Current Psychology (2021) 40:1159–1167
https://doi.org/10.1007/s12144-018-0041-2

High working memory capacity facilitates distraction as an emotion regulation strategy

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Published online: 31 October 2018

Abstract
Previous research suggests that distraction, which shifts attention away from negative situations or stimuli, reduces negative emotion. Although working memory capacity plays an important role in attention control, it remains unclear whether working memory capacity influences the effect of distraction as an emotion regulation strategy. In this study, we examined the relationship between working memory capacity and distraction. Seventy-six healthy undergraduate and graduate students participated in this study. Participants watched a movie clip that evoked negative emotion. Approximately half of the participants subsequently engaged in a distraction task in which they selected a category for 32 displayed images; the other half of the participants were instructed to wait 210 s as a questionnaire was prepared. The participants were asked to respond to the Positive and Negative Affect Schedule before and after watching the movie clip, as well as after completing the distraction task or waiting. A multiple regression analysis showed an interaction between the effectiveness of distraction and working memory capacity. As predicted, among participants in the distraction condition, those with higher working memory capacity expressed less negative emotion than those with lower working memory capacity. This result suggests that the effectiveness of distraction depends on individual differences in working memory capacity.

Keywords Distraction · Working memory capacity · Emotion regulation · Attention control

Introduction

Emotion regulation comprises a set of automatic and controlled processes involved in the initiation, maintenance, and modification of the occurrence, intensity, and duration of feeling states (Gross 1998; Gross and Thompson 2007; Webb et al. 2012). Many studies have found that emotion regulation strategies reduce negative emotions and facilitate mental health (Aldao et al. 2010; Gross 2015; Webb et al. 2012).

Distraction as an Emotion Regulation Strategy

Distraction is known as an emotion regulation strategy (Heiy and Cheavens 2014; Webb et al. 2012). Distraction can be seen when someone "focuses attention on different aspects of the situation or moves attention away from the situation altogether" (Gross and Thompson 2007, p 17). In other words, distraction is moving attention from negative emotions and thinking to other non-negative contents (Webb et al. 2012). For example, one might think about one's vacation plans while in a depressing meeting, call to mind memories that help to instantiate a desired emotional state, and so on (Gross 2015).

A number of studies have shown that distraction decreases negative emotion in experimental conditions (e.g., Brans et al. 2013; Erber and Tesser 1992; Joormann et al. 2007; Phillips et al. 2008; Siemer 2005). For instance, Nolen-Hoeksema and Morrow (1993) found that distraction reduces depressive mood relative to rumination. Similarly, Joormann et al. (2007) showed participants a negative movie and then asked them to perform a distraction task. In this task, 40 target words were presented. The participants were asked to generate two short anagram words based on a target word (e.g., "money" and "nose" from "monastery"). A comparison was then made between negative emotion immediately after watching the negative movie and again after the distraction task. Furthermore, Van Dillen and Koole (2007) indicated that

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mental calculations as distraction attenuated negative emotion that was evoked by negative pictures. These results showed that distraction as an emotion regulation strategy is effective in reducing negative emotion.

Although there are other emotion regulation strategies that are easier and faster to implement than distraction, these strategies are not superior to distraction. For instance, alcohol use (e.g., "I've been using alcohol or other drugs to make myself feel better" (Carver 1997)) and disengagement (e.g., "I've been giving up trying to deal with it" (Carver 1997)) are easier strategies to implement. However, these strategies lead to unsuccessful results (Litman 2006). While distraction may be more difficult to implement as an emotion regulation strategy than these non-adaptive strategies, it can be presumed to be a better emotion regulation strategy.

