Self-Reported Attention Control Skills Moderate the Effect of Self-Focused Attention on Depression

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Abstract
This study aimed to examine whether attention control skills (selective, switching, and divided attention) moderate the influence of self-preoccupation (the tendency to maintain self-focused attention) on depression. We conducted a cross-sectional survey at a Japanese university. A total of 283 undergraduate and graduate students answered Preoccupation Scale (measuring self-preoccupation), Voluntary Attention Control Scale (measuring self-reported attention control skills), and the Center for Epidemiologic Studies Depression Scale (the standardized measurement of depression), and we analyzed 267 questionnaires (101 men and 166 women). No cut-off points were set for screening individuals depression score. The results of the hierarchical multiple regression analysis were as follows: Higher skills of switching attention were associated with higher depression scores when combined with greater self-preoccupation tendencies. In contrast, higher levels of divided attention skill were associated with lower depression levels when combined with greater self-preoccupation. This study is the first to provide an overview of the protective role of divided attention skill against depression among individuals with high self-preoccupation. We conclude this article by showing that the interventions aiming to increase the divided attention skill rather than switching skill are expected to be effective in decreasing depressive symptoms and discussing the study’s limitations.

Keywords
self-focused attention, depression, attention regulation, divided attention, switching attention

Introduction
Various factors have been suggested as increasing depression. Some of these, such as rumination and self-focused attention, are connected to attention. Rumination involves behavior and thoughts that focus one’s attention on one’s depressive symptoms and their implications (Nolen-Hoeksema, 1991). It is a state in which negative mood is amplified and prolonged through repetitive focus on (thinking about) negative information (i.e., recalling negative experiences and continuously thinking about “how it makes me upset” and “why I had such a terrible experience”). Although self-focused attention is similar to rumination, it is considered a broader construct because it is not limited to negative information and deals with any type of focus on the self (Sakamoto, 1998).

Self-Focused Attention and Depression
Self-focused attention includes public self-focus and private self-focus, with the latter being strongly associated with depression. Private self-focus includes one’s inner being, cognitive faculties, emotional states, desires, and intentions (Fenigstein et al., 1975). Smith and Greenberg (1981) reported that private self-focus was positively correlated with depression after controlling for the effect of public self-focus. In addition, a meta-analysis showed that private self-focus was strongly associated with depression (Mor & Winquist, 2002). Therefore, reducing the levels of attention paid to inner feelings, thoughts, and sensations should be one of the targets of interventions to reduce depression.

Furthermore, the maintenance rather than the frequency of private self-focus is harmful to psychological health. According to Carver and Scheier (1982), self-focused attention reveals the discrepancy between one’s present state and reference values and triggers actions to reduce the discrepancy. Furthermore, failure to reduce this discrepancy leads to negative feelings resulting from the awareness of this inability. Sakamoto (1998) proposed “self-preoccupation,” which

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refers to the tendency to maintain private self-focus (i.e., finding it difficult to stop dwelling on thoughts such as: “what sort of person am I?” or “what is my physical and mental condition?”), and reported that self-preoccupation was more strongly positively correlated with depression than the frequency of self-focusing. Therefore, even though the occurrence of self-focused attention leads to a temporary depressive mood, the maintenance of self-focused attention could be a greater risk of depressive symptoms because it prolongs and exacerbates that mood.

**How to Mitigate the Maladaptive Effect of Self-Focused Attention**

One way to avoid amplifying depressive mood is to discontinue the self-focused attention. For example, distraction, which is the process of switching attention from one’s negative mood or thoughts to other subjects/objects (i.e., devoting oneself to a hobby), is considered to improve mood immediately (e.g., Nolen-Hoeksema & Morrow, 1993). However, it has been suggested that redirecting one’s attention from negative mood to non-self-related information is too effortful and prevents the development of alternative interpretations or cognition of negative experiences (Watkins & Teasdale, 2004). Therefore, the attempt to interrupt self-focused attention might not always be efficient.

