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# Gender Differences in the Contribution of Anger Components to Depressive Symptomatology

Noboru Iwata[1]*, Takashi Shimizu[2]

[1]Faculty of Healthcare, Kiryu University, Gunma, Japan.
[2]Japan Medi-Mental Institute, Tokyo, Japan.

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***Correspondence:**
Prof. Noboru Iwata, PhD, Faculty of Healthcare, Kiryu University, Gunma, Japan; Email: iwata-no@kiryu-u.ac.jp, n0b0ru1wata515@gmail.com



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## Abstract

**Objective**: The present study examined the association of anxiety- and anger-related components to depressive symptomatology for men and women.

**Methods**: The study relied on a cross-sectional design. of 2,054 Japanese workers affiliated with two occupational settings, complete responses on measures for depression, anxiety, and anger, were obtained from 1,862 workers (90.7%: 1,521 men, 341 women). A stepwise regression analysis was executed by gender and age group.

**Results**: Stepwise regression analysis revealed that main components were almost the same for both genders, i.e., trait anxiety, state anger and anger suppression. However, the explaining variances of anger were much larger for men, whereas those of state anxiety were larger for women. Anger expression outward was selected for men, but not for women.

**Conclusions**: Depressive symptomatology was largely explained by trait anxiety, state anger, and anger expression style. For men, state anger and either expression of feelings of anger inward or outward were exacerbating their depression as compared to women. This could explain in part the gender differences in depression.

## Introduction

Major depression is a serious, recurrent disorder linked to diminished role functioning and quality of life, medical morbidity, and mortality[1,2], and is one of the most common diseases in industrialized countries and the second most debilitating disease worldwide[3]. Depression is prevalent in approximately twice as many women as men[4]. The gender difference in depression has been found across various countries and cultures[5,6].

According to Simon and Lively[7], the gender gap in depression has been attempted to explain by a number of hypotheses, in which major ones include (1) the exposure hypothesis[8] and (2) the vulnerability hypothesis[9]. However, these hypotheses could not be fully supported by empirical studies[7]. Therefore, researchers have come to pay more attention to (3) the gendered-response hypothesis, i.e., women might tend to respond to stress with internalizing behaviors such as depression, while men tend to respond with externalizing behaviors such as antisocial conduct and substance abuse[10,11].

Atypical symptom set of depression in men or a masculine variation of depressive symptoms has received attention of researchers[12,13]. Masculine-type symptoms may mask some prototypic depressive symptoms[14,15]. It has been reported that more traditional men are more likely to endorse externalizing depressive symptoms such as anger and aggression[16], and a considerable number of men experience such atypical depressive symptoms[17].

Anger is consistently emphasized across all models of atypical depressive symptoms in men[18]. Anger could be regarded as a significant source of conflict for patients prone to depression, triggering intense guilt and self-criticism[19]. Conversely, a wide variety of unpleasant feelings apparently can give rise to angry and aggression. The anger suppression–depression link has been reported among university students[20]. Anxiety and depression are common mental disorders with high comorbidity, and hypothesized to share common vulnerabilities[21]. A non-specific negative affect component, negative affectivity (NA), is conceptualized as a long-standing sensitivity to negative or unpleasant stimuli[22]. NA is relevant to a variety of psychological disorders and includes affective states related to anger, feelings of rejection, nervousness, and guilt[23,24].

Taking the abovementioned psychopathologies and social support altogether, it could be hypothesized that there exist some connections involving atypical depression, masculine-type externalizing symptoms, anger/aggression, and anger suppression. Although some of these pairs have been investigated, there are no studies examining simultaneously the association of anger, anger expression, and anxiety with depressive symptomatology. This study examined the gender difference in the associations of anger, anger expression, and anxiety with depressive symptoms in a sample of Japanese working population. Although these associations might be bidirectional, we focused on the relative association of anger, anger expression, and anxiety to depressive symptomatology by gender.

## Methods

### Study Design and Participants

Our study participants comprised of 2,054 adult workers in two occupational settings: one was an oil company and the other was a governmental office of a suburb city, both in Japan. The surveys were conducted as a part of an annual health check, so the survey questionnaires were distributed through health and safety division of each organization. Workers were asked to fill out the survey questionnaire while explaining on the face sheet page about study objective and confidentiality of data with our guarantees that their responses would not result in any negative consequences. Workers responded to the survey questionnaire in their homes and brought their questionnaires at the health check.

