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IMPLICIT PROCESSING OF ENVIRONMENTAL RESOURCES IN PSYCHOLOGICAL RESILIENCE

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Psychological resilience refers to the human capacity to cope with distressing events such as abuse, disaster, and other stressful or traumatic circumstances. Previous investigations by using self-report questionnaires have focused exclusively on explicit aspects of psychological resilience. The present study investigated the relationship between implicit and explicit aspects of psychological resilience. We used a self-report questionnaire consisting of four types of psychological resilience scales as a measure of explicit aspects of psychological resilience. At the same time, we measured implicit aspects of psychological resilience by employing an implicit association test (IAT) that was designed to reveal participants' implicit associations between closely related people (family member, companion, and friend), and calm/anxiety attitudes. Our results showed that IAT scores exhibited significant interactions with questionnaire scores. We discuss potential links between explicit and implicit aspects of psychological resilience in terms of the availability of companion as environmental resources.

Key words: psychological resilience, mental health, consciousness, personality, implicit association test (IAT)

Individuals are often able to recover from the negative mental states in response to stressful life events. This ability is termed 'psychological resilience' (Masten, Best, & Garmezy, 1990). Although psychological resilience has been relatively well investigated, its definitions vary among researchers. For example, psychological resilience has been defined as the mental capacity of human beings to cope with harmful events (Werner & Smith, 1992), the flexibility and strength of the mind buffering mental damage (Shaffer, 1998), the ability to cope with life-environmental changes (McMahon, Gibson, Allen, & Saunders, 2007), mental recovery ability (Oshio, Nakaya, Kaneko, & Nagamine, 2002), compensation for mental damage (Jew, Green, & Kroger, 1999), emotional perseverance (Wagnild & Young, 1993), buffering factors preventing individuals from falling into psychological illness (Rutter, 1987), or a mechanism of mental state recovery (Luthar, Cicchetti, & Becker, 2000). While they differ in some respects, most of these definitions are consistent in terms of regarding psychological resilience as a psychological ability relating to the recovery of mental states.

Despite divergence in definitions, investigations of functional aspects of psychological resilience have arrived at a general consensus. In particular, the role of access to resources of psychological support in psychological resilience has been well

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documented using observational and questionnaire methods (Masten et al., 1990; Werner & Smith, 1992). In this study, we classified the resources of psychological support into the following two: 1) personal resources consisting of individual characteristics and 2) environmental resources consisting of social support provided by family and friends. Resources of both types have been found to be important for overcoming mental trauma (e.g. Masten et al., 1990). A recent study (Ihaya & Nakamura, 2008a) suggested that recognition and utilization of these resources should be considered as separate processes. Ihaya and Nakamura focused on the utilization of personal and environmental resources because besides the recognition of these resources, the utilization of them has beneficial effects on mental recovery. Consequently, these authors proposed a four-aspect classification of psychological resilience, that is, (I) personal resource recognition, (II) personal resource utilization, (III) environmental resource recognition, and (IV) environmental resource utilization. Moreover, Ihaya and Nakamura developed four scales to measure those four aspects of psychological resilience.

Despite the volume of previous research, current findings have been limited to explicit aspects of psychological resilience (i.e. explicit resilience). In general, findings have been based on observation and self-report questionnaires, methods that are susceptible to intentional distortion, particularly when they involve difficult questions. Moreover, such methods cannot be used to examine things that participants do not explicitly know. These limitations may be responsible for the diversity of definitions and concepts of psychological resilience proposed by previous researchers. Thus, the development of another measurement of implicit aspects of psychological resilience (i.e. implicit resilience) would be an important step forward.