In addition, self-focused attention is suggested to not only increase depression but also be adaptive and facilitate self-knowledge (Mckie et al., 2017; Nakajima et al., 2017; Trapnell & Campbell, 1999; Watkins & Teasdale, 2004). It is possible that there are some moderators of the relationship between self-preoccupation and depression. For example, the context in which self-focus occurs, the content and valence of the thought, and the concreteness of processing during self-focus have been found to affect the adaptiveness of self-focused attention (Watkins, 2008). These cognitive factors would play substantial roles, as they directly affect thoughts induced by self-focused attention. However, such factors would be difficult to control through interventions because they are closely associated with the causes and motivations of self-focused attention. It could be valuable to examine general moderators separately from the context, content, and purpose of self-focused attention. Facilitating this moderator is considered to mitigate the risk of the onset of depression in people with high self-preoccupation.

**Attentional Flexibility and Self-Focused Attention**

Considering self-preoccupation as a problem in attention control, it would be appropriate to assume that some factors related to attention regulation moderate the influence of self-preoccupation on depression. Detached mindfulness is an adaptive form of self-focused attention. One component of this self-focus—which is defined as objective awareness of thoughts and internal events in the absence of conceptual analysis and goal-directed responses (Wells, 2005)—is attention flexibility. Conversely, a deficit in attention flexibility is shown to be associated with negative rumination (DeJong et al., 2019; Mills et al., 2016; Tortella-Feliu et al., 2014). Thus, it is possible that self-preoccupation is particularly maladaptive when combined with low attention flexibility because individuals are unable to stop passively focusing on negative thoughts and self-evaluations. However, even though individuals are disposed to prolonging focusing attention on their inner thoughts, levels of self-preoccupation might not predict higher levels of depression or might even decrease depression by leading to constructive self-reflection and problem solving when they also possess adequate attention flexibility.

Attention regulation involves the ability to focus on particular objects (selective attention), switch attention from one object to another smoothly (switching attention), and focus on multiple objects simultaneously (divided attention). Wells (1990) proposed to heighten the skills of these attention components using an auditory task that requires focusing on one sound, quickly switching attention to another sound, and then focusing on different sounds at the same time. The procedure was established as the Attention Training Technique (ATT; Wells, 2000). ATT was reported to be effective in reducing depression and anxiety (Fergus et al., 2014; Knowles et al., 2016; Papageorgiou & Wells, 2000) and perceived stress (Myhr et al., 2019). However, it is unclear how selection, switching, and divided attention skills contribute to efficacy. While attention regulation ability as a whole is considered to alleviate maladaptive self-focused attention (Wells, 2005), it could play a different role in the relationship between self-preoccupation and depression. Furthermore, because most studies examined state-level effects of brief ATT session, it is unclear whether the efficacy of ATT is due to heightening attentional flexibility or temporarily distracting from negative self-focusing. For example, Fergus and Wheless (2018) reported that brief ATT shifted attention from self to the external environment more than a mindfulness-based task and a distraction task, whereas McEvoy et al. (2017) failed to find a decrease in self-focused attention from ATT. Thus, examining the association between self-preoccupation and trail-level attention regulation could contribute to confirming the mechanism of ATT.

**Current Study**

The aim of the present study was to examine the moderating effect of attention regulation skills on the relationship between self-preoccupation and depression. This study conducted a cross-sectional survey of undergraduates and graduate students to examine the protective role of attention regulation on depressive symptoms associated with self-preoccupation. We predicted that attention regulation skills (selective, switching, and divided attention) moderate the effect of self-preoccupation on depression. In addition, there
is a gender difference in the association between self-focused attention and depression. Self-focused attention in women was reported to have a stronger association with depression than in men (Mor & Winquist, 2002). Women were also reported to engage in self-focusing more than men following negative social evaluation from others (Vanderhasselt et al., 2018). Thus, we examined the association between self-preoccupation, depression, and attention regulation controlling for the effect of gender difference. Our hypothesis was that higher levels of attention regulation skills buffer the increase in depression caused by self-preoccupation, even when gender difference is controlled for. We also examined which components of attention regulation play central roles in alleviating the increase in depression by self-preoccupation.