Of 2,054 (1,655 men, 399 women), complete responses were obtained from 1,862 workers (90.7%: 1,521 men, 341 women). Mean age was 39.3 years (s.d.=10.7; range 18-62 years) for males and 31.5 years (s.d.=9.7; range 19-60 years) for females, yielding a significant difference ($p<0.0001$). The study protocol including the contents of questionnaire items was approved by members of health and safety division offices of both organizations. Also, all procedures were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2000.

### Measurements

The survey questionnaire included some demo-graphics items and the following psychological measurements for depression, anxiety, anger and anger expression.

Depressive Symptomatology. Depressive symptoms were measured by the Center for Epidemiologic Studies Depression Scale (CES-D)[25] in Japanese[26]. The CES-D is a 20-item self-administered questionnaire that assesses the frequency of depressive symptoms during the past week. This measure originally constitutes 16 negative items and four positive affect items, but the positive items were negatively revised and used due to measurement imprecision of positive question in Japanese[27]. Thus, we called this revised version as the CESD-R.

Anxiety. Anxiety was assessed by the State-Trait Anxiety Inventory (STAI)[28] in Japanese Adaptation[29]. The STAI consisted of 20 state anxiety (S-Anx) and 20 trait anxiety (T-Anx) items, with a four-point Likert scale. Studies in Japan[29,30] have demonstrated that the positive-negative distinction was much stronger than the state-trait distinction, and the measuring concept for positive items would not simply be opposite to that for negative items. Thus, anxiety-present (Anx/Present) items and anxiety-absent (Anx/Absent) items should be considered as different components. Four types of subscales; i.e., S-Anx/Present, S-Anx/Absent, T-Anx/Present, and T-Anx/Absent were calculated in this study.

Anger and Anger Expression. Anger and anger expression were measured by the State-Trait Anger Expression Inventory (STAXI)[31] in Japanese[32]. The STAXI comprised the State-Trait Anger scale[33] and the Anger-Expression (AX) scale[34]. The State-Trait Anger scale comprises 10 state anger and 10 trait anger items. The trait anger items can be divided into two subscales, Angry Temperament and Angry Reaction. The AX scale consists of three subscales: Anger Expression/In (AX/In), Anger Expression/Out (AX/ Out), and Anger Expression/Control (AX/Con), respectively[31,35].

Social Support. Social support (SS) scale of the Brief Job Stress Questionnaire[36] was used to measure social support from supervisors, coworkers, family members, and friends/others. Each subscale has four items with a four-point scale. This study refers only to emotional support.

### Analyses

Internal consistency reliabilities of psychological scales were examined by Cronbach's α. When examining gender difference of scale scores, not only a traditional significance level of $p<0.05$, but also the Bonferroni correction was adapted, i.e., $p<0.0033$ (0.05/15), because

of repetitive comparisons across 15 scale/subscale scores. As an exploratory investigation, multiple regression analysis with stepwise selection was used to determine the variables related to depressive symptomatology. Detailed investigations was further conducted for five gender-age subgroups. We first divided men and women into a younger group of 18 to 34 years old, then a group of 35 years old and above (35+) for women, and two groups of 35 to 46 years old and 47 years old and above (47+) for men so that the numbers would be evenly distributed.

## Results

### Gender Differences in Depression, Anxiety, and Anger

Table 1 shows internal consistencies and means of psychological scales. All Cronbach α's were at 0.70 or over, and mostly exceeded 0.80. The CESD-R scores did not vary between genders. As to the STAI, although no gender differences were observed on S-Anx subscales, T-Anx/Absent was higher among men, and T-Anx/Present was tended to be higher among women. As to the STAXI, although trait subscales did not differ by gender, state anger tended to be higher among men. Women expressed more AX/Out as compared to men, and men controlled their anger more than did women. No gender differences were observed on AX/In. SS scores except supervisor support were higher among women.

### Associations of Anxiety, Anger, and Social Support with Depression by Gender

Table 2 shows factors associated with depressive symptomatology by means of stepwise regression analysis by gender. The table entities indicate standardized regression coefficients (β). Age has been entered into the equation prior to the stepwise procedure, whereas for women it never reaches a significant level. Each step added a significant increase of variance of dependent variable, CESD-R, for both genders. The variables selected to the equation were mostly the same between genders, while the order varied.