It should be noted that distraction as emotion regulation and distraction (or distractibility) in the context of basic research on attention or attention deficit hyperactivity disorder (ADHD; Barkley 1997; Forster and Lavie 2016; Kalm 1995) are different concepts. Although they are similar in shifting attention away from one stimulus to another, they are different in the following two ways. First, they differ in terms of the experimental paradigm. Regarding distraction in the context of emotion regulation, distraction is actively shifting attention from negative emotions or thinking to some other non-negative stimulus (i.e., the distractor) to reduce negative emotion. For example, participants are asked to redirect attention from negative emotions or thinking to some other non-negative stimulus (e.g., thinking about travel plans, mental calculations, drawing positive contents; Phillips et al. 2008; Van Dillen and Koole 2007). On the other hand, in basic research on attention or ADHD, distraction means involuntary drifting of attention from a task- or goal-relevant stimulus to an irrelevant distractor (e.g., Lavie 2010; Minamoto et al. 2015). Therein, participants are instructed not to shift attention to a task- or goal- irrelevant stimulus in basic research on attention or ADHD. Second, they differ in terms of the research aims and concerns. In research on emotion regulation, the main concern is whether distraction attenuates negative emotion (Gross 2013, 2015). On the other hand, in basic research on attention or ADHD, the main concern is distraction itself or difficulty in attention control (e.g., Lavie 2010; Minamoto et al. 2015). Taken together, distraction as an emotion regulation strategy and distraction as a result of deficits of attention control differ greatly.

Distraction and Working Memory Capacity

While distraction is an effective emotion regulation strategy (Heiy and Cheavens 2014; Webb et al. 2012), when negative emotions are evoked, it is difficult for people to shift their attention away from negative stimuli and to shift their thinking and emotions to non-negative content. Negative emotions induce ruminative responses about the negative emotions, the causes of these emotions, and negative thinking (Nolen-Hoeksema 1991; Nolen-Hoeksema et al. 2008). Accordingly, with attention focused on a negative stimulus, one's emotions and thinking maintain and increase negative emotional states (Nolen-Hoeksema 1991; Nolen-Hoeksema and Morrow 1993; Webb et al. 2012). In other words, when negative emotions are evoked, it is not easy for distraction to attenuate these negative emotions. Therefore, it is important to determine factors that contribute to the efficacy of emotion regulation (Pe et al. 2013).

It is likely that difficulty in distraction is modulated by individual differences in working memory capacity (WMC), which is related to attention control. WMC refers to individual differences in the index of working memory (WM), which is defined as a limited resource system allowing the temporary storage and manipulation of information necessary for such complex tasks as comprehension, learning, and reasoning (Baddeley 2000; Baddeley and Hitch 1974). WMC is assessed in WM span tests, such as the reading span test (RSPAN; Daneman and Carpenter 1980) and operation span test (OSPAN; Conway et al. 2005; Turner and Engle 1989). For instance, the RSPAN requires participants to perform a short memory task where they encode and recall target words while reading other words. Similarly, the OSPAN is a short memory task that entails calculating mathematical eqs. WMC is well known to support attention control (Conway et al. 2001; Kane et al. 2001; Redick et al. 2007). For example, Kane et al. (2001) showed that the size of WMC, which was assessed by the OSPAN, supports attention control. In addition, attention control is important for distraction because distraction involves shifting attention from negative to non-negative content when negative emotions and thoughts that prevent attention from moving away from negative content are evoked. Therefore, we consider WMC to influence distraction.

Related to the relationships between WMC and distraction as emotion regulation, several previous studies have examined the relationship between WMC and emotion regulation strategies other than distraction (McRae et al. 2012; Pe et al. 2013; Schmeichel et al. 2008). Schmeichel et al. (2008) indicated that WMC modulates emotion regulation strategies, such as reappraisal and suppression. In this study, WMC was assessed by the OSPAN or N-back tasks (Gray 2001; Jonides et al. 1997). Regarding suppression, participants who had a high WMC capacity had lower emotional expression than those with low WMC when they watched positive or negative movies. In line with this, the larger the participants' WMC, the more they could regulate their emotions with reappraisal. Based on these results, this study suggested that WMC enhances emotion regulation ability because WMC facilitates the active maintenance of goal-relevant information (Baddeley and Hitch 1974; Conway et al. 2001). Furthermore, Hofmann et al. (2008) examined the effect of

WMC on expressive suppression with a task partner. In this study, participants' negative emotion was evoked by receiving anger-provoking negative feedback from a task partner. After emotion was evoked, the participants were given an opportunity to offer feedback to retaliate against the task partner. The degree of revenge was taken as an index of negative emotional behavior. The results showed that participants with higher WMC expressed less emotional behavior than those with lower WMC. Although limited to reappraisal and suppression, these studies indicated that emotion regulation is facilitated by higher WMC.

