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Loneliness, social support and cardiovascular reactivity to laboratory stress

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Abstract

Self-reported or explicit loneliness and social support have been inconsistently associated with cardiovascular reactivity (CVR) to stress. The present study aimed to adapt an implicit measure of loneliness**,** and use it alongside the measures of explicit loneliness and social support, to investigate their correlations with CVR to laboratory stress. Twenty-five female volunteers aged between 18 and 39 years completed self-reported measures of loneliness and social support, and an Implicit Association Test (IAT) of loneliness. The systolic blood pressure (SBP), diastolic blood pressure (DBP) and heart rate (HR) reactivity indices were measured in response to psychosocial stress induced in the laboratory. Functional support indices of social support were significantly correlated with CVR reactivity to stress. Interestingly, implicit, but not explicit, loneliness was significantly correlated with DBP reactivity after one of the stressors. No associations were found between structural support and CVR indices. Results are discussed in terms of validity of implicit versus explicit measures and possible factors that affect physiological outcomes.

Key words: Cardiovascular reactivity, implicit association test, loneliness, social support, stress.

Introduction

Loneliness has been described as a product of social isolation and can be defined as a subjective experience resulting from an unpleasant or inadmissible lack of (the quality of) certain social relationships (de Jong-Gierveld, 1987). A related construct, namely, social support can be categorized into two broad types: structural support and functional support. The former constitutes the quantity of support and includes properties such as the size, range and density of the social network. The latter refers to the quality of social support, and includes instrumental (tangible), emotional and informational support (Berkman et al., 2000). Loneliness is inversely correlated with quantity (Cutrona & Peplau, 1979) and quality of social relationships (Borys et al., 1985), satisfaction with emotional and tangible supports (Kim, 1999), family function (Kim & Baik, 2002) and being married (structural support) (Carr & Schellenbach, 1993; Lynch, 1977). Loneliness is positively correlated with problems and conflicts in social relationships (de Jong-Gierveld et al., 1987; Jirka et al., 1996). Lonely people also report higher levels of stress, and exaggerated frequency and intensity of daily hassles than their nonlonely counterparts (Cacioppo et al., 2000).

Lack of secure social relationships (Antonucci & Ernest, 1994) and loneliness (Rozanski et al., 1999; Sorkin et al., 2002) are associated with greater risk of developing cardiovascular disease (CVD). Dickens et al. (2005) found that not having a close confidant in life predicted cardiac events and cardiac-related mortality in the year after a myocardial infarction (MI) episode, after controlling for demographic factors and severity of MI. Models in health psychology consider heightened cardiovascular reactivity (CVR) as one route by which psychological factors may lead to CVD (e.g.,

Treiber et al., 2003). There is evidence that an exaggerated CVR to stress in daily life may accumulate, possibly leading to cardiovascular disorders including hypertension and coronary heart disease (Christenfeld & Gerin, 2000; Krantz & Manuck, 1984; Manuck, 1994; Steptoe et al., 2004). Social support may buffer the effect of stress on CVR by acting as a moderator (Cohen &Wills, 1985). For example, Christenfeld et al. (1997) found in an experimental design that a supportive friend yielded lower CVR to stress than a supportive stranger, which yielded lower CVR than a neutral stranger, demonstrating the importance of social presence and quality of relationship in reducing the CVR to stress. Another set of studies considered social support a stable variable (Sarason et al., 1986), and assessed its naturalistic levels and correlation with CVR to stress in the laboratory (Knox, 1993; Roy et al., 1998; Uchino et al., 2001). Finally, naturalistic levels of social support were found to be inversely related to ambulatory measures of CVR, particularly during high-stress periods (Linden et al., 1993) in line with the buffering hypothesis (Karlin et al., 2003).

The findings in this area however, have been inconsistent. Some studies found significant associations between social support and CVR (Craig et al., 2000; Fontana et al., 1999; Uchino & Garvey, 1997), while others did not (Boyce & Chesterman, 1990; Sheffield & Carroll, 1995; Uchino et al., 1992). Some findings have also been counter intuitive, where higher CVR was positively correlated with the size of social network (Roy et al., 1998). Although men showed higher CVR to stress than women in a few studies, Lepore et al. (1993) concluded that gender is not a moderator in this link. Some studies however showed the contrary (Steptoe et al., 2004).

