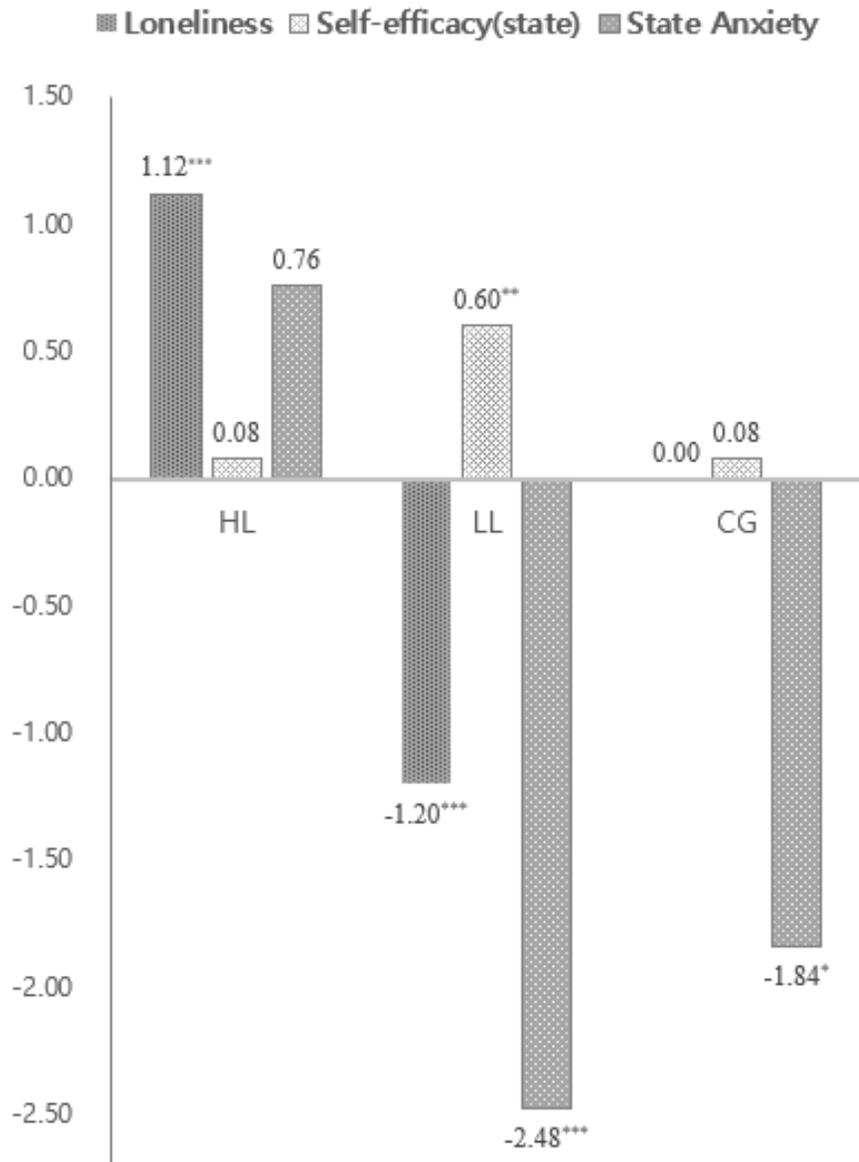


Figure 7. The impact of loneliness on self-efficacy(state) and state anxiety.

Notes: HL: High Loneliness, LL: Low Loneliness, CG: Control Group; \*\*\* $p < 0.001$ , \*\* $p < 0.01$ , \* $p < 0.05$

To examine the total difference scores of social self-efficacy and state anxiety, one-way ANOVA was assessed. If the data did not satisfy the assumption of normality, Kruskal-Wallis test was conducted. As can be seen in Table 8, the change was statistically significant between the groups for state anxiety ( $F(2)=3.47$ ,  $p=.04$ ,  $\eta^2=.09$ ) and state social self-efficacy ( $H(2)=7.49$ ,  $p=.02$ ,  $\eta^2=.17$ ). The difference in trait social self-efficacy was not significant as predicted ( $F(2)=1.82$ ,  $p=.17$ ,  $\eta^2=.05$ ).

Table 8. *Summary of One-way ANOVA (Kruskal-Wallis test) with Change Score Results.*

	Mean(Standard Deviation)			$F$ ( $H$ )	$\eta^2$
	HL	LL	CG		
State Anxiety (STAI-Y)	0.76(6.26)	-2.48(3.16)	-1.84(3.80)	3.47*	.09
SSES-S	0.08(0.70)	0.60(0.76)	0.08(.70)	7.49*	.17
SSES-T	-1.64(5.60)	1.68(8.11)	0.72(4.84)	1.82	.05

*Note.* F: One-way ANOVA statistics; H: Kruskal-Wallis test statistics; HL: High Loneliness; LL: Low Loneliness; CG: Control Group; ES: effect size (using  $\eta^2$ ). STAI-Y: State Anxiety Inventory Form Y; SSES-S: Social Self-Efficacy Scale-State, SSES-T: Social Self-Efficacy Scale-State-Trait, \* $p<.05$ .

Tukey's HSD test revealed that state anxiety in HL was significantly different from that of LL at 95% significance level ( $p=.04$ ). However, state anxiety scores of HL ( $p=.12$ ) and LL ( $p=.88$ ) did not significantly differ from CG.

Nonparametric Dunn's test was conducted to examine state

social self-efficacy difference between the three conditions. The result showed that increased change of social self-efficacy in LL significantly differed from HL ( $p=.04$ ) and CG ( $p=.08$ ) at  $p<.1$  significance level. However, score difference between HL and CG ( $p=1.0$ ) was not significant.