Although no studies have directly examined whether WMC facilitates distraction as emotion regulation, Barrett et al. (2004) implied that WMC is an important factor for the success of distraction, and they suggested the possibility that people with higher WMC show more effective distraction than those with lower WMC. This idea is partially supported by studies that have found a relationship between WMC and attention control (Conway et al. 2001; Kane et al. 2001; Redick et al. 2007). Conway et al. (2001) assessed participants' WMC and then compared their attention control ability, which was tested with a selective listing task. The results revealed that people who score high on the OSPAN are better at focusing their attention on goal-relevant stimuli. According to previous studies (Conway et al. 2001; Kane et al. 2001), high WMC enhances attention control. If so, WMC may influence the flexible allocation of attention, which may thus facilitate the effect of distraction on negative emotion. In other words, compared with those with lower WMC, people with higher WMC can shift attentional focus from negative emotions to non-negative stimuli and situations more easily, and their negative emotions are more likely to be attenuated by distraction. Based on this research, we hypothesized that high WMC enhances the effect of distraction as emotion regulation of negative emotions.

Aim and Hypothesis

The aim of the present study is to examine the relationships between WMC and the effect of distraction as an emotion regulation strategy. Based on previous research that has examined the effect of WMC on emotion regulation, such as reappraisal and expressive suppression (Hofmann et al. 2008; McRae et al. 2012; Pe et al. 2013; Schmeichel et al. 2008), and the relationships between WMC and attention control (Conway et al. 2001; Kane et al. 2001; Redick et al. 2007), we hypothesized that distraction as emotion regulation will attenuate negative emotion more in individuals with high WMC because high WMC supports the ability to shift attention away from negative thinking to neutral content. However, no study has examined the relationship between distraction as an emotion regulation strategy and WMC. Therefore, we investigated whether WMC enhances the effect of distraction on negative emotion. In this study, participants carried out a distraction or control task after negative emotion was evoked by a movie. Although previous research (McRae et al. 2012; Pe et al. 2013; Schmeichel et al. 2008) examining the relationship between WMC and reappraisal assessed WMC only with the OSPAN, we assessed participants' WMC with the OSPAN and RSPAN. The primary reason for this is that recent studies have assessed WMC with two or more span tests, such as the OSPAN and RSPAN (Beilock and Carr 2005; Sibley and Beilock 2007; Unsworth and McMillan 2013).

Method

Participants

Seventy-six undergraduate and graduate students took part in this study. Participants were native Japanese speakers and right handed. No participants reported currently having any psychiatric disorders or taking any medication. The participants were assigned to the distraction condition or control condition randomly. The average age of the 37 participants (28 females) in the distraction condition was 21 years ($SD = 1.91$), and the average age of the 39 participants (21 females) in the control condition was 20 years ($SD = 2.11$). Because previous research has indicated that the effect of distraction on negative emotion is modulated by depressive tendency and trait anxiety (e.g., Joormann et al. 2007), we confirmed that there were no differences in depressive tendency (Center for Epidemiological Studies Depression; Radloff 1977; Shima et al. 1985) and trait anxiety (State-Trait Anxiety Inventory; Shimizu and Imae 1981; Spielberger et al. 1970) between the distraction and control conditions. The present study was conducted with the approval of the Ethical Committee of the Graduate School of Education, Hiroshima University, and all participants signed a written informed consent form.

Procedure

Figure 1 shows the procedure of this study. On arrival, the participants were seated in a comfortable chair. The participants first completed the Positive and Negative Affect Scale – Negative Affect subscale (PANAS-NA, see below; baseline) and a WMC test. After that, they watched a movie clip that has been shown to evoke negative emotions. The participants then completed the PANAS-NA again (time 1). Subsequently, the participants in the distraction condition proceeded with a distraction task. The participants in the control condition had no task; instead, they were told to sit and wait for 210 s. The waiting time was similar to the mean time within which the distraction