T-Anx/Present was firstly selected for both genders. It could explain approximately half of the variance of depressive symptomatology. Next, state anger was selected for men, while it was the third variable for women. For women at step 2, S-Anx/Present was selected, while it was the seventh variable for men. For men, SS from family members was the third. At step 4, AX/In was selected for men, and SS from supervisors was selected for women. The more men suppressed their anger inward, the more they suffered from depressive symptoms. T-Anx/Absent was commonly selected, but AX/Out was only selected for men; i.e., the more men expressed their anger outward, the more they tended to be depressed.

**Table 1:** Internal consistencies and means of psychological scales by gender

| | | Men | | Women | | |
|---|---|---|---|---|---|---|
| Scale/Subscales | Cronbach's α | Mean | (SD) | Mean | (SD) | p |
| CESD-R | 0.92 | 8.9 | 8.4 | 9.5 | 8.1 | |
| STAI | | | | | | |
| State Anxiety/Present | 0.88 | 15.7 | 4.7 | 15.4 | 4.6 | |
| State Anxiety/Absent | 0.93 | 28.1 | 5.9 | 27.6 | 6.0 | |
| Trait Anxiety/Present | 0.89 | 18.5 | 5.0 | 19.1 | 5.1 | * |
| Trait Anxiety/Absent | 0.90 | 26.4 | 5.3 | 24.6 | 5.4 | ** |
| STAXI | | | | | | |
| State Trait Anger Scale | | | | | | |
| State Anger | 0.91 | 11.3 | 3.1 | 10.9 | 2.3 | * |
| Trait Anger/Temperament | 0.83 | 7.6 | 2.3 | 7.7 | 2.4 | |
| Trait Anger/Reaction | 0.76 | 6.8 | 1.9 | 7.0 | 2.0 | |
| Anger Expression (AX) | | | | | | |
| AX/In | 0.74 | 10.8 | 2.9 | 10.8 | 2.9 | |
| AX/Out | 0.78 | 12.5 | 3.0 | 13.2 | 3.6 | ** |
| AX/Control | 0.90 | 24.5 | 6.1 | 22.9 | 6.2 | ** |
| Social Support (SS) | | | | | | |
| Supervisors | 0.82 | 10.6 | 3.1 | 10.3 | 3.3 | |
| Coworkers | 0.80 | 11.3 | 2.7 | 12.0 | 2.7 | ** |
| Family members | 0.88 | 11.8 | 3.1 | 12.3 | 3.0 | * |
| Friends/Others | 0.80 | 10.8 | 2.9 | 12.2 | 2.6 | ** |

Number of subjects varied by subscale; Men (n=1607–1624) and Women (n=343–355).

*p<0.05 and **p<0.0033 (Bonferroni correction for 15 repetitive comparisons).

Note. CESD-R: Center for Epidemiologic Studies Depression Scale revised, STAI: State-Trait Anxiety Inventory, STAXI: State-Trait Anger Expression Inventory

**Table 2:** Factors associated with depressive symptomatology —stepwise regression by gender—

| Subscales selected | Step 1 | Step 2 | Step 3 | Step 4 | Step 5 | Step 6 | Step 7 | (Corr.) |
|---|---|---|---|---|---|---|---|---|
| Men (n=1360) | | | | | | | | |
| 0. Age (yrs) | -.13 ** | -.12 ** | -.11 ** | -.10 ** | -.10 ** | -.10 ** | -.10 ** | (-.27) ** |
| 1. Trait Anxiety/Present | **.70** ** | **.52** ** | **.50** ** | **.45** ** | **.39** ** | **.39** ** | **.37** ** | (.73) ** |
| 2. State Anger | | **.37** ** | **.35** ** | **.34** ** | **.32** ** | **.32** ** | **.30** ** | (.63) ** |
| 3. SS from Family members | | | -.13 ** | -.13 ** | -.10 ** | -.10 ** | -.11 ** | (-.31) ** |
| 4. AX/In | | | | .13 ** | .14 ** | .12 ** | .12 ** | (.53) ** |
| 5. Trait Anxiety/Absent | | | | | .12 ** | .12 ** | .12 ** | (.50) ** |
| 6. AX/Out | | | | | | .04 * | .04 * | (.27) ** |
| 7. State Anxiety/Present | | | | | | | .05 * | (.60) ** |
| Adj. $R^2$ | .53 ** | .63 ** | .65 ** | .66 ** | .67 ** | .67 ** | .67 ** | – |
| Women (n=314) | | | | | | | | |
| 0. Age (yrs) | -.04 | -.02 | -.03 | -.02 | .01 | .00 | | (-.19) * |
| 1. Trait Anxiety/Present | **.69** ** | **.51** ** | **.48** ** | **.47** ** | **.43** ** | **.39** ** | | (.70) ** |
| 2. State Anxiety/Present | | **.32** ** | **.26** ** | **.26** ** | **.25** ** | .24 ** | | (.63) ** |
| 3. State Anger | | | .15 ** | .14 ** | .12 * | .12 * | | (.47) ** |
| 4. SS from Supervisors | | | | -.12 * | -.12 * | -.10 * | | (-.26) ** |
| 5. AX/In | | | | | .12 * | .13 * | | (.48) ** |
| 6. Trait Anxiety/Absent | | | | | | .11 * | | (.40) ** |
| Adj. $R^2$ | .49 ** | .55 ** | .57 ** | .58 ** | .59 ** | .60 ** | | – |