As trait social self-efficacy was not significantly changed by the difference of loneliness, a prerequisite for mediation analysis was not satisfied. In that, further mediation analysis did not test mediation model with trait social self-efficacy.

### **Mediation effect of social self-efficacy.**

Using within-participant mediation analysis MEMORE with 10,000 bootstrapping, the mediation effect was estimated to lie between .15 and 1.25 with 95% Monte Carlo confidence interval. Because zero is not in the 95% confidence interval, the result showed that loneliness indirectly influenced to state anxiety through its effect on state social self-efficacy. As can be seen in *Figure 8*, loneliness negatively influenced to state social self-efficacy ( $a=-.25, [-.42$  to  $-.08]$ ,  $p<.01$ ) and state social self-efficacy also negatively affected to state anxiety ( $b=-2.44, [-3.85$  to  $-1.02]$ ,  $p<.001$ ). However, direct effect was not significant ( $c'=.57, [-.50$  to  $1.64]$ ,  $p<.05$ ).

This result is seen inconsistent with the outcome of Study 1 which revealed both direct and indirect effect. However, considering characteristic of an empirical study that is known to use to find a short-term causal effect, the pathway of loneliness might be through social self-efficacy, rather than feeling social anxiety directly. It is

hard to explain casual pathway of loneliness from the result of a cross-sectional survey in Study 1, and more delicate future study is needed.

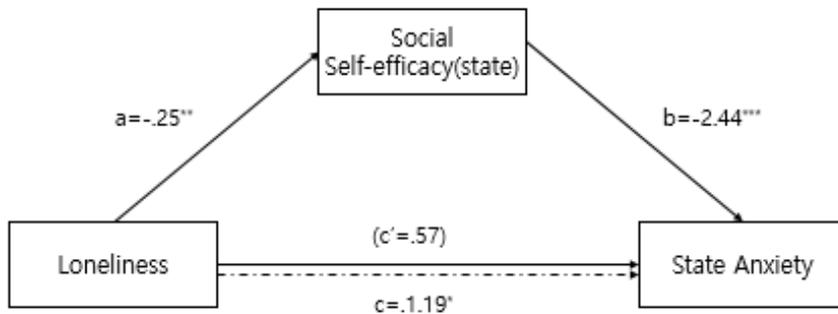


Figure 8. Indirect effect of loneliness on state anxiety through state social self-efficacy.

## Discussion

Based on the result of Study 1, Study 2 experimentally investigated the role of loneliness on anticipated social anxiety through social self-efficacy. Loneliness manipulation developed by previous studies was used to examine the causal role of loneliness (Lamster et al., 2017; Wildschut et al., 2006). For provoking anticipated social anxiety, participants were informed that they would have a discussion which is related to both performance and interaction social anxiety. Baseline test, manipulation check test, comparing means test (e.g., t-test, repeated ANOVA) and MEMORE

Macro(Montoya & Hayes, 2017) were conducted to analyze the indirect effect of loneliness. Loneliness manipulation test showed the successful result in randomly assigned groups. In other words, loneliness score was increased or decreased differentially in the experimental conditions as predicted.

Based on this result, comparing means tests revealed that reduced loneliness predicts increased state social self-efficacy as well as decreased anticipated social anxiety. This result is consistent with hypothesis 2 that indicates the causal effect of loneliness. However, difference scores of social self-efficacy and anticipated social anxiety were not significant in HL condition group. The outcome of HL is seen inconsistent with the result in LL condition group, but this could be explained by comparing the power of effect size.

First, the effect size of anticipated state anxiety in LL condition group was more substantial(Cohen's  $d=.28$ ) than that of HL condition groups(Cohen's  $d=.09$ ). Similarly, effect size of social self-efficacy of LL ( $r=.60$ ) was much larger than that of HL( $r=0.06$ ). According to Lamster et al. (2017), relatively low effect power in HL condition group might result from the limitation of experimental design because participants are becoming more habituated to the experimenter during the experimental process. Getting accustomed to the experimental environment may result in relatively lower anticipated social anxiety and higher state social efficacy scores. Statistically significant, but lesser effect size of anticipated social anxiety in CG(Cohen's  $d=.25$ ) might be explained in the same context. Resembling results were also found in prior experimental studies(Lamster et al., 2017; Lincoln, Lange, Bureau, Exner, & Moritz,

2009). There was no difference in state social self-efficacy of CG. As hypothesized, a difference in trait social self-efficacy was not significant with any three conditions.

In the one-way ANOVA analysis with change score, the result revealed significant effects with anticipated state anxiety and state social self-efficacy, supporting reduced loneliness has an impact on greater state social self-efficacy and less anticipated social anxiety. Effects of trait social self-efficacy was not statistically significant again in one-way ANOVA analysis.

After finding the causal support of reduced loneliness as hypothesized, mediation analysis was assessed for the primary goal of this study. Although loneliness has been considered as a risk factor of social anxiety, the specific path was not clear. One potential pathway might be found in the mediation process that loneliness effects to anticipated social anxiety through social self-efficacy. MEMORE Macro (Montoya & Hayes, 2017), designed for experimental study, was used for testing indirect effect of loneliness.

In the result of the mediation test, loneliness revealed the significant indirect effect on anticipated social anxiety via state social self-efficacy. However, the direct pathway between loneliness and anticipated social anxiety was not significant. This finding indicates the full mediation effect of social self-efficacy from loneliness to social anxiety.