Materials and Methods

Participants and Procedure

The participants were Japanese undergraduates and graduate students in the faculty of Letters, Arts, and Sciences at Waseda University. The survey took place from May 2018 to April 2019. We distributed questionnaires or printed QR codes for access to the online form version (Google Forms) in introductory psychology classes. To determine the sample size to detect the interaction effects between self-preoccupation and attention regulation skills in hierarchical regression analysis, we first used the software G*Power 3.1 (Faul et al., 2009) using $d = 0.08$ (small to medium effect size), $\alpha = .05$, and $1 - \beta = .95$, and found that a sample of more than 219 was required. In addition, considering that Sakamoto (1998) reported a significant association between self-occupation and depression using 227 and 342 Japanese samples ($rs = .41 - .44$), we chose a comparable sample size in the present study. Although data were obtained from 283 students, 16 students submitted incomplete responses. Thus, 267 participants (101 men and 166 women; age: $M = 19.9, SD = 1.5$, with a range from 18 to 27 years) who filled out the questionnaires were included in the analyses. The participants were advised verbally and in writing that (a) participation was voluntary and answering the questionnaire implied informed consent, (b) they could stop answering or withdraw the consent for participation without any disadvantages, and (c) they did not receive any payment for participation. The present study was approved by the Ethics Review Committee on Research with Human Subjects of Waseda university.

Measures

Preoccupation Scale. The Preoccupation Scale (Sakamoto, 1998) is a 19-item self-report questionnaire that assesses the tendency to maintain the focus of attention on private-self or external matters. The scale includes two subscales that focus on self-preoccupation and external preoccupation. The self-preoccupation subscale includes 11 items to assess the tendency to continue focusing more on the self than on others or the environment (e.g., “I often analyze myself for long periods of time”) and ranges from 11 to 55. The external preoccupation subscale includes eight items to assess the tendency to absorb oneself in some external things (e.g., “I am not satisfied until I complete something that I set out to do”) and ranges from 8 to 40. There were no cut-off points in both subscales. Each item is rated using a 5-point scale ranging from 1 (does not apply to me at all) to 5 (applies to me very well). The Preoccupation Scale has demonstrated sufficient reliability and validity (Sakamoto, 1998). It has been shown that the self-preoccupation subscale has a strong positive correlation with neuroticism personality traits and external preoccupation with conscientiousness personality traits (Ikeda et al., 2019). In this study, each subscale showed good internal consistency (Cronbach’s $\alpha$s were .90 for self-preoccupation and .81 for external preoccupation).

Voluntary Attention Control Scale. The Voluntary Attention Control Scale (Imai et al., 2015) was used to measure subjective levels of attention control skills. The scale consists of three subscales: selective attention skill ($\alpha = .84$), which seeks information on how strongly one can concentrate on a particular task (e.g., “I can concentrate on a thing which I must do even when the circumstances are noisy”); switching attention skill ($\alpha = .89$), which attempts to identify how smoothly one can switch attention from one object to another (e.g., “If distracted, I can intentionally switch my attention to another thing”); and divided attention skill ($\alpha = .93$), which asks how effectively one can engage in several tasks simultaneously (e.g., “I can divide my attention and focus on several things simultaneously”). Each item is rated using a 6-point scale ranging from 1 (does not apply to me at all) to 6 (applies to me very well), and each subscale includes six items that range from 6 to 36. There were no cut-off points in the Voluntary Attention Control Scale. In Imai and colleagues’ (2015) study, the score of each subscale demonstrated medium correlations with auditory attention task measuring each skill ($rs > .43, ps < .01$). Thus, although this is a self-reported questionnaire, the score should reflect one’s objective attention skills.