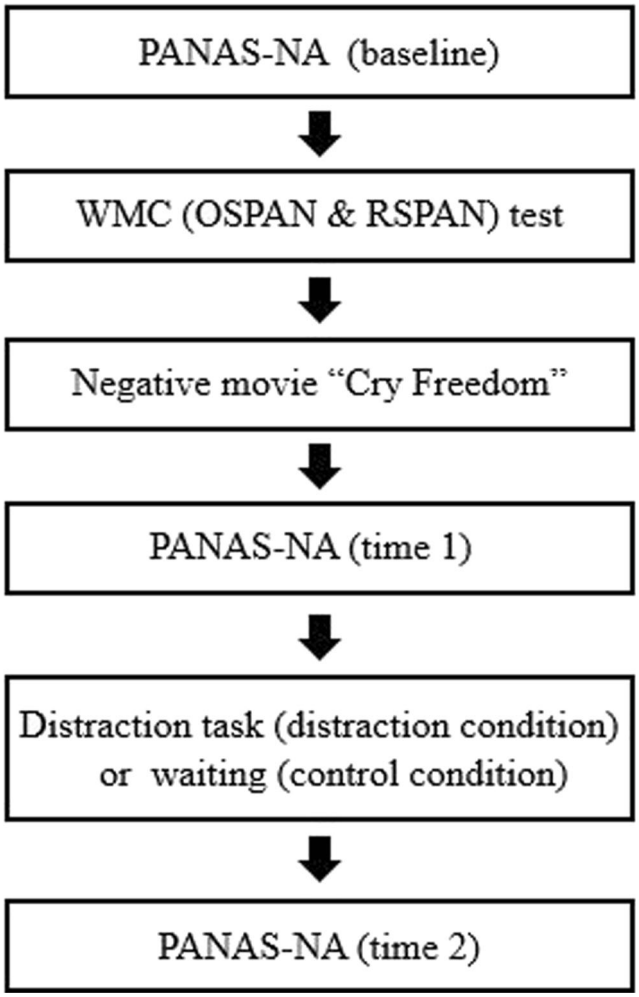

Fig. 1 Schematic diagram of the protocol. *Note*. *PANAS-NA* Positive and Negative Affect Schedule - Negative Affect subscale, *WMC* Working Memory Capacity, *OSPAN* Operation Span Test, *RSPAN* Reading Span Test

task was completed. After the distraction task or waiting time, the participants again completed the PANAS-NA (time 2). Finally, the participants were debriefed regarding the purpose of the study, and their introspections were recorded. For the introspective reports, we asked the participants whether they were able to determine the experimental purpose and the reason that we asked them to complete the same questionnaire three times.

Questionnaire

Negative emotion was assessed using the Japanese version of the PANAS (Sato and Yasuda 2001; Watson et al. 1988). In this study, we used the negative affect (NA) subscale. In line with Watson et al. (1988), the participants were instructed to answer how they felt at that very moment using a 6-point Likert scale ranging from 1 (not at all) to 6 (extremely).

Working Memory Capacity Test

WMC was assessed using the Japanese versions of the OSPAN and RSPAN (Otsuka and Miyatani 2012). It is suggested that the OSPAN and RSPAN measure phonological WMC rather than visuospatial WMC. The OSPAN requires participants to solve mathematical equations and to memorize target words in Japanese characters. Specifically, participants are first presented with a mathematical equation (e.g., $(7 \times 3) + 3 = 18$), and they have to indicate whether the given answer is correct. Next, participants are presented with a target word. This series of tasks is repeated 5 to 8 times depending on the task trials. Participants are then instructed to recall target words in the same order in which they were presented. The RSPAN is similar to the OSPAN. However, the RSPAN uses true-false questions for sentences rather than mathematical equations. The true-false questions require participants to answer whether a presented sentence (e.g., "He did not work from day to night because he would like to be trusted by others") is logical. Although the Japanese version of the WMC test is basically the same as that in previous research et al. 2005), it differs in terms of difficulty. Specifically, the number of target words in the original OSPAN and RSPAN ranges from 3 to 7, whereas the number of target words ranges from 5 to 8 in the Japanese versions.

WMC was evaluated by partial-credit unit scoring (total number of correct words), as in previous studies (Conway et al. 2005; Otsuka and Miyatani 2007; Unsworth et al. 2005). This score was the total number of target words recalled in the correct order. The WMC score in the OSPAN and RSPAN could range from 0 to 78. We computed the WMC score for the OSPAN and RSPAN separately and then calculated the mean score. This mean score was used as an index of individual differences in WMC.