On the other hand, taking the process of Study 2 into account, interpretation of this empirical study should be careful. State social self-efficacy scale was provided to the participants ahead of state anxiety scale, but the time gap between two scales was very close. Since social self-efficacy is known as an interacting variable with

social anxiety (Leary, 1983), the comprehensive causal step should be investigated in future replication.

In summary, the reduction of loneliness impacts on increasing state social self-efficacy as well as reducing anticipated social anxiety were indicated in Study 2. Loneliness was not associated with trait social self-efficacy in the short-term experiment. Moreover, the mediation effect of state social self-efficacy was significant between loneliness and anticipated social anxiety whereas the direct impact of loneliness on anticipated social anxiety showed no evidence. This result is expected to contribute to the developmental pathway of loneliness on social anxiety.

## General Discussion

In this study, association between loneliness and social anxiety has been investigated, focusing on the indirect pathway through social self-efficacy. In order to test hypotheses, Study 1 used self-report scales for survey study and Study 2 conducted experimental paradigm to confirm the result of Study 1.

In Study 1, mediation effect of social self-efficacy between loneliness and social anxiety was investigated including analysis of subtypes of social anxiety. Effect of loneliness was tested while controlling depression. The result of correlation analysis supported previous studies suggesting that loneliness is more strongly connected with social interaction anxiety than other types of social anxiety. Feeling of loneliness showed higher correlation with simple performance behaviors rather than feeling nervous or fear in social performance situation. On the other hand, mediation effect of social self-efficacy was significant between loneliness and social anxiety regardless of its type.

To extend the result of Study 1, Study 2 conducted experimental approach using loneliness manipulation. The result showed that reducing loneliness causes promoting state social self-efficacy and decreasing anticipated social anxiety. The total effect of increased or decreased loneliness also revealed its substantial impact on state social self-efficacy and anticipated social anxiety. However, impact of increased loneliness alone did not predict significant changes. The indirect effect of loneliness was statistically significant but was not in direct effect. Moreover, trait social self-efficacy difference was not significant from pre to post-assessment.

Indication and importance of this study are as follows. First, this study aimed to find a pathway from loneliness to social anxiety and explored relationships between loneliness and subtypes of social anxiety. Association of interaction social anxiety and loneliness has been suggested, yet empirical study was underexamined. This attempt would be a foundational contribution for revealing the more specific relationship between loneliness and social anxiety among increasing loneliness studies.

Second, this study has importance about having an experimental approach to identify the causal role of loneliness on social anxiety. To the best of knowledge, it is the first time to attempt to investigate the impact of loneliness on social anxiety with loneliness manipulation. This study found that reduced loneliness has its impacts on improving state social self-efficacy and decreasing anticipated social anxiety using 25min experimental paradigm. Although High Loneliness condition group did not show significant impacts, the overall result indicates the possible causal role of loneliness considering the effect size of the groups. This is also in accordance with recent studies suggesting loneliness as a potential transdiagnostic factors of mental disorders (Cacioppo et al., 2002; Meltzer et al., 2013).

Moreover, the result of this study also has clinical importance of loneliness and social anxiety. In this Study 1 and Study 2, the indirect pathway of loneliness suggests that the treatments for increasing social self-efficacy could be useful to prevent adverse impacts of loneliness. In addition, the experimental process for reducing loneliness indicates that reminding social resources of the individual may be one possible way of clinical intervention.

The limitation and suggestion for future study are following.

First, because participants of this study are composed of undergraduate students, the interpretation of this study could be limited. While the moderating role of age on loneliness is controversial, the probability of difference among generations is hardly discarded since many loneliness studies are focusing on older adults or adolescents. For the reasons, the result of this study would not be suitable for all ages. Future replications should consider whether the age difference in loneliness has an impact.

Next, although this study used both survey as well as an experimental paradigm to investigate a causal relationship between loneliness and social anxiety, this attempt also has the limitation of the cross-sectional study. Therefore, future research should investigate with longitudinal studies to reveal clear implication of pathway between loneliness and social anxiety.

Third, the experimental manipulation to provoke loneliness in this study needs to be improved. In this Study 2, HL condition makes a significant difference neither anticipated social anxiety nor state social self-efficacy, whereas LL condition group showed all significant effects with larger effect size. Similarly, the result of previous loneliness manipulation study (Lamster et al., 2017) showed that HL condition effect was much smaller than that of LL. Lamster explained this biased result with the limitation of the experimental structure. Because participants and their experimenters share the most of the experimental processes, participants became habituated to their experimenter. As a consequent, feeling of loneliness is partially reduced. Therefore, to reveal the exact impact of high loneliness, more elaborately designed manipulation would be needed in future study.

Lastly, interactive relationship between loneliness and social anxiety should be considered in future study. The present study tested the impact of loneliness on social anxiety alone, but previous studies also indicated an interactive relationship between loneliness and social anxiety(Lim et al., 2016). Future replication may investigate specificity of the interaction. In addition, examining whether the difference between clinical social anxiety group and healthy group would be significant.

Although above limitations, this study has importance to reveal indirect pathway of loneliness and shows its impacts on subtypes of social anxiety. Regarding modern society construction that makes people prone to be lonelier, investigating specific mechanism between two variables in this study may be valuable. This study is expected to be a base for revealing the complicated relationship between loneliness and social anxiety.