Unlike social support, only a few studies have investigated the association

between levels of loneliness and CVR. Steptoe et al. (2004) found a positive correlation between loneliness and diastolic blood pressure reactions to acute mental stress in women, controlling for the effects of several confounders (e.g., age, marital status). By contrast, no such effect was found with undergraduate students (Cacioppo et al., 2002).

An important limitation of the research in this area is the reliance on self-reported measures of social support and loneliness. It is an established fact that explicit measures are contaminated by social desirability and prone to presentation biases (Holtgraves, 2004). These biases could be interpersonal (evaluation apprehension or intention to impress) or intrapersonal (self-deception) in nature (Nosek, 2005). It is tempting to speculate that in instances where self-report measures did not correlate with the outcomes, one of the plausible explanations could be the possibility of these presentational biases influencing the self-reported responses. The use of implicit tools may prove to be a solution **to these** limitations. According to the dual process theory, thinking and reasoning operate from implicit and explicit systems. The implicit system does not include awareness and hence is difficult to control. The explicit system on the other hand, is based on deliberation and is flexible in its controllability (Evans, 2003). Therefore, motivation to fake on the part of the respondent may result in altered responses on the conventional self-report measures (Fazio & Olson, 2003) possibly influencing the relationship between CVR and explicit measures. A few studies demonstrated that implicit measures superceded explicit measures in predicting physiological outcomes (Egloff et al., 2002; Gidron et al., 2005; Phelps et al., 2000). It can be argued that in contrast to the consciously-controlled responses on the explicit measures, implicit measures elicit more automatic responses and hence are more likely to

correlate with physiological responses which also occur automatically. Moreover, since explicit and implicit measures of psychosocial constructs are not typically strongly correlated (Greenwald et al., 1998), they may differentially predict various health outcomes.

We adapted an Implicit Association Test (IAT; Greenwald et al., 1998) to measure loneliness. This tool has been used to measure implicit attitudes, stereotypes, personality and self-esteem (e.g., Asendorpf & Mucke, 2002). The IAT is a computerized reaction-time test which assesses the relative strength of associations by comparing the performance on two pairs of concepts. Although respondents do not lack awareness that the IAT is being administered, it assesses psychosocial constructs indirectly without any verbal self-report. Moreover, responses on the IAT are difficult to fake (Egloff & Schmukle, 2002). The two important criteria for determining the validity of the IAT are its capacity to (a) correlate with conventional self-report measures, and (b) predict outcome variables (Greenwald et al., 2003; Poehlman et al., 2005). Due to the fact that the implicit-explicit correlation may vary across different social constructs, and many factors moderate this relationship (Nosek, 2005), it is important to demonstrate the predictive validity of this IAT-Loneliness, which was the aim of the present study. We administered both explicit measures of social support and loneliness with an IAT-Loneliness to investigate their correlation with CVR to social stress. We hypothesized that loneliness and support need will correlate positively, and social support inversely with CVR to stress.

Materials and method

Participants

Fifty* female non-smoking Psychology students from the University of Southampton were randomly assigned to either Experimental (stressor) or Control Group. This study focuses mainly on the Experimental Group i.e., those exposed to the stressor. Given the gender differences in the relations between loneliness and CVR (e.g., Steptoe et al., 2004), and since most of the current students in the school were women, men were not included in the present study. The data of two participants were excluded due to high baseline blood pressure (BP) (> 140/90 mmHg). The remaining normotensive sample's mean age was 22.09 (SD = 6.1) years (n = 23).

This study was approved by the school ethics committee and the participants gave informed consent to take part in the study.

Procedure

The Trier Social Stress Test (TSST) (Kirschbaum et al., 1993) was used to induce psychosocial stress in the laboratory. The original protocol was followed, which consisted of a speech task and a mental arithmetic task. In the speech task, participants were asked to imagine that they had applied for a research-assistant job in the school of psychology, and were there to present themselves to a committee which would evaluate them on the basis of their personal characteristics. The task was to convince the committee in a free speech that they were the best candidate for the vacant position.