One promising measurement for assessing implicit attitudes is the Implicit Association Test (IAT; Greenwald, McGhee, & Schwartz, 1998). The IAT can reveal the strength of an implicit association between two concepts. This method involves the measurement of reaction time for categorizing a target item into pre-defined categories (2×2) in the presence of category labels, in the left and right peripheral visual fields. In one condition, one response key is assigned for categorizing the target into the two left categories (for example 'self' and 'calmness') and the other key is assigned to categorizing the target into the two right categories (for example 'others' and 'anxiety'). In the other condition, one response key is assigned to categorizing the target into the two left categories (for example 'others' and 'calmness') and the other key is simultaneously assigned to categorizing the target into the two right categories (for example 'self' and 'anxiety'). Consequently, an implicit association in this case would be quantified by the differential of the normalized reaction time between the two situations: When reaction times for categorizing 'self' and 'calmness' using the same key are shorter than those for categorizing 'self' and 'anxiety' using the same key, it turns out that concepts of self and calmness are implicitly associated, or that concepts of the self and anxiety are implicitly dissociated.

Previous research has employed the IAT to measure observers' implicit attitudes and explicit personality traits (Egloff & Schmukle, 2002; Greenwald & Banaji, 1995). For example, Egloff and Schmukle (2002) examined the relationship between implicit and

explicit aspects of anxiety by using the IAT to measure the implicit association between the self and anxiety, in addition to questionnaires measuring explicit aspects of anxiety and social desirability. As a result, although the reliability of both the IAT and the questionnaire was confirmed, the results of the two measures were not in accord.

The present study aimed to elucidate implicit resilience. Here, implicit resilience refers to the implicit recognition and utilization of personal and environmental resources. We particularly focused on the implicit recognition and utilization of environmental resources, examining whether participants were able to implicitly recognize environmental resources. Previous researches on the role of social support in the maintenance of mental health suggested that social support from families and friends contributed to internal adjustment and mental recovery from negative life events of each individual (Cicero, Lo Coco, Gullo, & Lo Verso, 2009; Powers, Ressler, & Bradley, 2009; Shima, 1992; Suganuma et al., 1996; Tanno, 2007), suggesting that individuals have positive impression about helpful closely related people. Therefore, we hypothesized that if the recognition and utilization of environmental resources (i.e. closely related people) were made implicitly, the results would reveal implicit associations between closely related people and positive concepts.

Moreover, we sought to clarify the relationship between implicit and explicit resilience. Previous studies using the IAT have shown discrepancies between explicit and implicit aspects of cognition (Nosek, Banaji, & Greenwald, 2002; Dasgupta, McGhee, Greenwald, & Banaji, 2000), while others have shown agreement (Sato & Yoshida, 2009). However, it remains unclear whether IAT-based measures of implicit resilience are concordant with questionnaire-based measures of explicit resilience.

Thus, the primary purpose of the current experiment was to clarify the relationship between implicit and explicit resilience. We employed a set of questionnaires developed by Ihaya and Nakamura (2008a) to measure explicit resilience. Additionally, we utilized the IAT to investigate implicit resilience, measuring the strength of implicit associations between closely related people and calm-anxious attitudes. We predicted that the association between closely related people and the calm attitude would be stronger for people with higher explicit resilience scores than for those with lower explicit resilience scores, because people with high explicit resilience scores would be expected to have the ability to implicitly utilize environmental resources.

METHOD

Participants

Twenty four undergraduate and graduate students from Kyushu University (12 male, 12 female, mean age: 24.8 years) participated in this experiment. Participants were naive to the purpose of the experiment, and all reported normal or corrected-to-normal vision.

Apparatus

Stimuli in the IAT task were displayed on a 19-inch CRT monitor (MA901Un; Iiyama, Japan) with a resolution of 1024×768 pixels and a vertical refresh rate of 100 Hz. A viewing distance of 60 cm was maintained using a head-and-chin rest. A PC/AT compatible computer (HP Compaq Business Desktop d530

MT) controlled the presentation of stimuli and collection of data. Stimuli and experiments were programmed in Delphi 6 (Borland Software Corporation).