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# Appendix

Appendix A. Revised UCLA Loneliness Scale-Korean Version

Appendix B. Social Phobia Scale-6 (SPS-6)-Korean Version

Appendix C. Social Interaction Anxiety Scale-6 (SIAS-6)-  
Korean Version

Appendix D. Social Anxiety Questionnaire (SAQ)-Korean  
Version

Appendix E. Trait Social Self-efficacy Scale

Appendix F. State Social Self-efficacy Scale

Appendix G. State Loneliness Scale

Appendix H. Center for Epidemiological Studies-Depression  
scale (CES-D)- Korean Version

Appendix I. State Trait Anxiety Index-Y-Korean Version

Appendix J. Manipulated Revised UCLA Loneliness Scale

Appendix K. False feedback for High Loneliness condition

Appendix L. Debriefing

## Appendix A. Revised UCLA Loneliness Scale (RULS) -Korean Version

다음의 문항에 대해 얼마나 자주 그렇게 느끼고 있는지 답해주시기 바랍니다. 정확히 맞지 않더라도 모든 질문에 대해 느끼거나 생각하고 있는 것에 따라서, 자세히 읽으신 후 해당되는 점수에 O 표 해주시기 바랍니다.

	전혀 그렇지 않다	거의 그렇지 않다	때때로 그렇다	자주 그 렇다
1. 나는 내 주위 사람들과 기분이 통한다.	1	2	3	4
2. 나는 사람들과 교제가 부족하다	1	2	3	4
3. 나는 의지할 사람이 한 사람도 없다.	1	2	3	4
4. 나는 혼자라고 느끼지 않는다.	1	2	3	4
5. 나는 내 친구들 모임에 속해 있다.	1	2	3	4
6. 나는 내 주위 사람들과 많은 공통점을 가지고 있다.	1	2	3	4
7. 나는 더 이상 아무하고도 가깝지 않다.	1	2	3	4
8. 주위 사람들은 나의 관심사와 생각들을 나와 함께 나누지 않는 것 같다.	1	2	3	4
9. 나는 외향적이다.	1	2	3	4
10. 나는 가깝게 느끼는 사람들이 있다.	1	2	3	4
11. 나는 혼자 남겨진 느낌이 든다.	1	2	3	4
12. 사람들과 나와 교제는 피상적이다.	1	2	3	4
13. 어느 누구도 나를 가장 잘 알지 못한다.	1	2	3	4
14. 나는 다른 사람들로 부터 소외감을 느낀다.	1	2	3	4
15. 내가 교제를 원할 때 나는 친구들을 사귈 수 있다.	1	2	3	4
16. 나를 진심으로 이해해주는 사람들이 있다.	1	2	3	4
17. 나는 소외된 것 같아 슬픈 느낌이 든다.	1	2	3	4
18. 사람들은 내 주위에 있는 것이진정 나와 함께 있는 것이 아니다.	1	2	3	4
19. 나와 함께 이야기를 나눌 수 있는 사람들이 있다..	1	2	3	4
20. 나는 의지할 사람들이 있다.	1	2	3	4

## Appendix B. Social Phobia Scale-6 (SPS-6) -Korean Version

다음 문항들은 사회적 상황에서 경험할 수 있는 생각과 감정에 대한 것입니다. 각각 문항들을 주의 깊게 읽으시고, 자신에게 해당되는 정도에 따라 “전혀 그렇지 않다(0)” - “매우 그렇다(4)”까지 O표 해주시기 바랍니다.

	전혀 그렇지 않다	약간 그렇다	웬만큼 그렇다	상당히 그렇다	매우 그렇다
1. 길을 가고 있을 때 사람들이 나를 주시하지 않을까 신경이 쓰인다.	0	1	2	3	4
2. 다른 사람들이 쳐다보고 있을 때 떨게 되지 않을까 걱정한다.	0	1	2	3	4
3. 버스나 기차에서 다른 사람들과 마주 앉아야 할 경우 긴장되곤 한다.	0	1	2	3	4
4. 다른 사람의 관심을 끄는 행동을 하게 될까봐 걱정한다.	0	1	2	3	4
5. 엘리베이터에 있을 때, 다른 사람들이 나를 쳐다보지 않을까 긴장된다.	0	1	2	3	4
6. 줄을 서 있을 때, 나만 유난히 눈에 띈 것 같이 느껴진다.	0	1	2	3	4

## Appendix C. Social Interaction Anxiety Scale-6 (SIAS-6)-Korean Version

다음 문항들은 사회적 상황에서 경험할 수 있는 생각과 감정에 대한 것입니다. 각각 문항들을 주의 깊게 읽으시고, 자신에게 해당되는 정도에 따라 “전혀 그렇지 않다(0)” - “매우 그렇다(4)” 까지 0표 해주시기 바랍니다.

	전혀 그렇지 않다	약간 그렇다	웬만큼 그렇다	상당히 그렇다	매우 그렇다
1. 다른 사람들과 눈을 마주치기가 힘들다.	0	1	2	3	4
2. 동료들과 편안하게 어울리는 것이 어렵다.	0	1	2	3	4
3. 길에서 아는 사람을 만나면 긴장된다.	0	1	2	3	4
4. 다른 사람과 단 둘이 상황에서 는 긴장된다..	0	1	2	3	4
5. 다른 사람들과 이야기 하는 것이 어렵다.	0	1	2	3	4
6. 다른 사람 주장에 반대하기 어렵다.	0	1	2	3	4

## Appendix D. Social Anxiety Questionnaire (SAQ) -Korean Version

아래에는 당신에게 긴장감, 불편함 또는 스트레스를 유발할 수 있는 사회적 상황들이 제시되어 있습니다. 각각의 사회적 상황에 대해서 당신의 반응과 가장 잘 일치한다고 생각되는 숫자에 O표 해주십시오. “1”은 긴장감, 불편함 또는 스트레스가 거의 없음을 의미하고 “5”는 긴장감, 불편함 혹은 스트레스가 매우 높음을 뜻합니다.