Movie Clip

A clip from the movie "Cry freedom" was shown to the participants. This movie clip is recommended for evoking negative emotion (Gross and Levenson 1995; Rottenberg et al. 2007). Previous studies have indicated that this movie evokes negative emotion, especially anger, in Japanese participants (Sato et al. 2007). We cut some scenes following editing instructions, and the final clip length was 156 s. The selected scene depicts people who were protesting being suddenly shot with guns by police officers. We added an explanatory title in Japanese.

Distraction Task

We carried out a category judgement task as a distraction (Fig. 2). This task was implemented using PsychoPy

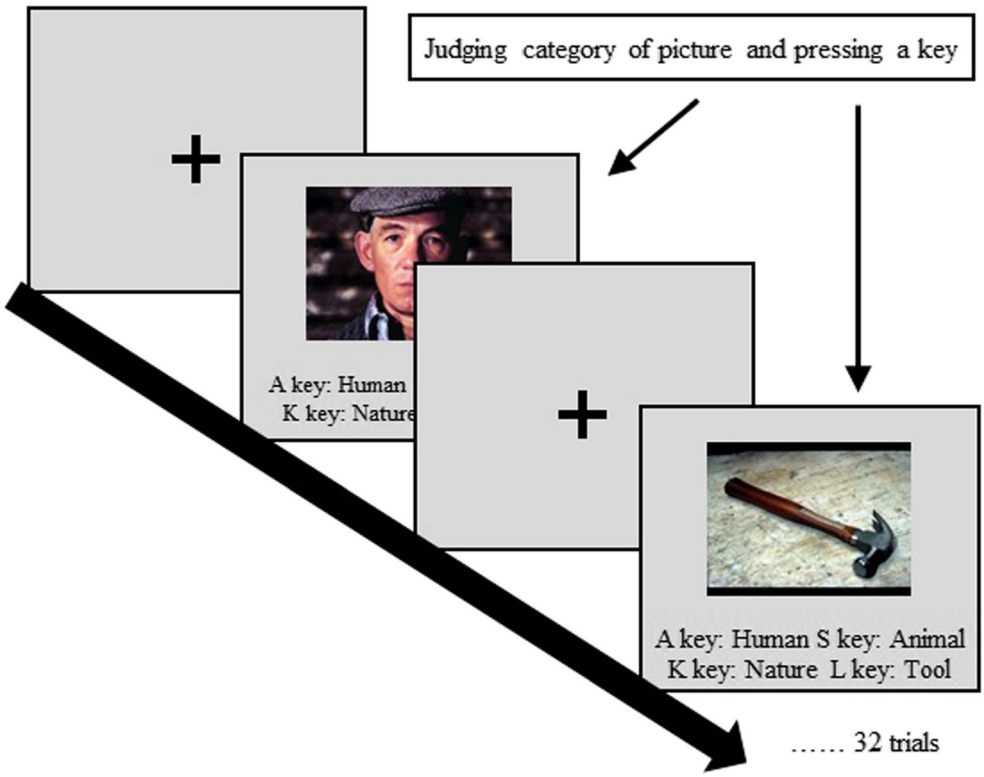

Fig. 2 The procedure of the category judgement task as a distraction

v1.82.01 (Peirce 2007, 2008). The participants judged the category of displayed images accurately by pressing the A, S, K, or L key as soon as possible. These keys corresponded to the categories human, animal, nature, and tool. A cross bar was presented for 1 s, and an image was then presented for 3.5 s. During the image presentation, the participants pressed a key to indicate the category. This task consisted of 32 trials. The number of correct answers and mean reaction time were calculated from this task.

We used neutral images[1] that were chosen from the International Affect Picture System (IAPS; Lang et al. 1999) after a preliminary experiment ($N = 10$) in which the images' valence, arousal, and ease of categorization were checked. Participants in the preliminary experiment were presented with images and asked to respond regarding the valence (1 = displeasure; 9 = pleasure) and arousal (1 = sleepy; 9 = arousing). In addition, they were asked whether judging the images' category was difficult (1 = difficult; 9 = easy). The mean valence of the images was 4.79 ($SD = .01$), the mean level of arousal was 4.98 ($SD = .10$), and the mean ease of categorization was 7.98 ($SD = .67$).