Stimuli

Questionnaire task. The questionnaire was paper-based. Self-report questionnaires of resilience assessing (1) environmental resource recognition and (2) environmental resource utilization based on Ihaya and Nakamura (2008a, b) were used. The environmental resource recognition questionnaire contained 20 items, measuring the degree to which the participants recognized the presence of environmental resources around them (e.g., father, mother, brother, and sister, friend, or senior) on a 5-point scale (1: totally inapplicable to me, to 5: totally applicable to me). The environmental resource utilization questionnaire contained 30 items, measuring the degree to which the participants utilized environmental resources around them (e.g., father, mother, brother, and sister, a friend, or a senior) on a 5-point scale (1: I never do this, to 5: I always do this).

IAT task. The IAT was computer-based. Stimuli were presented on a background with a luminance of 41.0 cd/m². Stimuli consisted of (1) An instruction prompt, (2) Peripheral category labels, (3) A central target to be categorized, (4) Key name letters for responses, and (5) A feedback symbol. (1) The instruction prompt words were colored black (0.01 cd/m²) and each letter subtended 1.34° and 0.76° in height. (2) Peripheral category labels were colored blue (CIE xy-coordinates of .14/.07, 6.65 cd/m²) or maroon (CIE xy-coordinates of .63/.35, 2.00 cd/m²), subtended 1.15° of visual angle in height, and were presented 8.58° above and 9.91° right and left of the center of display. (3) The target was colored blue (CIE xy-coordinates of .14/.07, 6.65 cd/m²) or maroon (CIE xy-coordinates of .63/.35, 2.00 cd/m²) and subtended 0.76° of visual angle in height, and was presented at the center of display. (4) Each of the key name letters was colored black (0.01 cd/m²), subtended 1.34° in height, and was presented 10.00° above, and 9.91° to the right and left of the center of display. (5) As a feedback symbol for an incorrect response an “X” was employed, which was colored red (CIE xy-coordinates of .62/.34, 15.6 cd/m²), subtended 1.53° in height, and was presented 3.34° below the center of the display. The sizes of fonts for instruction prompt words were 20 points, peripheral category labels were 35 points, the target was 30 points, and “X” was 50 points.

Category labels relating to an environmental resource target were: “closely related person (関わり深い人)” and “job name (職業)”. Category labels relating to an attitude target were: “calm (平穏な)” and “anxious (不安な)”. Seven words were employed for each of the four categories: *closely related person* (sibling (きょうだい), best friend (親友), seniors (先輩), companion (仲間), father (父親), mother (母親), and friend (友達)), *job name* (driver (運転手), businessman (会社員), clerk (事務員), cook (料理人), shop employee (店員), guide (ガイド), and rail station employee (駅員)), *calm* (relaxed (リラックスした), balanced (バランスのとれた), at ease (気楽な), restful (心地よい), comfortable (安心する), reliable (頼れる), and model (目標となる)) and *anxious* (nervous (神経質な), afraid (ためらう), fearful (恐怖の), scared (おびえた), uncomfortable (心配する), unreliable (頼りない), and uninterested (無関心な)). These adjectives used here were similar to those used in a study by Egloff and Schmukle (2002).

Procedure

Participants completed the questionnaire and IAT tasks individually. The IAT task was performed in a darkened room, followed by the completion of the questionnaire task in a lit room. The IAT task comprised eight blocks (see Figure 1). In Block 1, participants practiced the categorization of environmental resource targets into “closely related person” or “job name” (consisting of 42 trials: 7 items × 2 noun categories × 3 repetitions). Category labels for an environmental resource target were presented on the left and right sides of the visual field. Participants were asked to categorize the central environmental resource target into either of two pre-defined categories (closely-related person or job name) as quickly as possible while maintaining accuracy, by pressing either the ‘d’ or ‘k’ key according to the spatial side of category labels (‘d’ and ‘k’ keys were in the left and right side of the observer). The spatial side of the category labels was counterbalanced across participants. In Block 2, participants practiced categorizing an attitude target into “anxious” or “calm” (consisting of 42 trials: 7 items × 2 noun categories × 3 repetitions). Category labels were presented in the left and right side of the visual field. Participants were asked to categorize the target into two pre-defined categories (calm or anxious) as quickly as possible while maintaining accuracy, pressing either the “d” or “k” key according to the side of category labels. The side of presentation of category labels was counterbalanced across participants. Blocks 3 and 4 were taken as “critical blocks”: target category labels for both an