만약 제시된 상황을 한 번도 경험한 적이 없다면, 당신이 이러한 상황에 처했을 때 얼마나 긴장감, 불편감 또는 스트레스를 느낄 것인지 상상해 보세요. 그리고 당신이 어떻게 느낄 지를 평가하여 적절한 숫자에 O표 해주십시오. 모든 문항들을 읽고 솔직하게 응답해주시기 바랍니다. 정답에 있어 옳고 그름이 없는 문항들인 만큼 걱정하지 마시고 표시해 주십시오.

	전혀/거의 불편하지 않다	약간 불편 하다	상당히 불편하다	많이 불편하다	매우 /극히 불편하다
1. 누군가에게 인사했는데 무시당했을 때	1	2	3	4	5
2. 옆 사람에게 조용히 해달라고 요구해야 할 때	1	2	3	4	5
3. 많은 사람들 앞에서 말할 때	1	2	3	4	5
4. 호감 가는 사람에게 데이트를 요청할 때	1	2	3	4	5
5. 점원에게 음식에 대해 불만을 얘기할 때	1	2	3	4	5
6. 내가 호감을 느끼는 사람들이 날 쳐다보고 있다고 느낄 때	1	2	3	4	5
7. 지위가 높은 사람들을 만나는 모임에 참여할 때	1	2	3	4	5
8. 내 말에 주의를 집중하지 않는 사람에게 얘기할 때	1	2	3	4	5
9. 하기 싫은 일에 대한 부탁을 거절할 때	1	2	3	4	5
10. 새로운 친구들을 사귄 때	1	2	3	4	5
11. 누군가에게 그들 때문에 내 기분이 상했다는 사실을 얘기할 때	1	2	3	4	5
12. 수업, 업무 또는 회의 중에	1	2	3	4	5

발언해야 할 때

13. 방금 처음 만난 사람과 대화를 계속할 때	1	2	3	4	5
14. 귀찮게 구는 사람에게 내가 짜증났다는 것을 전달할 때	1	2	3	4	5
15. 내가 잘 모르는 사람들의 모임에서 한 명씩 인사를 나눌 때	1	2	3	4	5
16. 여러 사람들 앞에서 놀림을 당할 때	1	2	3	4	5
17. 파티나 회의에서 내가 모르는 사람들에게 얘기할 때	1	2	3	4	5
18. 수업시간에 선생님께서로부터 혹은 미팅에서 상사로부터 질문을 받았을 때	1	2	3	4	5
19. 방금 처음 만난 사람과 대화하면서 그 사람의 눈을 쳐다볼 때	1	2	3	4	5
20. 호감 가는 사람으로부터 데이트 신청을 받을 때	1	2	3	4	5
21. 다른 사람들 앞에서 실수했을 때	1	2	3	4	5
22. 내가 아는 사람이 한 명밖에 없는 모임에 참석할 때	1	2	3	4	5
23. 호감을 느끼는 사람에게 말을 걸 때	1	2	3	4	5
24. 내가 잘못된 것에 대해서 질책 받을 때	1	2	3	4	5
25. 동료나 학우들과 저녁을 먹으면서 전체 그룹을 대신하여 말을 하도록 요청 받을 때	1	2	3	4	5
26. 신경에 거슬리는 행동을 하는 사람에게 그 행동을 그만해달라고 얘기할 때	1	2	3	4	5
27. 호감 가는 사람에게 같이 춤추자고 얘기할 때	1	2	3	4	5
28. 비판을 받을 때	1	2	3	4	5
29. 상급자나 높은 위치에 있는 사람에게 말할 때	1	2	3	4	5
30. 호감을 느끼는 사람에게 더 친해지고 싶다고 얘기할 때	1	2	3	4	5

## Appendix E. Trait Social Self-efficacy Scale

아래 문항들은 대인관계에서 경험할 수 있는 수 있는 생각과 기대를 알아보기 위한 것입니다. 각 상황별로 당신이 잘 해낼 수 있다고 생각하는 정도를 아래 0부터 10사이의 숫자에 표시해 주십시오

전혀 해낼 수 없다.      중간 정도로 할 수 있다.      정말 잘할 수 있다										
<u>0</u>	1	2	3	4	5	6	7	8	9	<u>10</u>

1. 모르는 사람과 만나 대화를 나누는 상황	0	1	2	3	4	5	6	7	8	9	10
2. 선생님이나 교수님과 만나 대화를 나누는 상황	0	1	2	3	4	5	6	7	8	9	10
3. 수업시간이나 공식적인 모임에서 여러 사람들 앞에서 발표하는 상황	0	1	2	3	4	5	6	7	8	9	10
4. 직장을 구하기 위한 면접시험 상황에서 면접관과 만나는 상황	0	1	2	3	4	5	6	7	8	9	10
5. 매력적인 이성과 만나 대화를 나누는 상황.	0	1	2	3	4	5	6	7	8	9	10
6. 여러 사람들 앞에서 장기자랑을 하는 상황.	0	1	2	3	4	5	6	7	8	9	10
7. 잘 모르는 사람에게 전화를 거는 상황.	0	1	2	3	4	5	6	7	8	9	10
8. 권위적 위치에 있는 사람과 만나 대화를 나누는 상황.	0	1	2	3	4	5	6	7	8	9	10
9. 많은 사람들 앞에서 자기소개를 해야 하는 상황.	0	1	2	3	4	5	6	7	8	9	10
10. 나와 전혀 다른 사람과 함께 있는 상황.	0	1	2	3	4	5	6	7	8	9	10
11. 수업 시간에 선생님의 지명을 받는 상황.	0	1	2	3	4	5	6	7	8	9	10
12. 처음 만난 이성과 대화를 나누는 상황.	0	1	2	3	4	5	6	7	8	9	10
13. 모임의 리더나 사회를 맡아 진행을 하는 상황.	0	1	2	3	4	5	6	7	8	9	10