[1] IDs of the chosen IAPS images: 1302, 1321, 2190, 2200, 2215, 2440, 2516, 5500, 5520, 5740, 5920, 5950, 7004, 7006, 7009, 7010, 7020, 7025, 7030, 7031, 7034, 7035, 7050, 7080, 7090, 7150, 7175, 7211, 7950, 8010, 8060, and 8160.

Results

Descriptive Statistics and Preliminary Analysis: Did Participants Have the Same Degree of Negative Emotion at Baseline and WMC Between the Distraction and Control Conditions?

Table 1 shows the mean score for NA from baseline to time 2 and the WMC score. Before conducting the main analysis on the relationship between distraction and WMC, we confirmed the following two points. First, negative emotion at baseline may have differed between the distraction and control conditions and between the WMC groups. Hence, we confirmed that baseline negative emotion was not significantly different between these groups. We conducted a multiple regression analysis to predict the baseline NA for WMC, condition (0 = control, 1 = distraction), and their interaction. There were

Table 1 Mean (*SD*) score of negative emotion and WMC

	Negative emotion (PANAS-NA)			WMC
	Baseline	Time 1	Time 2	
Distraction condition	2.24 (.97)	3.66 (.82)	2.01 (.67)	65.99 (8.54)
Control condition	2.26 (.89)	3.63 (.90)	2.89 (1.05)	65.01 (8.51)

PANAS-NA Positive and Negative Affect Schedule - Negative Affect subscale, *WMC* working memory capacity

no significant main effects for WMC or condition (WMC: $\beta = -.10$, t (72) = −.84, $p = .40$; condition: $\beta = -.01$, t (72) = −.04, $p = .97$), and there was no significant interaction ($\beta = -.04$, t (72) = −.35, $p = .73$).

Second, we conducted a t-test to confirm that WMC was not significantly different between the distraction and control conditions because a difference in WMC between conditions could influence the main results. The t-test showed that mean WMC in the distraction condition was equivalent to that in the control condition (t (74) = −.50, $p = .62$, $d = -.11$).

Manipulation Check: Did the Movie Clip Evoke Negative Emotion?

We confirmed whether negative emotion was successfully evoked in the participants by the emotion-eliciting movie. A two-way ANOVA (condition [0 = control, 1 = distraction] × time point of subjective emotion measurement [0 = baseline, 1 = time 1]) for NA showed no significant main effect for condition and no significant interaction between time point of measuring NA and condition (main effect: F (1, 74) = .001, $p = .98$, $\eta p^2 = .001$; interaction effect: F (1, 74) = .02, $p = .88$, $\eta p^2 = .001$). However, there was a significant main effect of time point (F (1, 74) = 115.60, $p < .001$, $\eta p^2 = .61$), where NA was higher at time 1 than at the baseline, regardless of condition.

Main Analysis: Does WMC Enhance or Reduce the Effect of Distraction?

To analyze the relationship between WMC and the distraction effect on negative emotion, we calculated the attenuation amount of NA from time 1 to time 2. The higher this index, the greater the decrease in negative emotion from time 1 to time 2. Subsequently, we conducted a multiple regression analysis that predicted the extent to which NA was attenuated by WMC, the condition (0 = control, 1 = distraction), and their interaction. There were significant main effects for WMC ($\beta = .34$, t (72) = 2.51, $p = .015$) and condition ($\beta = .46$, t (72) = 4.46, $p < .001$) and a significant interaction between the two factors (Fig. 3: $\beta = .28$, t (72) = 2.07, $p = .042$). Regarding the interaction between WMC and condition, we conducted simple slope analyses. In the distraction condition, participants with higher WMC showed a stronger decrease in NA ($\beta = .56$, t (35) = 2.46, $p = .017$). However, there was no significant single slope for the control condition ($\beta = .06$, t (37) = 0.35, $p = .72$).