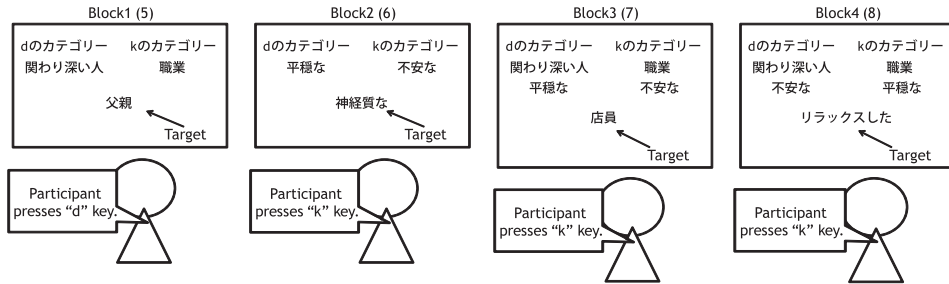


Fig. 1. A schematic illustration of stimulus display and observers' task in the IAT used in this study. In Blocks 5, 6, 7, and 8, the response keys were reversed from those used in Blocks 1, 2, 3, and 4, respectively. The followings show Japanese words employed in our experiment and their English translations (in parentheses): “カテゴリー” (category), “関わり深い人” (closely related person), “職業” (jobname), “平穏な” (calm), “不安な” (anxious), “父親” (father), “神経質な” (nervous), “店員” (shop employee), and “リラックスした” (relaxed).

environmental resource target and an attitude target were presented simultaneously in the peripheral field. The response key corresponding to either of category labels for the environmental resource target was shared with the key for either of category labels for the attitude target. For example in Block 3, participants were asked to press the “d” key either when a central environmental resource target belonged to the left category “closely related person” or when a central attitude target belonged to the left category of “calm”. Similarly, they were asked to respond by pressing the “k” key either when a central environmental resource target belonged to the right category “job name” or when a central attitude target belonged to the right category “anxious”. In contrast, in Block 4, participants were asked to respond with the “d” key either when a central environmental resource target belonged to the left category “job name” or when a central attitude target belonged to the left category “calm”. They were asked to press the “k” key either when a central environmental resource target belonged to the right category “closely related person” or when a central attitude target belonged to the right category “anxious”. The presentation side of the target category labels was counterbalanced across participants. The order of Blocks 3 and 4 was also counterbalanced across participants. Blocks 3 and 4 consisted of 84 trials each (7 items \times 4 categories \times 3 repetitions). Blocks 5, 6, 7, and 8 were replications of Blocks 1, 2, 3, and 4, except for that the side of the target category names was reversed. When participants made an incorrect response, a red X was presented below the target until they made a correct response. There were no inter-trial intervals. Reaction time on each trial was recorded as time interval between the onset of the target presentation and key press with a correct response.

RESULTS

For each participant, we computed a D score as an index of the strength of the implicit association between environmental resources and calm-anxious attitudes. To remove the influence of anticipatory responses and momentary inattention on reaction time, responses meeting the following criteria were considered as outliers and excluded from analysis: (1) responses in trials with reaction time less than 300 ms or greater than 3000 ms, (2) responses from participants with an error rate of more than 20% and (3) responses from participants with a mean reaction time of more than 2000 ms. In this experiment no participants met the criteria (2) and (3).

To analyze our data we first subtracted the mean reaction time in the critical trials of



Fig. 2. The results of the IAT in high and low resilience groups on three factors of the environmental resource recognition. The negative and positive values respectively represent strong and weak associations between the concepts of each target category and calm attitudes. Error bars denote standard errors of the mean.