## Appendix F. State Social Self-efficacy Scale

잠시 후에 있을 토론에서 당신은 얼마나 잘 할 수 있을 것이라 생각합니까? 그 정도를 아래 척도상의 적당한 숫자에 O표 하여 주십시오.

전혀 해낼 수 없다			중간 정도로 할 수 있다			정말 잘 해낼 수 있다		
<u>0</u>	1	2	3	4	5	6	7	8

## Appendix G. State Loneliness Scale

다음 문장에 당신이 동의하는 정도를 아래 척도 상에 O표 하여 주십시오.

‘나는 지금 약간의 외로움을 느낀다.’

매우 동의하지 않는다.					매우 동의한다.				
1	2	3	4	5	6	7	8	9	<u>10</u>

## Appendix H. Center for Epidemiological Studies- Depression scale (CES-D)-Korean Version

아래에 적혀 있는 문장을 잘 읽으신 후, 지난 1 주 동안 당신이 느끼시고 행동하신 것을 가장 잘 나타낸다고 생각되는 숫자에 O 표시하시기 바랍니다.

나는 지난 1주일 동안...	극히 드물게 (1일이하)	가끔 (1-2일)	자주 (3-4일)	거의 대부분 (6-7일)
1. 평소에는 아무렇지도 않던 일들이 귀찮게 느껴졌다.	1	2	3	4
2. 먹고 싶지 않았다; 입맛이 없었다.	1	2	3	4
3. 가족이나 친구가 도와주더라도 울적한 기분을 떨쳐버릴 수 없었다.	1	2	3	4
4. 다른 사람만큼 능력이 있다고 느꼈다.	1	2	3	4
5. 무슨 일을 하던 집중하기가 어려웠다.	1	2	3	4
6. 우울했다.	1	2	3	4
7. 하는 일마다 힘들게 느껴졌다.	1	2	3	4
8. 미래에 대하여 희망적으로 느꼈다.	1	2	3	4
9. 내 인생은 실패작이라는 생각이 들었다.	1	2	3	4
10. 두려움을 느꼈다.	1	2	3	4
11. 잠을 설쳤다; 잠을 잘 이루지 못했다.	1	2	3	4
12. 행복했다.	1	2	3	4
13. 평소보다 말을 적게 했다; 말수가 줄었다.	1	2	3	4
14. 세상에 홀로 있는 듯한 외로움을 느꼈다.	1	2	3	4
15. 사람들이 나에게 차갑게 대하는 것 같았다.	1	2	3	4
16. 생활이 즐거웠다.	1	2	3	4
17. 갑자기 울음이 나왔다.	1	2	3	4
18. 슬픔을 느꼈다.	1	2	3	4
19. 사람들이 나를 싫어하는 것 같았다.	1	2	3	4
20. 도무지 무엇을 시작할 기운이 나지 않았다.	1	2	3	4

## Appendix I. State Trait Anxiety Index-Y -Korean Version

다음에는 현재의 상태를 표시하는 문항들이 제시되어 있습니다. 당신이 지금 이 순간에 경험하고 있는 상태가 어떠한지 응답해 주십시오. 너무 깊이 생각하지 마시고 머리에 떠오르는데로 응답하시면 됩니다. 아래의 기준에 맞추어 가장 적절한 숫자에 O표 해주시기 바랍니다.

	전혀 아니다	약간 그렇다	상당히 그렇다	매우 그렇다
1. 평안하다	1	2	3	4
2. 안정감을 느낀다	1	2	3	4
3. 긴장감을 느낀다..	1	2	3	4
4. 심하게 긴장된다.	1	2	3	4
5. 마음이 편하다	1	2	3	4
6. 속상하다	1	2	3	4
7. 불행이 닥칠까봐 걱정한다.	1	2	3	4
8. 흡족하다.	1	2	3	4
9. 두렵다	1	2	3	4
10. 편안하다	1	2	3	4
11. 자신감을 느낀다.	1	2	3	4
12. 안절부절 못한다.	1	2	3	4
13. 초조하다.	1	2	3	4
14. 어찌할 바를 모르겠다.	1	2	3	4
15. 느긋한 기분이 든다.	1	2	3	4
16. 만족감을 느낀다.	1	2	3	4
17. 불안하다.	1	2	3	4
18. 혼란스럽다.	1	2	3	4
19. 동요 없이 안정되어 있다.	1	2	3	4
20. 기분이 좋다.	1	2	3	4