The Center for Epidemiologic Studies Depression Scale. The Japanese version of the Center for Epidemiologic Studies Depression (CES-D) scale (Shima et al., 1985) was used to measure levels of depressive symptoms during the preceding week. This scale includes 20 items ($\alpha = .88$) to assess depressive symptoms during the previous week (e.g., “I was bothered by things that usually don’t bother me”). Each item is rated using a 4-point scale ranging from 0 (less than 1 day) to 3 (5–7 days), and the total score ranges from 0 to 60. Although the cut-off point of the CES-D scale for major depression in the Japanese general sample is proposed as 16 (Shima et al., 1985) or 19 (Wada et al., 2007), this analogue study did not screen participants.
Table 1. Descriptive Statistics and Zero-Order Correlations.

| Variables | Depression | SP | EP | Select | Switch | M   | SD  |
|-----------|------------|----|----|--------|--------|-----|-----|
| Depression| .48**      |    |    |        |        | 16.7| 9.7 |
| SP        | .01        | -.27** | -.02 | .28** | .57**  | 36.5| 8.8 |
| EP        |            |      |     |        |        | 27.4| 5.5 |
| Select    | -          |      |     |        |        | 21.1| 5.5 |
| Switch    | -          |      |     |        |        | 19.6| 5.7 |
| Divide    | -          |      |     |        |        | 17.7| 6.3 |

Note. SP = self-preoccupation; EP = external preoccupation; Select = selective attention; Switch = switching attention; Divide = divided attention. p < .10; **p < .01.

Data Analyses

First, correlation analyses were performed to examine the associations between variables. Next, hierarchical multiple regression analysis was conducted to examine the moderating effects of attention regulation skills on the influence of self-preoccupation on depression (Model A). The effects of gender, which was dummy coded (0 = women, 1 = men), and age were controlled for in the first step. The second step included the scores for self-preoccupation, selective attention, switching attention, and divided attention. The interactions between self-preoccupation and each attention skill were entered in the final step. A further hierarchical multiple regression analysis was conducted, replacing self-preoccupation with external preoccupation (Model B). Simple slope tests were performed to interpret the interaction. The analyses were conducted using statistical software R and HAD (Shimizu et al., 2006).

Results

Preliminary Analyses

The participants comprised 101 men and 166 women who were undergraduate or graduate students living in Japan. The mean age of participants was 19.9 ± 1.5 years ranging from 18 to 27 years. Of our sample, 92 (34.5%) participants (41 men and 51 women) were over the cut-off point of the Japanese version of the CES-D scale (>19). There was no gender difference in the CES-D scale scores, t(265) = 1.24, n.s., d = .16. Descriptive statistics and zero-order correlations are shown in Table 1. Self-preoccupation was positively correlated with depression and negatively correlated with switching attention and divided attention. External preoccupation was significantly positively correlated with selective attention and negatively correlated with divided attention at a marginally significant level but was not correlated with depression. Significant positive correlations were observed between self-preoccupation and external preoccupation and between the three attentional control skills. We tested gender difference on the correlation between self-preoccupation and depression, and no significant difference was found (men: r = .57, p < .01; women: r = .42, p < .01; z = 1.50, n.s.).

In addition, the results of partial correlation analyses showed that when external preoccupation was controlled for, self-preoccupation was significantly correlated with selective attention (r = −.18, p < .01), divided attention (r = −.15, p < .05), and depression (r = −.53, p < .01). When self-preoccupation was controlled for, external preoccupation was correlated with selective attention (r = .31, p < .01) and depression (r = −.24, p < .01) but not with switching attention (r = .06, n.s.) or divided attention (r = −.04, n.s.).

The Moderating Effects of Attention Flexibility

The hierarchical regression analysis was conducted to examine how effectively the attention regulation skills could moderate the influence of self-preoccupation on depression (Table 2, Model A). We confirmed the normality of residuals by the shape of the Q-Q plot, no issues of multicollinearity using Variance inflation factor (VIF) (<3.4), and homoscedasticity by the shape of residuals versus fit plot. The final model was significant, accounting for 36.2% of the variance in depression. In the final step, the interactions between self-preoccupation and each attention regulation skill accounted for an additional 1.8% of the variance (R² increased at a marginally significant level). In the final model, the effects of self-preoccupation and attention regulation skills, except for switching attention, were significant. In addition, the interaction between self-preoccupation and switching attention was significant. The final step showed better model fit (Akaike information criterion [AIC] = 1,846.86) than the second step (AIC = 1,848.98).