Ten minutes were given to prepare the speech (Anticipation period) followed by a 5-minute speech in front of a committee sitting behind a one-way mirror (protocol was modified according to Lupien et al., 1997). In the subsequent arithmetic task, participants' task was to count backwards from 1687 to 0 in 13-step sequences. In case of

* The present study was done as part of a larger study on the effects of stress on biological markers.

an error, the participant had to start again from 1687. This task lasted for 5 minutes and was carried out in the similar one-way mirror condition.

In the control condition, participants were asked to write a letter of application and a paper-and-pencil arithmetic task without any evaluation (Domes et al., 2002).

Measures

Demographic information and confounders included age and relationship status. The latter was assessed by using the following categories: single, with a partner, married/living as married, separated, divorced or widowed. Due to the low frequencies and contextual overlap between the relevant categories, the categories *single*, *separated*, and *divorced* or *widowed* were merged and given a score of *1*, and the categories *with a partner* and *married/living as married* were merged and scored as *2*. The Fear of Negative Evaluation (FNE) Scale-Brief Version (Leary, 1983) was used to control for the possible confounding effect of this construct. Previous research has shown higher levels of CVR in high social-fear participants than in low social-fear ones (Burns, 1995). This 12-item scale assesses the degree to which people experience apprehension at the prospect of being evaluated negatively, on a 5-point rating scale ranging from *not at all* to *extremely*. Cronbach's alpha reliability of the scale in this sample was 0.91 (n = 23).

Cardiovascular reactivity measures Systolic blood pressure (SBP), diastolic blood pressure (DBP) (in mmHg) and heart rate HR (in beats per minute) were measured while seated at: (1) Baseline (after a 10-minute rest period), (2) Anticipation period, (3) After speech task, (4) After arithmetic task, and (5) Follow up (25 minutes later), using an Omron digital automatic blood pressure monitor (Omron Healthcare UK Ltd.).

The Arizona Social Support Interview Schedule (ASSIS) (Barrera, 1980) was used to

assess social support. It includes 27 questions for assessing four indices of social support: available network size (perceived network size), utilized network size (or actual network size), support satisfaction, and support need. These are determined by asking respondents to nominate providers in the areas of intimate interaction, material aid, advice, positive feedback, physical assistance and social participation, thus making the ASSIS reflect both structural and functional support. Overall support satisfaction is determined on a 1 (very dissatisfied) to 7 (very satisfied) and support need on a 1 (no need at all) to 5 (very great need) scales. Initial assessment of the psychometric properties shows the ASSIS to be a promising social-support measure (Barrera & Balls, 1983).

The UCLA Loneliness Scale (version 3) (Russell, 1996) uses 20-items to gauge the subjective feelings of loneliness on a 1 (*never*) to 4 (*always*) frequency scale. Cronbach's alpha reliability of the scale in this sample was 0.90.

The Implicit Association Test-Loneliness (IAT-L) is a reaction-time tool designed to measure implicit loneliness and run on a laptop computer. It involves a series of seven blocks including two practice blocks before each of the two critical ones. In each block, stimulus words, which are exemplars of either two target concepts or two attributes, appear in the middle of the screen, and the participant needs to assign them to one of the categories of attributes or target concepts. In the first block, the participant assigns exemplars of one of the two target-concept categories (SELF, OTHERS), using one of the two assigned keys (*e*, *i*) on the keyboard. In the second block, the participant assigns the exemplar words to one of the two attribute categories (LONELY, NONLONELY), by pressing the relevant key (*e* for LONELY, *i* for NONLONELY). In the third block, the two above-mentioned categories are combined and stimuli for both appear randomly, and

a target concept and attribute share the same response key (e.g., LONELY or SELF assigned to key *e*). The fourth block features the reversal of response assignments in Block 2 (i.e., key *e* for NONLONELY instead of key *i*). In the fifth block, target concepts and attributes are combined again as in Block 3, after reversing the keys (e.g., LONELY or OTHERS assigned to key *i*). Each block comprises 20 trials except critical Blocks 3 and 5 which comprise 40 trials each.