Block 3 (where the categorization of an environmental resource target into ‘closely related person’ was paired with the categorization of an attitude target into ‘calm’) from mean reaction time in the critical trials of Block 4 (where the categorization of an environmental resource target into ‘closely related person’ was paired with the categorization of an attitude target into ‘anxious’). The similar subtraction was made for Block 7 from Block 8. Thus, response time differentials were calculated. Second, we divided each of the response time differentials by the standard deviation of the response times in their original blocks. Third, these were averaged to produce a D score. Here, a negative (or positive) D score indicated a strong implicit association between environmental resources and calm attitudes (or between environmental resources and anxious attitudes).

The results are shown in Figure 2. To compute an internal consistency, we separately calculated D scores from reaction times in response to each target word relating to closely related people for each participant, then computed Cronbach’s alpha of these D scores (alpha was .78). Next, we computed the alpha of scores for the environmental resource recognition scale (alpha was .84) and for the environmental resource utilization questionnaires (alpha was .91). These results exhibited high internal consistencies for both measures.

According to Ihaya and Nakamura (2008a), both the environmental resource recognition and environmental resource utilization questionnaires had three factors; Family member resources, companion resources, and friend resources. Hence, we also subdivided data of the IAT task into three based on target types (*family member, companion, and friend*) in accordance with three factors advocated by Ihaya and Nakamura (2008a). Specifically, a target type ‘family member’ consisted of data for environmental resource targets of sibling, father, and mother, a target type ‘companion’ consisted of data for environmental resource targets of companion and senior, and a target type ‘friend’ consisted of data for environmental resource targets of friend and best friend. In addition, we divided 24 participants into high and low resilience groups on the basis of mean questionnaire scores for each of three factors. Participants with the higher resilience scale score than the mean score were assigned to the high resilience group and participants

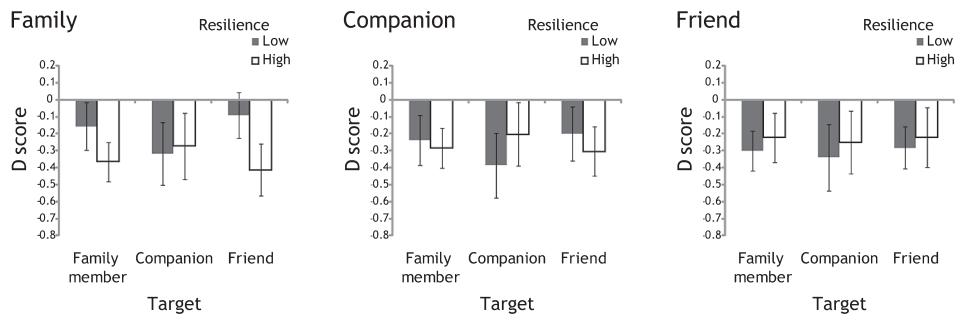


Fig. 3. The results of the IAT in high and low resilience groups on three factors of environmental resource utilization. The negative and positive values represent strong and weak associations between the concepts of each target category and calm attitudes. Error bars denote standard errors of the mean.

with the lower resilience score were assigned to the low resilience group¹. For each target type of the IAT, D scores from the higher and lower participants were analyzed separately. We acknowledged significant differences in questionnaire scores between high and low resilience groups, on family member [$t(22) = 7.73, p < .0001$], companion [$t(22) = 5.05, p < .0001$], and friend factors [$t(22) = 5.48, p < .0001$] of recognition of environmental resources, and on family [$t(22) = 11.73, p < .0001$], companion [$t(22) = 6.52, p < .0001$], and friend factors [$t(22) = 7.01, p < .0001$] of utilization of environmental resources.

For each factor of (1) the environmental resource recognition scale and (2) the environmental resource utilization scale, a mixed analysis of variance (ANOVA) was performed on D scores, with resilience group (high vs. low) as a between-participants factor, and target type of the IAT (family member, companion, and friend) as a within-participants factor.