One might argue that WMC relates to performance on the distraction task and that this performance influenced the relationship between WMC and distraction. Hence, we conducted correlation analysis between WMC and the performance index of the distraction task to rule out this possibility. The mean ratio of correct answers was 97.89% ($SD = 2.56$, range 90.63%–100%), and the mean reaction time was 1.15 s ($SD = 0.25$, range 0.76–1.76). The correlation analysis revealed no significant relationships (WMC × ratio of correct answer: $r = .11$, t (35) = .67, $p = .50$; WMC × mean reaction time: $r = -.01$, t (35) = .07, $p = .95$).

Discussion

In this study, we examined the relationships between WMC and the effectiveness of distraction as an emotion regulation strategy. Our results indicate that distraction reduced negative emotion in individuals with high WMC. That is, the results support the hypothesis that WMC enhances the effect of distraction, indicating that WMC is an effective factor in facilitating distraction for emotion regulation.

Why did WMC contribute to the success of distraction for emotion regulation? A likely interpretation of the results is that WMC supports attention control (Conway et al. 2001; Redick et al. 2007). It is likely that people with higher WMC are good at shifting their attention to a neutral stimulus, such as a distraction task, even if negative emotion is evoked. Negative emotion induces individuals to focus attention on negative stimuli and situations (Pratto and John 1991). Furthermore, paying attention to negative emotions, thinking, and stimuli maintains and increases negative emotion (Nolen-Hoeksema 1991; Nolen-Hoeksema and Morrow 1993; Webb et al. 2012). Thus, when negative emotion is evoked, it is difficult to draw attention away from the negative stimulus to a non-negative stimulus. WMC supports the shifting of attention to a neutral stimulus and reduces negative rumination, which occurs through the focus of attention on thinking and negative stimuli in a negative situation et al. 2011). Therefore, people with high WMC can more efficiently distract themselves than people with low WMC.

Although a number of studies have indicated that distraction attenuates negative emotion, some studies have reported that distraction does not influence emotion (Arnow et al. 2004; Nolen-Hoeksema et al. 1993). Based on the results of the present study, the inconsistency in the findings related to the distraction effect might be caused by the difference in participants' WMC. If more participants with lower WMC were recruited by chance, it would be difficult to observe a clear decrease in negative emotion through distraction. Future studies on emotion regulation strategies, such as distraction and reappraisal, should thus consider WMC.

The present study contributes to improving the efficacy of distraction in emotion regulation. Although previous studies have revealed that distraction is effective for attenuating negative emotion, it has also been noted that distraction is not an easy strategy to implement in certain situations. In addition, previous studies have found that some clinical groups show emotion dysregulation (Gratz and Roemer 2004; Gross 2013;

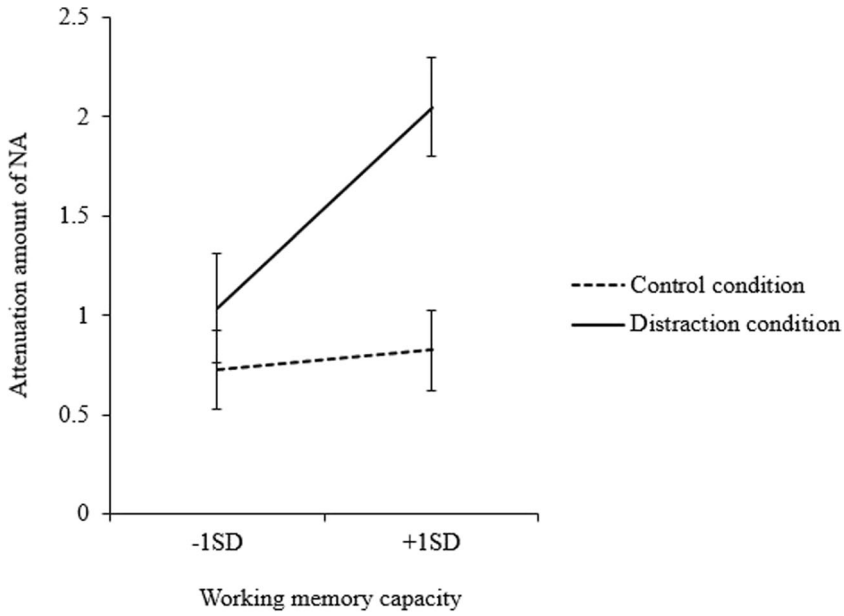

Fig. 3 WMC modulates the effect of distraction in regulating emotion. *Note*. Error bars indicate standard error (SE). The attenuation amount of NA is the difference between time 1 and time 2. A higher attenuation amount for NA means negative emotion greatly decreased from time 1 to time 2. NA = negative affect