## Appendix J. Manipulated Revised UCLA Loneliness Scale

### <높은 외로움 집단용>

1. 나는 늘 내 주위 사람들과 기분이 통한다.
2. 나는 이따금 사람들과 교제가 부족하다.
3. 나는 의지할 사람이 많지 않다(한 사람도 없다).
4. 나는 혼자라고 거의 느끼지 않는다.
5. 나는 언제나 내 친구들 모임에 속해 있다.
6. 나는 내 주위 사람들과 매우 많은 공통점을 가지고 있다.
7. 나는 더 이상 아무하고도 가깝지 않다.
8. 주위 사람들은 나의 관심사와 생각들을 나와 많이(함께) 나누지 않는 것 같다.
9. 나는 항상 외향적이다.
10. 나는 가깝게 느끼는 사람들이 여러 명 있다.
11. 나는 이따금 혼자 남겨진 느낌이 든다.
12. 사람들과 나와의 교제는 때때로 피상적이다.
13. 사람들은 내게(어느 누구도) 나를 가장 잘 알지 못한다.
14. 나는 가끔 다른 사람들로 부터 소외감을 느낀다.
15. 내가 교제를 원할 때 나는 늘 친구들을 사귄 수 있다.
16. 나를 늘 진심으로 이해해주는 사람들이 있다.
17. 나는 가끔 소외된 것 같아 슬픈 느낌이 든다.
18. 사람들은 내 주위에 있는 것이지 진정 나와 함께 있는 것이 아니다.
19. 나와 함께 이야기를 나눌 수 있는 사람들이 항상 있다.
20. 나는 언제나 의지할 사람들이 있다.

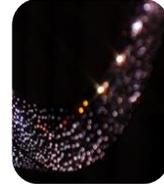
<낮은 외로움 집단용>

1. 나는 종종 내 주위 사람들과 기분이 통한다.
2. 나는 늘 사람들과 교제가 부족하다.
3. 나는 의지할 사람이 한 사람도 없다.
4. 나는 혼자라고 느끼지 않는다.
5. 나는 때때로 내 친구들 모임에 속해 있다.
6. 나는 내 주위 사람들과 어느정도(많은) 공통점을 가지고 있다.
7. 나는 더 이상 아무하고도 가깝지 않다.
8. 주위 사람들은 나의 관심사와 생각들을 나와 많이(함께) 나누지 않는 것 같다.
9. 나는 종종 외향적이다.
10. 나는 가깝게 느끼는 사람들이 있다.
11. 나는 늘 혼자 남겨진 느낌이 든다.
12. 사람들과 나와의 모든 교제는 피상적이다.
13. 어느 누구도 나를 가장 잘 알지 못한다.
14. 나는 늘 다른 사람으로부터 소외감을 느낀다.
15. 내가 교제를 원할 때 나는 친구들을 사귄 수 있다.
16. 나를 진심으로 이해해주는 사람들이 있다.
17. 나는 늘 소외된 것 같아 슬픈 느낌이 든다.
18. 사람들은 내 주위에 있는 것이지 진정 나와 함께 있는 것이 아니다.
19. 나와 함께 이야기를 나눌 수 있는 사람들이 있다.
20. 나는 의지할 사람들이 있다.

# Appendix K. False feedback for High Loneliness condition

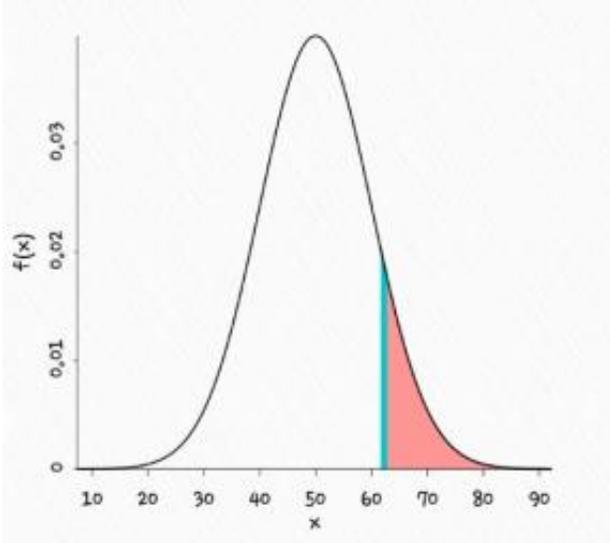


## "K-RULS" 검사해석 결과지 Results for college students



규준집단: 대학생      검사일: 2017년 7월 14일

DATA SUMMARY		
규준집단: 대학생	성별: 여자	연령: 만 19세

DATA ANALYSIS	
	
t점수	백분율
32	88%

당신은 당신과 나이, 성별, 교육수준과 동일한 237명 중 매우 낮은 외로움 점수를 기록 하였습니다. 당신의 점수는 상위 12% 수준으로, 당신이 낮은 점수를 받은 사람들보다 연인, 친구, 지인 등의 관계에서 상대적으로 더 많은 유대감을 느낀다는 것을 의미합니다.