Each stimulus word remains on the screen until the participant responds. If the response is correct, the next stimulus word appears on the screen. However, if the response is incorrect, an "X" appears under the stimulus word and remains on the screen until the correct response is made. The inter-trial interval is 150ms. Scoring of the IAT-L is done according to the recommended scoring algorithm for the IAT (Greenwald et al., 2003). Initial data reduction is done as follows: (a) data from the critical and practice blocks are used; (b) trials with latencies > 10,000 ms are eliminated; (c) data from participants who, on more than 10% of trials, exhibit latencies less than 300 ms are eliminated. The IAT-L score *D* is obtained by subtracting mean scores on Block 3 from those on Block 5 (and practice Block 3 from practice Block 5) for each participant, dividing the resulting value by relevant pooled-trials' standard deviation, and finally averaging the two resulting quotients (i.e., practice and critical). The internal consistency of the IAT-L in this sample was 0.78 which was computed by the correlation between the IAT measure based on practice blocks and another IAT measure based on critical blocks (Greenwald et al., 2003).

The stimulus words for the modified IAT were generated by nominating 16 synonyms for each of the LONELY and NONLONELY categories. These words were

generated by an online thesaurus of the English language (Thesaurus.com) using the keywords *lonely*, *alone* for a list of synonyms and antonyms. A list of 16 finally selected words in each category was given to 10 postgraduate research students at the School of Psychology, University of Southampton, who acted as judges. They were asked to rate these words on their relevance to the LONELY and NONLONELY categories on a 1 (*Not at all*) to 5 (*Extremely relevant*) rating scale. Finally, 5 words were chosen for each category if they fell into the "extremely relevant" category by ≥ 70 % of the judges (List of words in Appendix).

Statistical Analyses

All variables were initially tested for variation and significant deviation. The following transformations shifted the distributions to normality: square root for IAT *D* and logarithm for Age.

To analyze the effects of stress on BP and HR, a two-way mixed Analysis of Variance (ANOVA) was done with Time as the within-subjects factor (Baseline, Post speech task, Post arithmetic task, Follow up) and Group as the between-subjects factor (Experimental, Control). The association between loneliness and social support, and CVR to each of the tasks[1] was analyzed by partial correlations, after controlling for the respective CVR baseline and relationship status. Given that research has shown that increased CVR to stressful daily life may have a cumulative effect predictive of CVD

[1] There is a possibility that the correlation between social support and CVR indices may differ in response to different types of stressors (Kamarck et al., 1990), and some people might find public speaking more stressful than the arithmetic task or vice versa, even if both tasks involve performance in the face of evaluation. Therefore, we analyzed the CVR to each of the tasks separately.

(Krantz & Manuck, 1984), and **since** the rate of mortality from cardiovascular diseases has been correlated with marital status (Menotti & Giampaoli, 1998), one would assume higher CVR to stress in single people than in the ones with partners. We thus controlled for the effects of relationship status since people with partners may have a perception of availability of the partner's support which may buffer the effects of stress on CVR. FNE scores were not correlated with any of the CVR indices, and therefore were not controlled for. Finally, the association between explicit and implicit loneliness was tested using Pearson's correlation.

Results

Effects of the Stress on CVR

The effects of Time [$F(3,138) = 11.70$, $p < 0.001$], Group [$F(1, 46) = 15.91$, $p < 0.001$] and the interaction Time x Group [$F(3,138) = 22.78$, $p < 0.001$] were significant for SBP. The effects of Time [$F(3,138) = 11.46$, $p < 0.001$], Group [$F(1, 46) = 16.53$, $p < 0.001$] and Time x Group [$F(3,138) = 18.36$, $p < 0.001$] were significant for DBP. Similarly, Time $F(3,138) = 7.83$, $p < 0.001$], Group [$F(1,46) = 3.94$, $p = 0.05$] and Time x Group [$F(3,138) = 5.29$, $p < 0.01$] effects were significant for HR (see Figures 1 and 2). Further t-tests revealed that the Experimental Group had significantly higher levels of ΔSBP, ΔDBP and ΔHR after both speech and arithmetic tasks (all ps < 0.05) than Controls. Having established that the TSST induced greater **stress[2] and hence higher**