Mennin et al. 2005). For example, Mennin et al. (2005) reported that people with generalized anxiety disorder have more difficulty managing their emotional reactions. Based on the results of this study showing that WMC facilitates the efficacy of distraction, it can be presumed that interventions for WMC would improve distraction, which in turn would enhance mental health.

Limitations and Future Directions

There are five limitations to this study. First, WMC was assessed by the OSPAN and RSPAN. Based on previous studies (Beilock and Carr 2005; Sibley and Beilock 2007; Unsworth and McMillan 2013), we used two WM span tests. Although we measured phonological WMC with these tasks, WMC consists not only of a phonological but also a visuospatial component. Thus, it is not certain that the effect of distraction on negative emotion is modulated only by verbal WMC. In this respect, a further study that examines whether visuospatial WMC enhances the effect of distraction should be conducted.

Second, although previous research (e.g., Gross and Levenson 1993) has used a similar method to that in the present study, the participants may have noticed the measurement of change in subjective emotion since they completed the PANAS three times. In addition, in the distraction condition, the participants may have noticed that the purpose of the present study was to observe a reduction in negative emotion as a result of the distraction task. Although it can be presumed that the participants did not notice the aim of the present study and the reason for completing the PANAS three times based on the introspective reports, it is undeniable that these issues exist. In future studies, it would be desirable to apply an implicit measurement of emotion (e.g., Implicit Positive and Negative Affect Test: IPANAT; Quirin et al. 2009) to confirm whether high WMC enhances the effect of distraction.

Third, this study did not consider the daily frequency of emotion regulation. Thus, we cannot deny the possibility that individual differences in daily use of distraction influenced our results. Relevant to this, previous studies have shown a positive relationship between reappraisal tendencies and WMC (Andreotti et al. 2013; McRae et al. 2012). Although we suggest that WMC facilitates distraction, there may be reverse causality in the daily use or ability of distraction to enhance WMC. Further studies should consider these possibilities.

Fourth, previous studies indicated the relationships between distraction and working memory load (WML), which is the degree of consumption of cognitive resources (Van Dillen and Derks 2012; Van Dillen and Koole 2007). Van Dillen and colleagues showed that higher WML in a distraction task enhances the effect of distraction in regulating emotion. This is because higher WML in a distraction task reduces the WM resources available to maintain negative thinking and emotion (Van Dillen and Derks 2012; Van Dillen and Koole 2007). Although we revealed the effect of WMC on distraction, the relationships between WMC, WML, and distraction are not clear. This unclear point should be examined by measuring WMC and manipulating WML of distraction.

Finally, we did not examine the long-term effect of WMC and distraction. Although the results indicated that WMC influences the effect of distraction in regulating emotion, we assessed only the short-term effect of WMC on distraction. This study and many previous studies have indicated that distraction is an adaptive emotion regulation strategy in the short term. However, some research suggests that distraction is

maladaptive or is not efficient in regulating negative emotion in the long term. Although the long-term ineffectiveness of distraction has been criticized from the perspective of motivation and goals (Kohama 2012; Murayama and Oikawa 2005), further research on the long-term effects of distraction considering WMC should be conducted.

Conclusion

The present study investigated the effect of WMC on distraction as an emotion regulation strategy. We hypothesized that the higher a person's WMC, the more distraction would reduce negative emotion. The results showed that individuals with higher WMC can more effectively use distraction for emotion regulation than those with lower WMC. These results were interpreted in terms of attention control. WMC improves attention control, which in turn, facilitates shifting attention away from negative thinking and emotions to non-negative content. The present research highlights that WMC is a determining factor that contributes to the efficacy of distraction as an emotion regulation strategy.

Acknowledgements This work was supported by JSPS KAKENHI Grant Number 17H02635.

Compliance with Ethical Standards

Conflict of Interest No potential conflict of interest is reported by the authors.

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