*p < .05, **p < .001. β's ≥ .25 have been shown in boldface.

Age has been entered into the regression model prior to the stepwise procedure.

SS: Social Support, (Corr.): Pearson's correlation with CES-DR.

The analyses were further conducted by gender and age group (Table 3). The stepwise procedure selected T-Anx/Present for all the groups with the largest β's. State anger was selected with the second largest and mostly moderate amount of β's in men's age-groups, whereas S-Anx/Present was the second largest for women. T-Anx/Absent was also selected, but the β's were smaller than state anger. AX subscales were more likely to be selected for men than women. SS from family member alleviated depressive symptoms for men aged 18-34 years and aged 35-46 years, whereas SS from coworkers did so for men aged 47+ years and women age 18-34 years, and SS from supervisor for women aged 35+ years.

To clarify the contribution of these psychological components to depressive symptomatology, the proportions of explained variances were displayed in Figure 1. The variables interrelate, and thus all sorts of mediation and moderation processes might be reflected. The β's represent regression coefficients adjusted for other variables in the model, therefore the summation of squared β's in Table 2 do not correspond to the total variances explained. For instance, in a case of men aged 18-34 years, the summation value is 33.3%, while the total variances explained obtained from stepwise regression analysis was 66.7%. That is, 33.4% (66.7 – 33.3) is the covariance among these variables. In Figure 1, such covariance and squared β's of each variable are illustrated. Anger components were larger in men, and anxiety components were larger in women.

## Discussion

This study examined the relative associations of anger, anger expression, anxiety, and social support with depressive symptoms in a sample of 1,862 full-time workers affiliated with two occupational enterprises in Japan. A stepwise regression analysis by gender revealed that seven and six components of the 14 candidates were significantly correlated with depressive symptomatology in men and women, respectively. Main components were T-Anx/Present and state anger for men, and T-Anx/Present and S-Anx/Present for women. AX/In (anger suppression) was also significant correlate for both genders, but AX/Out (anger expression) was only for men. Family support and supervisor support were significant correlates for men and women, respectively. Analysis by gender and age-group yielded that depressive symptomatology in men was explained by more various components including anger expression style, and effective support providers varied by the group.

The psychopathological symptoms examined here could reflect, at least in part, the underlying negative affect. Thus, to investigate the pure connections among them, the covariance of negative affect should be partialled out. The Trait Anxiety scale of the STAI has been used as the negative affect measure[37]. T-Anx/Present could be regarded as reflecting pure component of negative affect in Japanese[29]. Accordingly, it seems reasonable that T-Anx/Present was the first variable in all stepwise selections, which explained