## Appendix L. Debriefing

### <Debriefing>

1. 실험이 종료되었습니다. 본 연구는 'K-RULS 외로움 척도 개정판 개발 및 타당화 연구'로 알려졌으나, '외로움이 사회불안에 미치는 영향'을 알아보기 위한 목적으로 설계된 실험연구였습니다. 실험을 위해 본래 목적을 숨기게 되어 깊은 양해를 구합니다. 귀하께서는 원하시는 경우 언제든지 연구 참여를 철회하실 수 있습니다.
2. 귀하께서는 높은 외로움, 낮은 외로움, 외로움 통제 등 세가지 처리 조건 중 하나에 무선으로 배정되었습니다. 모든 참가자는 각 조건에 따라 서로 다른 질문지에 응답하신 후 각기 다른 검사 해석을 들으셨습니다. **1) 높은 외로움 조건**(높은 외로움 점수가 유도된 질문지를 작성한 후 높은 수준의 외로움에 대한 검사해석을 들음) **2) 낮은 외로움 조건**(낮은 외로움 점수가 유도된 질문지를 작성한 후 낮은 수준의 외로움에 대한 검사해석을 들음) **3) 외로움 통제조건**(조작되지 않은 질문지를 작성한 후 본인의 점수에 따른 검사해석을 들음) 따라서 외로움 통제조건에 배정되신 게 아니라면 귀하가 들으셨던 검사 해석은 귀하의 실제 외로움 점수와 무관합니다.  
또한 연구에 필요한 최소한의 절차만 진행하기 위해 귀하께서는 실제 토론 상황을 경험하지 않으셨습니다. 토론상황 전 실시하신 심리검사가 연구 자료의 수집의 마지막 단계입니다.  
실험에 대해 더 궁금한 점이 있다면 자유롭게 질문해 주시길 바랍니다.
3. 귀하께서 제공해주신 정보는 외로움이 사회불안에 미치는 영향에 대한 이해를 증진하는 데 도움이 될 것입니다. 또한 작성하신 설문이나 실험 결과는 연구 외에 다른 목적으로 사용되지 않을 것입니다.
4. 이 실험은 금년도 11월까지 계속 진행될 예정입니다. 아직 실험에 참여하지 않은 분들이 정보에 노출되어 실험 결과에 영향을 미치지 않도록, 실험 조건이나 구체적인 실험 절차에 대해 비밀을 지켜주시기를 간곡히 부탁드립니다.
5. 실험 참여에 대한 감사의 표시로 약속 드린 현금 7,000원을 드립니다. 바쁘신 와중에 실험에 참여해 주신 것에 대해 다시 한 번 진심으로 감사를 드립니다.
6. 끝으로 혹시 본 연구가 종료된 이후에도 불쾌감이나 외로움 등의 정서적 불편감이 지속되거나 심리적 도움이 필요하신 경우 학교 내의 심리상담센터에서 도움을 받아보시기를 권해드립니다:  
대학생활문화원(63동 5층, 02-880-5501) 또는 24시간 긴급상담전화 SNU Call(02-880-8080)

저는 이 사후설명문을 읽었습니다

참여자 (인)

## 외로움이 사회적 자기효능감을 통해 사회불안에 미치는 간접효과

외로움은 다양한 정신장애와 신체건강에 모두 영향을 미치는 위험요인으로서 현대사회의 구조적 변화에 따라 그 심각성이 대두되고 있다. 특히 외로움이 사회불안장애와 밀접한 관계를 가지는 것으로 알려져 왔으나 외로움이 사회불안에 미치는 심리적 기제에 대한 연구는 소수에 불과하였다. 이를 위해 본 연구에서는 외로움이 사회불안에 미치는 경로를 탐색하고자 하였으며, 사회적 자기효능감이 매개된 간접효과를 확인하였다. 사회적 자기효능감과 외로움의 직접적 관계를 보고한 연구는 거의 없으나, 외로움이 자기효능감에 미치는 영향이 시사되었고 외로움이 사회적 감정이라는 점을 고려한다면 두 변인이 밀접한 관련을 가질 것으로 보인다. 또한 사회적 자기효능감은 사회불안을 예측하는 주요 변인으로 잘 알려진 바 있으므로 외로움이 사회불안에 미치는 과정을 매개할 것으로 가정하였다.

연구 1에서는 설문연구를 통해 사회불안에 대한 외로움의 간접효과를 확인하고자 하였다. 이 때 사회불안장애의 여러 하위유형을 확인할 수 있는 여러 척도들을(SPS-6/SIAS-6, SAQ) 통해 외로움이 사회불안의 하위유형에 미치는 차별적 영향도 함께 탐색하였다. 자료를 분석한 결과 외로움은 사회불안의 여러 하위유형 중에서도 사회적 상호작용 불안과 상대적으로 밀접한 관련을 보였지만, 사회적 자기효능감이 매개된 모든 사회불안의 하위유형에 간접효과를 미치는 것으로 나타났다.

연구 2에서는 실험연구를 통해 외로움이 사회불안에 미치는 인과적 영향을 확인하고자 하였다. 외로움이 사회불안에 미치는 영향은 기존의 연구에서 시사되었으나 외로움이 어떠한 경로를 통해 사회불안으로 발전되는지 구체적으로 알려지지 않았다. 선행연구에서는 통제된 실험환경에서 외로움을 조작함으로써 외로움이 다른 변인에 미치는

영향을 확인한 바 있었으므로 본 연구에서도 이를 활용하여 외로움이 사회불안에 미치는 간접효과를 검증하였다. 매개변인은 연구 1과 마찬가지로 사회적 자기효능감으로 측정하였다. 분석 결과 외로움 저집단에서는 외로움이 감소될수록 자기효능감이 증가하고 사회불안은 감소하는 것으로 나타났다. 그러나 외로움 고집단에서 높아진 외로움은 유의한 영향을 나타내지 않았다. 부트스트래핑 매개모형 분석 결과에서는 외로움이 사회불안에 미치는 간접효과가 신뢰도 95% 수준에서 유의한 것으로 나타났다.

본 연구는 최근 사회적 문제로 떠오른 외로움이 사회불안에 미치는 간접효과를 다각적 방법으로 확인하고 정신병리의 발전경로를 구체화함으로써 사회불안에 대한 외로움의 역할을 이해하고자 하였다. 마지막으로 본 연구의 의의와 한계점을 논의하고, 그리고 후속 연구를 위한 제언을 제시하였다.

**주요어** : 외로움, 사회불안, 사회적 자기효능감, 간접효과  
**학 번** : 2016-20187