[2] The subjective pre- and post-TSST levels of stress were measured, using a Visual Analogue Scale (VAS). The participants were asked to mark on a 10-cm horizontal line, showing "no stress" and "the worst stress I have ever felt" on the two ends, the point which represented their level of stress: (1) before, and (2) after TSST. A two-way mixed Analysis of Variance (ANOVA) was done to analyze the effects of TSST vs. Control on the levels of subjective stress. Results showed that the effects of Time [$F(1,46) = 90.80$, $p < 0.001$], Group [$F(1,46) = 21.86$, $p < 0.001$] and Time x Group [$F(1,46) = 25.73$, $p < 0.001$] were significant, suggesting that the Experimental Group experienced significantly higher levels of stress after the TSST than the Control Group.

CVR than the Control tasks, we now focus on the TSST group alone in relation to prediction of CVR by loneliness and social support.

Insert Figures 1 and 2 about here

Correlates of CVR

The relationship between the measures of loneliness and social support**,** and CVR indices is presented in Table I. Support need was positively correlated with SBP reactivity after speech task ($r = 0.43$, $p < 0.05$) and DBP reactivity after both speech ($r = 0.37$, $p = 0.05$) and arithmetic ($r = 0.47$, $p < 0.05$) tasks. HR reactivity after arithmetic task was negatively associated with support satisfaction ($r = -0.60$, $p < 0.01$), while the negative correlation between HR reactivity after speech task and support satisfaction showed a trend toward statistical significance ($r = -0.35$, $p = 0.06$). While explicit loneliness failed to correlate significantly with the CVR indices, implicit loneliness was positively correlated with DBP reactivity after the arithmetic task ($r = 0.51$, $p < 0.01$). No significant correlations were found between the structural indices of social support and CVR to stress. All correlations were found after controlling for the respective baseline and relationship status.

Insert Table I about here

Correlations between Implicit and Explicit Loneliness

Implicit loneliness as measured by the IAT-L did not significantly correlate with

explicit loneliness (r = 0.16, *ns*). The correlations between implicit loneliness and social support indices were also nonsignificant (see Table II, N = 48). However, there was a trend toward a significant correlation between implicit loneliness and support need (r = 0.26, p = 0.07) suggesting that the higher the implicit loneliness, the higher is the need for social support.

Insert Table II about here

Discussion

This study aimed at adapting an IAT to measure loneliness, and using it alongside the explicit loneliness and social support measures to investigate whether these measures correlate with CVR to the stress induced in the laboratory. Results of this study show that SBP reactivity after speech task, and DBP reactivity after both speech and arithmetic tasks positively correlated with support need, suggesting that the greater the need for social support, the higher is the participants' BP reactivity to stress. Also, lower satisfaction with social support was associated with higher HR reactivity after the arithmetic task. More importantly, implicit, but not explicit, loneliness was significantly correlated with DBP reactivity after the arithmetic task. Given that implicit loneliness correlated with DBP reactivity and not with any other reactivity index, this finding warrants caution and replication. It is however interesting to note that although the correlations between the implicit and any of the explicit measures did not reach the conventional level of significance in this sample, there was a strong trend in the case of

support need. The fact that support need, which is a subscale of social support, was consistently and significantly associated with the CVR indices in this study, suggests that support need and implicit loneliness may be related concepts predictive of greater CVR. This pattern of correlation between support need and implicit loneliness may thus hint at the construct validity of the IAT-L. The results of this study are in line with and extend the findings of previous studies. Whilst some of those studies found significant associations between social support (or the lack of) and both SBP and DBP (Allen et al., 2002), others found them for only one CVR index (Gerin et al., 1995; Lepore et al., 1993). Steptoe and his colleagues (2004) found significant correlations between explicit loneliness and DBP reactivity in women, unlike in the present study. No such associations were found for SBP and HR. There is a possibility that the smaller size and age of our sample magnified the presentational biases, which might have accounted for the disparity between the former and the present study. Nevertheless, our findings extend those of Steptoe et al. to an implicit measure of loneliness.