**Table 3:** Factors associated with depressive symptomatology by gender and age-group

| | Men | | | Women | |
|---|---|---|---|---|---|
| Components | -34 yrs | 35-46 yrs | 47+ yrs | -34 yrs | 35+ yrs |
| Subscales | (n=387) | (n=517) | (n=456) | (n=206) | (n=108) |
| Negative Affectivity | | | | | |
| Trait Anxiety/Present | **.44** *** | **.33** *** | **.40** *** | **.41** *** | **.46** *** |
| Anxiety | | | | | |
| Trait Anxiety/Absent | .17 *** | .15 *** | .09 ** | .10 * | — |
| State Anxiety/Present | — | .08 * | — | .24 *** | **.34** *** |
| Anger/Anger Expression (AX) | | | | | |
| State Anger | **.27** *** | **.32** *** | **.34** *** | .12 * | — |
| Trait Anger/Reaction | .10 ** | — | — | — | — |
| AX/In | — | .11 ** | .16 *** | .13 ** | — |
| AX/Out | — | .09 ** | .07 * | — | — |
| AX/Control | — | .07 * | — | — | — |
| Social Support | | | | | |
| Family members | -.17 *** | -.11 *** | — | — | — |
| Coworkers | — | — | -.07 * | -.10 * | — |
| Supervisors | — | — | — | — | -.17 * |
| Adj. $R^2$ | .67 *** | .66 *** | .66 *** | .60 *** | .52 *** |

*$p$ < .05, **p < .01, ***$p$ < .001. $\beta$'s ≥ .25 have been shown in boldface.

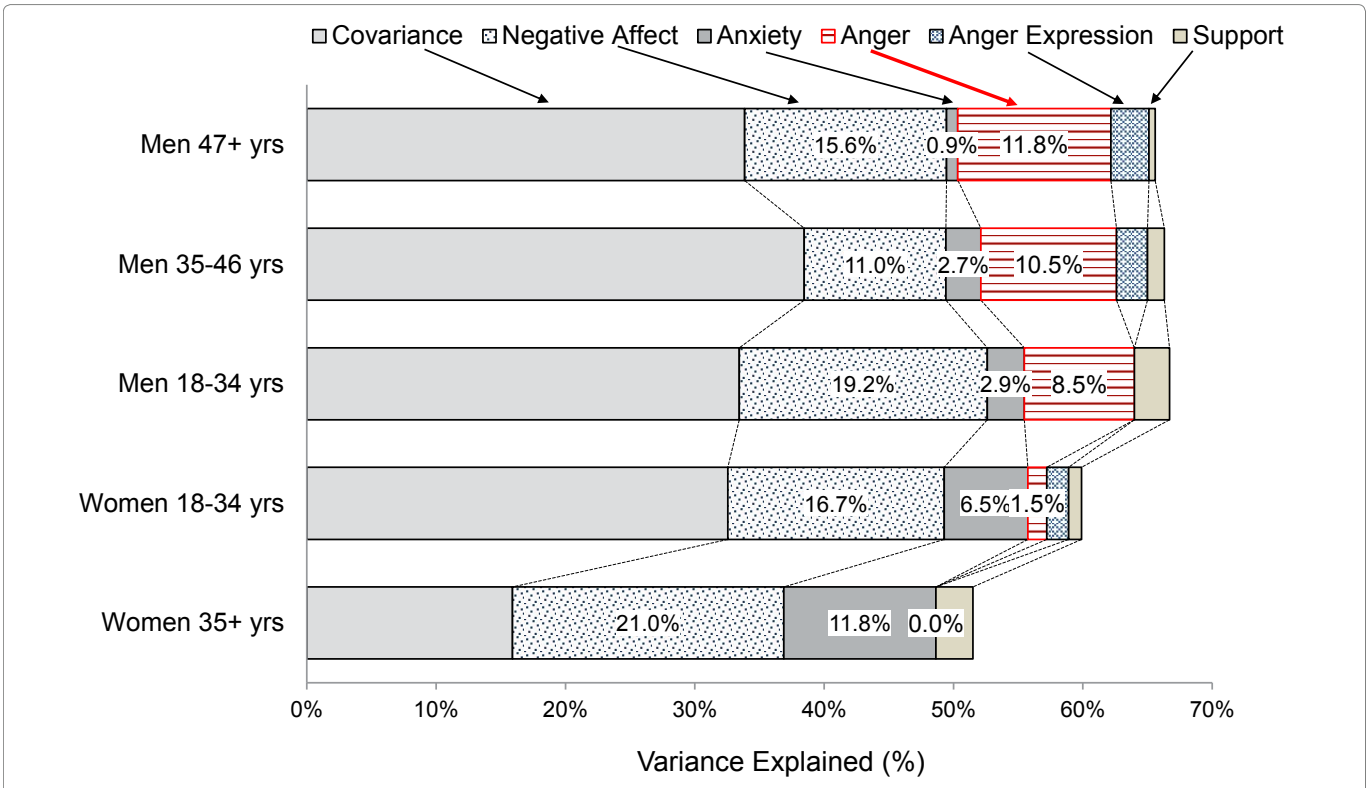


**Figure 1:** The proportions of variances of depressive symptomatology explained by anxiety, anger, anger expression, and social support by gender and age group

approximately half of the variance of depressive symptoms (Table 2). And thus, the β's of subsequent variables represent the negative affect-adjusted contribution to depressive symptoms.