The simple slope analyses (Figure 1A) showed that the simple slope for higher self-preoccupation (M + 1 SD) was significant, B = 0.56, SE = 0.21, β = .34, t(257) = 2.63, p < .01, but that for lower self-preoccupation (M − 1 SD) was not, B = −0.11, SE = 0.19, β = −0.06, t(257) = −0.54, n.s. The interaction between self-preoccupation and divided attention was also significant. Although the simple slope (Figure 1B) for higher self-preoccupation was significant, B = −0.70, SE = 0.17, β = −.46, t(257) = −4.11, p < .001, the slope for lower self-preoccupation was not, B = −0.10, SE = 0.15, β = −.06, t(257) = −0.62, n.s.
Table 2. Hierarchical Regression Analysis of Preoccupation and Attention Control Predicting Depression.

| Independent variables | Step 1 | Step 2 | Step 3 |
|------------------------|--------|--------|--------|
|                        |        |        |        |
| **Model A**            |        |        |        |
| Sex                    | 1.47   | 1.20   | 0.08   | 2.00   | 0.99   | 0.10*  | 2.02   | 0.99   | 0.10*  |
| Age                    | 0.03   | 0.39   | 0.00   | 0.38   | 0.32   | 0.06   | 0.45   | 0.32   | 0.07   |
| SP                     | 0.50   | 0.06   | 0.46***| 0.50   | 0.06   | 0.46***| 0.50   | 0.06   | 0.46***|
| Select                 | -0.41  | 0.11   | -0.24***| -0.46  | 0.11   | -0.27***| -0.46  | 0.11   | -0.27***|
| Switch                 | 0.19   | 0.14   | 0.12   | 0.23   | 0.14   | 0.14   | 0.23   | 0.14   | 0.14   |
| Divide                 | -0.36  | 0.11   | -0.24***| -0.39  | 0.11   | -0.26***| -0.39  | 0.11   | -0.26***|
| Select × SP            | -0.00  | 0.01   | -0.03  | 0.04   | 0.02   | -0.21* | 0.04   | 0.02   | -0.21* |
| Switch × SP            | -0.03  | 0.01   | -0.20**| 0.27   | 0.03   | -0.28**| 0.27   | 0.03   | -0.28**|
| Divide × SP            | -0.01  | 0.02   | -0.05  | 0.02   | 0.03   | -0.07  | 0.02   | 0.03   | -0.07  |
| R²                     | 0.01   |        | 0.34***| 0.36***|        |        |        |        |        |
| ΔR²                    | 0.01   |        | 0.34***| 0.36***|        |        |        |        |        |
| AIC                    | 1,953.98 | 1,848.98 | 1,846.86 |

| **Model B**            |        |        |        |
|                        |        |        |        |
| Sex                    | 1.47   | 1.20   | 0.08   | 1.72   | 1.14   | 0.09   | 1.80   | 1.15   | 0.09   |
| Age                    | 0.03   | 0.39   | 0.00   | 0.26   | 0.37   | 0.04   | 0.27   | 0.37   | 0.04   |
| EP                     | 0.05   | 0.11   | 0.03   | 0.08   | 0.16   | 0.05   | 0.06   | 0.16   | 0.03   |
| Select                 | -0.34  | 0.13   | -0.20**| -0.34  | 0.13   | -0.20**| -0.34  | 0.13   | -0.20**|
| Switch                 | 0.08   | 0.16   | 0.05   | 0.08   | 0.16   | 0.05   | 0.08   | 0.16   | 0.05   |
| Divide                 | -0.43  | 0.13   | -0.28**| -0.41  | 0.14   | -0.27**| -0.41  | 0.14   | -0.27**|
| Select × EP            | -0.01  | 0.02   | -0.03  | 0.02   | 0.03   | 0.07   | 0.02   | 0.03   | 0.07   |
| Switch × EP            | -0.01  | 0.02   | -0.05  | 0.02   | 0.03   | 0.10   | 0.02   | 0.03   | 0.10   |
| Divide × EP            | -0.01  | 0.02   | -0.05  | 0.02   | 0.03   | 0.10   | 0.02   | 0.03   | 0.10   |
| R²                     | 0.01   |        | 0.14**| 0.14***|        |        |        |        |        |
| ΔR²                    | 0.01   |        | 0.14**| 0.14***|        |        |        |        |        |
| AIC                    | 1,953.98 | 1,919.48 | 1,924.85 |

Note. SP = self-preoccupation; Select = selective attention; Switch = switching attention; Divide = divided attention; EP = external preoccupation; AIC = Akaike information criterion.  
†p < .10. *p < .05. **p < .01. ***p < .001.