The CVR was associated with the functional, but not structural, indices of social support in the present study, which replicates previous findings (Craig & Deichert, 2002). Structural indices have been found to be poor correlates of CVR to stress (Roy et al., 1998) merely due to the limited, and sometimes misleading, information these measures provide. It could be the reason behind the counter-intuitive direction of their correlations in this sample. Moreover, the evidence that relationship quality moderates the effect of social support on CVR (Uno et al., 2002) validates our findings.

Although all the correlations between the implicit and explicit measures were in the expected direction, none reached the conventional level of significance in our sample.

As mentioned above, a strong trend was found between support need and implicit loneliness, suggesting a link between these concepts. A plausible explanation for these nonsignificant findings could be that the implicit-explicit correlations may vary across different social constructs (Nosek et al., 2002) and can be moderated by several factors (Nosek, 2005) as discussed earlier in this paper. According to the MODE model, the motivation and opportunity to deliberate alters the responses on the explicit measures resulting in low correlations between the explicit and implicit measures (Fazio & Olson, 2003). The fact that increasing the spontaneity of explicit measures (hence reducing the opportunity to deliberate) increased the correlations between the implicit and explicit measures (Hofmann et al., 2005), supports this model. Given that the participants were undergraduate students and younger people may associate loneliness with low popularity more than older adults do, our sample's explicit responses may have been more biased by social desirability. A similar pattern of weak implicit-explicit correlations was found in previous studies on implicit anxiety and self-esteem (Egloff & Schmukle, 2002; Greenwald & Farnham, 2000) yet, as in the present study, the IATs showed higher predictive validity than the explicit measures.

The use of multiple statistical analyses with a small sample size is a limitation of this study. However, significant correlations suggest that the effect size of these associations is strong.

One may speculate on the pathways leading to the observed relations. The feelings of loneliness may alter the perception of one's capability to deal with the stressor by having an adverse effect on self-esteem or self-efficacy. Such perceived incapacity may possibly enhance the effects of stress, possibly leading to higher CVR in response to

the stressors. Since increased platelet aggregation, a pro-thrombotic process, is associated with psychological stress (Markovitz & Matthews, 1991), increased psychosocial stress and CVR due to the lack of social support may translate in to higher CVD risk (Everson-Rose & Lewis, 2005; Knox & Uvnas-Moberg, 1998). Future studies need to concentrate on testing such possible underlying causal psychophysiological processes. Behavioral mechanisms such as lifestyle and habits may also play a role in both development and progression of CVD, and may also be related to loneliness and lack of social support.

Based on our findings, the IAT-L may be a useful tool in predicting physiological stress responses. Future studies may consider the use of implicit measures with reference to physiological outcomes, particularly with populations which are more susceptible to presentation biases and for constructs that are socially sensitive. The use of an implicit test to measure loneliness and predict CVR is novel and the results of this preliminary study are promising. However, further work on the improvement of the construct and concurrent validity of this IAT is a goal for future research.

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Table I. Partial correlation coefficients between loneliness and social support, and: (1) BP reactivity, (2) HR reactivity to stress, after controlling for respective baseline and relationship status.

	SBP(s)	SBP(a)	DBP(s)	DBP(a)	HR(s)	HR(a)
	(n = 23)					
Explicit						
Loneliness	0.29	0.13	0.17	0.32†	-0.00	-0.05
Implicit						
Loneliness	-0.15	-0.01	0.08	0.51**	-0.10	-0.06
Available Network Size	0.24	-0.01	0.25	-0.11	0.08	0.12
Utilized Network Size	0.04	-0.15	0.18	-0.11	-0.15	-0.13
Support Satisfaction	0.08	0.34†	-0.12	-0.17	-0.35†	-0.60**
Support Need	0.43*	0.17	0.37*	0.47*	-0.14	-0.17

*$p \leq 0.05$, **$p < 0.01$, $^{\dagger}p < 0.10$, one-tailed.

Note. (s) = After speech task; (a) = After arithmetic task.