State anger was the second variable for men, and S-Anx/Present was the case for women, after T-Anx/Present was firstly selected. Although state anger–depression link was observed for both genders, the β's varied greater between genders: i.e., β in men was more than twice of its women's counterpart (Table 2). It became more obvious when

examined by gender and age group (Table 3 and Figure 1). That is, after controlling for the variance explained by negative affectivity, state anger was largely associated with depressive symptomatology in men, while state anxiety was the case for women.

This study provided empirical evidence for the state anger–depression link in men. Also, this study yielded that even after controlling for negative affect, state anxiety was significantly and most highly correlated with depression in women. T-Anx/Absent, which could be regarded as (absence of) positive affect, was also correlated with depressive symptoms for both genders, except for women aged 35+ years.

The contribution of anger suppression (AX/In) to depressive symptoms was the same for men and women (Table 2), except for two of the five gender-age subgroups (Table 3). The other anger expression components showed gender differences: i.e., anger expression (AX/Out) was selected only for men, except for men under 35 years, and all AX subscales showed significant contribution for men aged 35-46 years, while none was detected for women aged 35+ years. Accordingly, anger suppression–depression link might be the same for men and women, while another anger expression style, such as outward expression of anger, was only associated with depressive symptomatology in men.

Although the prevailing belief in the western countries has been that women have greater difficulty expressing their anger, resulting in an increased incidence of anger suppression[38], there is no evidence that women are more likely than men to suppress anger[39]. However, there are no empirical reports in Japan and other Asian countries addressing it. Such behavior is an expected polite manner, particularly for women. We therefore speculate that the Japanese women would be more likely than men to suppress the expression of their angry feelings, and thus anger suppression–depression link might be more prominent in women. However, the anger suppression (AX/In) score was comparable between genders (Table 1), and anger suppression–depression link as well.

Traditionally, in the East Asian cultural system, derived from the Confucian tradition, to keep social harmony is one of the most important values in their societies, recommending socially a modest attitude.[40] Growing up in such a Confucian society might make a person to pay much attention to one's group situation and interpersonal relations. This may be presumably reflected in the Japanese cognitive style and behavior including expression of emotion.[41] Thus, individuals with a stronger interdependent self-construal, regardless of gender, tend to suppress or avoid angry feelings in order to maintain social harmony[20,42].

In occupational settings in Japan, there still exits a relatively strong hierarchy or supervisor–subordinate relationship. Under such circumstances, the subordinates might make a conscious effort to suppress outward expression of anger[43]. Significant association of outward expression of anger observed only in men might reflect atypical or masculine-type depressive symptoms[12,13]. It has been reported that more traditional men are likely to endorse such symptoms[16]. Thus, both suppression and outward expression of anger significantly contributed to depressive symptomatology for middle and senior age groups of men but not for younger men (Table 3).

## Limitations

Several limitations to the present study should be mentioned. First, the generalizability of our findings is limited because our sample was limited to general adult workers, predominantly men, affiliated with two occupational organizations in Japan. Second, this study relied on a cross-sectional design and we analyzed the relative contribution of anxiety, anger, and anger expression to depression: i.e., depression was used as a dependent variable and others were used as independent variables. However, these associations would be bidirectional nature. Thus, longitudinal research design should be employed in a future study.

## Conclusion

This study revealed that 1) state anger was largely associated with depressive symptomatology in men, while state anxiety was the case for women, and 2) anger suppression–depression link was the same for men and women, whereas another expression style of anger, such as outward expression of anger, contributed only to depressive symptomatology in men. There might exist a gendered pathway involving anger and anger expression leading to depression. Accordingly at the assessment of depression, masculine-type of depressive symptoms should be taken into consideration particularly for middle aged men.

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## Conflict of Interest

The authors declare no conflict of interest.

## Author Contributions

N.I. conceptualized the study, analyzed the data, prepared the first draft, and revised the paper. T.S. contributed to the data collection and revised the paper. All authors approved the final draft.

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