Figure 1. The simple slope test of the interactions between SP and switching attention (A) and dividing attention (B).  
Note. SP = self-preoccupation.
We also tested the indirect effect of self-preoccupation on depression through attention regulation skills (bootstrapping method with 1,000 samples). In this model, three attention regulation skills were entered as mediators and the effects of age and gender were controlled for. Results showed that divided attention indicated marginally significant indirect effect ($\beta = .04, SE = 0.02$, 95% confidence interval [CI] = [0.00, 0.10]) whereas the total indirect effect was not significant ($\beta = .03, SE = 0.03$, 95% CI = [-0.03, 0.08]). The model fit was not better than the moderation model (AIC = 6,947.83).

The result of the second hierarchical multiple regression analysis in which self-preoccupation was replaced with external preoccupation (Model B) is shown in Table 2. The model also confirmed the normality of residuals, with no problem of multicollinearity (VIF < 3.5) and homoscedasticity. The second step was significant, accounting for 13.3% of the variance in depression. However, the final step did not show a significant increase in $R^2$. There was no significant interaction between external preoccupation and attention regulation skills.

**Discussion**

The results indicated that switching and divided attention skills played moderating roles, rather than mediating roles, in the relationship between self-preoccupation and depression, even when gender difference was controlled for. It is interesting to note that these skills showed opposite associations with self-preoccupation. The results suggested that when the tendency to maintain self-focus was relatively strong, depressive symptoms were alleviated by higher levels of divided attention skill and increased by higher levels of switching attention skill. Therefore, attentional flexibility moderated the association between depression and perseverative “self-focusing” in particular.

Our findings showed that although the switching attention skill was negatively correlated with depression, it could lead to maladaptive cognition or behavior when combined with high levels of self-preoccupation. Switching attention is considered as one of the most standard methods used to reduce negative mood caused by focusing on negative thoughts (e.g., using distraction for emotional regulation). However, as mentioned previously, attempts to obstruct self-focus often lead to undesirable consequences (Watkins & Teasdale, 2004). Likewise, the results of this study suggested that individuals with a high likelihood of engaging in and maintaining self-focused attention tended to exacerbate depression by trying to divert from negative inner information. In such cases, switching attention would be characterized by avoidance behavior. The distraction to avoid aversive objects or thoughts is associated with low levels of quality of life (Wolgast & Lundh, 2017) and high levels of depression (Ishikawa et al., 2018). Distraction of self-focused attention in situations which require reflection is considered to lead to the postponement of coping with problems, thereby increasing the difficulty of the situation and depression and reducing self-esteem and self-efficacy (van Eerde, 2003). People who tend to maintain less self-focused attention may adaptively prevent exacerbating their depressive mood by switching attention from negative thoughts. However, those with higher levels of self-preoccupation and switching attention ability may cope with their depressive mood adaptively by distracting themselves for the sake of avoidance repetitively and excessively. Therefore, interventions designed to promote switching attention or induce distractions could be ineffective, or even inappropriate, for people with high levels of self-preoccupation.