Table II. Pearson's correlation coefficients between implicit and explicit measures.

	Explicit Loneliness	Available Network Size	Utilized Network Size	Support Satisfaction	Support Need
			($N = 48$)		
Implicit Loneliness	0.16	-0.22	-0.07	-0.18	0.26[†]

[†] $p < 0.10$, two-tailed.

Figure 1. Effects of manipulation of stress on SBP and DBP at (1) Baseline, (2) After Speech Task, (3) After Arithmetic Task, and (4) Follow up (Experimental Group $n = 23$, Control Group $n = 25$). $^{**}p = 0.01$, $^{***}p < 0.001$, two-tailed.

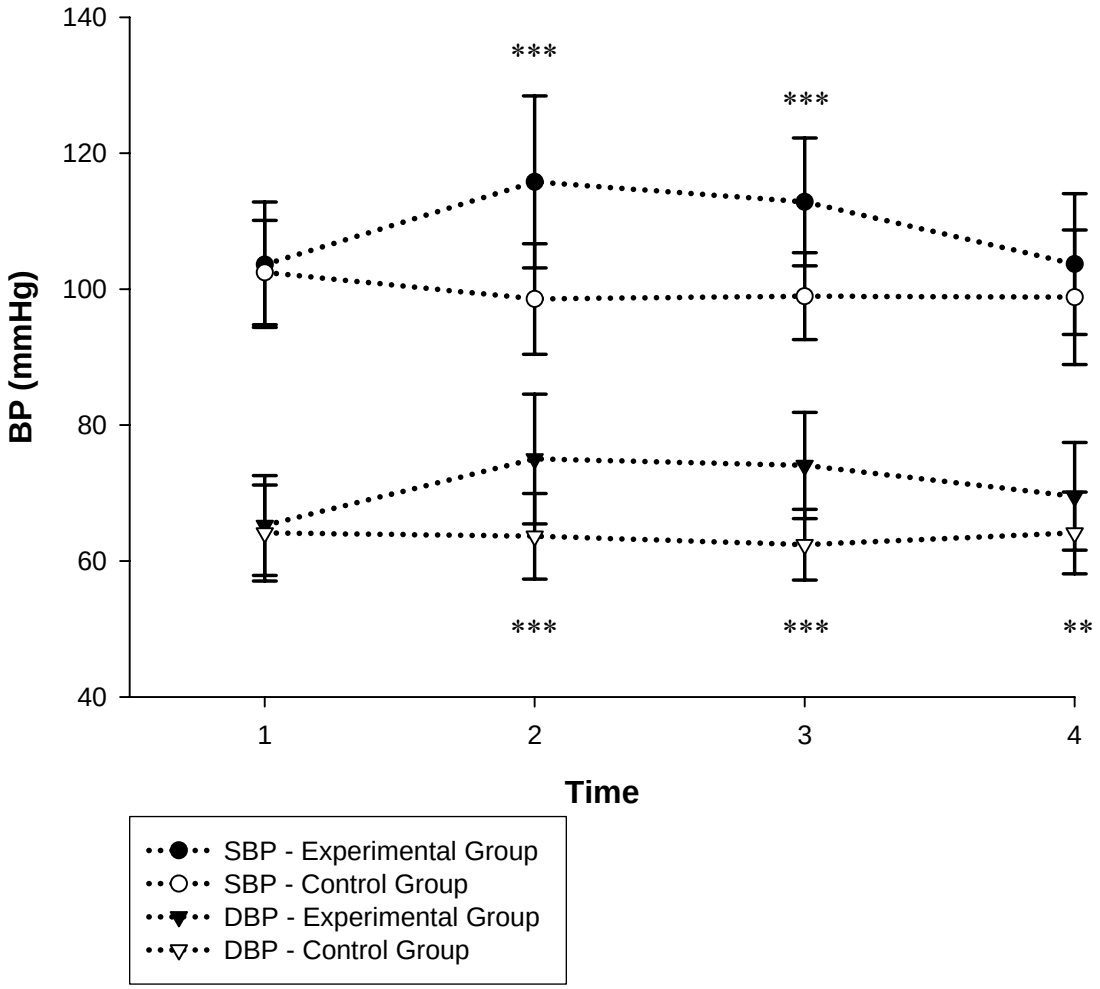
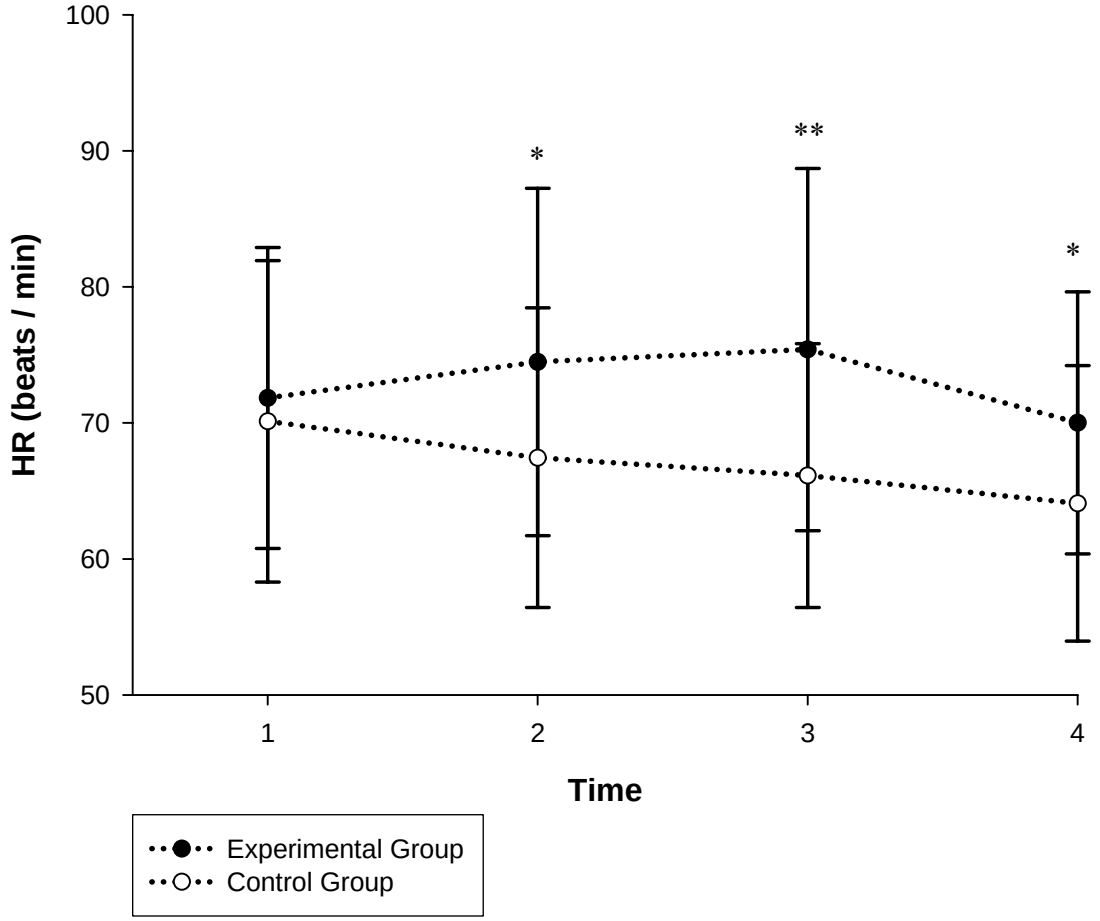


Figure 2. Effects of manipulation of stress on HR at (1) Baseline, (2) After Speech Task, (3) After Arithmetic Task, and (4) Follow up (Experimental Group $n = 23$, Control Group $n = 25$). *$p < 0.05$, **$p < 0.01$, two-tailed.



Appendix. Stimulus words used in the IAT-L

List of words for IAT-L

SELF	OTHERS	LONELY	NONLONELY
I	They	All alone	Supported
Me	Them	Abandoned	Cared for
My	Their	Unloved	Loved
Mine	It	Deserted	Looked after
Myself	Other	Isolated	Beloved