By contrast, we found that dividing attention is an important factor that buffered increased depression severity caused by self-focusing. The ability to divide attention between multiple objects could prevent one from focusing their attentional resources entirely on the self. Rumination leads to prolonged and amplified depressive moods through repetitive processing of particular negative information (Papageorgiou & Wells, 2004; Whitmer & Gotlib, 2013). Dividing attention between internal and external information could help make self-focus more constructive or less perseverative because this would enable individuals to relativize, reconsider, or accept their negative thoughts. For example, mindfulness, which includes training to broaden the attentional focus, cultivates the observation of aversive objects from a distanced, nonevaluative perspective and has been suggested to reduce rumination and depression (Bieling et al., 2012; Hawley et al., 2014; Wolkin, 2015). This attitude could be associated with experiential self-focus (Watkins, 2004; Watkins & Teasdale, 2004), which is an adaptive form of self-focused attention. Furthermore, both ATT and mindfulness-based interventions were suggested to reduce anxiety through the increment of distanced observing, present-focused attention, and metacognitive beliefs about the controllability of thoughts (McEvoy et al., 2017). Therefore, the ability to divide attention could allow individuals to use self-focus as an adaptive method by broadening attentional focus rather than suppressing or distracting self-focused attention.

In contrast to the findings on self-preoccupation, the influence of external preoccupation (the tendency to focus continuously on external objects) on depression was neither significant nor moderated by attention control skills. Although both self-preoccupation and external preoccupation are considered to be based on common processing, such as the maintenance of attention, they are also related to differential neural mechanisms. Ikeda et al. (2019) reported that self-preoccupation is positively associated with gray matter volume in the posterior cingulate gyrus which is activated by unintentional self-reference, while external preoccupation is not. It is possible that people with higher self-preoccupation use voluntary attention regulation to cope with passive self-focusing whereas external preoccupation is based on deliberate attention regulation.
The findings of this study could contribute to the development of more efficient interventions to prevent exacerbation of depression caused by self-preoccupation, such as those involving attention training that focuses on dividing attention. For example, the findings could support the efficacy of mindfulness in cultivating acceptance and non-judgmental, open awareness of various thoughts or feelings. Furthermore, Ishikawa and Koshikawa (2018) showed the possible efficacy of dividing-attention training; they reported that engaging in a distraction task while deliberately recalling unpleasant memories was effective in reducing one’s aversion to the memories. Dividing attention skill would play a significant role in mitigating the increase of negative mood and cognition.

Limitations
The study was subject to several limitations. First, as it was cross-sectional in design, it is unclear whether training in the divided attention skill definitely reduced depressive symptoms in those with high levels of self-occupation. In addition, as the increase in \( R^2 \) was marginally significant when the interactions between self-preoccupation and attention regulation were entered into the regression model, the moderating effects might be relatively weak. Further research is required to determine how switching or dividing attention functions when individuals are focusing on negative thoughts. Second, all of the variables examined in the study were measured using questionnaires. In particular, several studies have suggested that attentional abilities measured through self-reported questionnaires are inconsistent with objective indices (e.g., Van Bockstaele et al., 2011). The score of the Voluntary Attention Control Scale might reflect not only the actual level of attention regulation but also one’s beliefs about one’s abilities to control attention or tendency of responses toward self-preoccupation. However, despite this, the present results would be valuable because the intervention to heighten cognitive function is reported to increase the subjective attention skill as well (Richmond et al., 2011). Further studies should re-examine the associations among depression, self-preoccupation, and attention regulation using an experimental design and behavioral indices. Finally, participants of the present study were limited to Japanese undergraduates. While the association between self-focused attention and depression has been reported as being stronger in women than men in the general population (Mor & Winquist, 2002) and even in Japanese samples (Sakamoto, 2000), we found no gender difference in the correlation between self-preoccupation and depression. It is possible that a sampling bias occurred in present study and further studies should examine whether our findings are replicated in other populations, ages, or clinical samples. However, Sakamoto (1998) reported no difference in self-preoccupation scale scores between women and men. There is the possibility that gender difference is indicated in the frequency of self-focused attention, but not in the tendency to maintain self-focus (self-preoccupation), or perhaps the self-preoccupation scale is not sufficiently valid. These points should also be considered in future studies.

Conclusion
In sum, our study suggests that although attention skills have been shown to decrease maladaptive coping with depressive mood (Wells & Matthews, 1994), these skills do not necessarily alleviate depressive symptoms when combined with a high level of self-preoccupation. Interventions aiming to increase the divided attention skill are expected to be more effective in decreasing depressive symptoms than the interventions focusing on the switching attention skill.

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Ethics Statement
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