(1) Environmental resource recognition scale

For the family member factor of the scale, the ANOVA of D scores did not reveal any significant main effects [resilience group: $F(1, 22) = .61, p > .44$; target type: $F(2, 44) = .30, p > .74$], or any significant interactions [$F(2, 44) = 2.13, p > .13$]. For the companion factor of the scale, the ANOVA revealed a significant interaction [$F(2, 44) = 3.91, p < .03$], but no significant main effect [resilience group: $F(1, 22) = .86, p > .36$; target type: $F(2, 44) = .11, p > .90$]. In addition, a post-hoc test revealed a significant simple main effect only in the companion condition [resilience group: $F(1, 66) = 4.87, p < .04$]. For the friend factor of the scale, the ANOVA did not reveal

¹ Aside from the ANOVA, we conducted a Pearson's correlation coefficient test between D score and questionnaire score. However, no significant correlations were acknowledged between them in all conditions ($p > .05$). On the other hand, as mentioned in the text, when we divided participants into two groups based on questionnaire scores on companion resources, we got a significant difference in D scores between the groups in ANOVA ($p < .05$). Closely looking into the data, we noticed that the D scores of the low explicit resilience group generally distributed in a negative area while those of the high explicit resilience group widely scattered around zero. Due to the difference in distribution pattern of D scores between the groups, the significant difference of mean D scores between the groups was acknowledged but not a significant correlation between D scores and questionnaire scores.

any significant main effects [resilience group: $F(1, 22) = 3.25, p > .08$; target type: $F(2, 44) = .19, p > .82$] or interactions [$F(2, 44) = 1.12, p > .33$].

Additionally, we conducted one-sample *t*-tests for the difference between D score and 0, in order to assess whether environmental resources were associated with calm attitudes more strongly than with anxious attitudes. As a result, significant differences were acknowledged in family member targets [$t(13) = 3.58, p < .004$] and friend targets [$t(13) = 2.59, p < .03$] for the high resilience group on the family member factor. Significant differences were also acknowledged in family member targets [$t(11) = 2.65, p < .03$] for the high resilience group and in companion targets [$t(11) = 2.95, p < .02$] for the low resilience group on the companion factor. Moreover, significant differences were acknowledged in companion targets [$t(9) = 3.03, p < .02$] and friend targets [$t(9) = 3.00, p < .02$] for the low resilience group on the friend factor.

(2) Environmental resource utilization scale

For the family member factor of the scale, the ANOVA on D scores revealed no significant main effect [resilience group: $F(1, 22) = .74, p > .40$; target type: $F(2, 44) = .10, p > .91$] or interactions [$F(2, 44) = 1.64, p > .20$]. For the companion factor of the scale, the ANOVA did not reveal any significant main effects [resilience group: $F(1, 22) = .88, p > .35$; target type: $F(2, 44) = .22, p > .80$] or interactions [$F(2, 44) = 1.10, p > .34$]. For the friend factor of the scale, the ANOVA did not reveal any significant main effects [resilience group: $F(1, 22) = .30, p < .59$; target type: $F(2, 44) = .08, p > .92$] or any interactions [$F(2, 44) = .14, p > .87$].

Additionally, we conducted one-sample *t*-tests for the difference between D score and 0. As a result, significant differences were acknowledged in family member targets [$t(11) = 3.20, p < .009$] and friend targets [$t(11) = 2.68, p < .03$] for the high resilience group on the family member factor. Significant difference was also acknowledged in companion targets [$t(9) = 2.39, p < .05$] for the high resilience group on the companion factor. Moreover, significant difference was acknowledged in family member targets [$t(9) = 2.73, p < .03$] for the low resilience group on the friend factor.

DISCUSSION

We investigated the relationship between implicit and explicit aspects of psychological resilience. A number of previous studies have repeatedly proved that what the IAT can measure is the implicit association between target concepts and attitudes (Dasgupta et al., 2000; Egloff & Schmukle, 2002; Greenwald et al., 1998; Greenwald & Nosek, 2001; Greenwald, Poehlman, Uhlmann, & Banaji, 2009). Hence, we believe that the present results with the significant difference in D score between high and low participant groups do reflect the difference of implicit association of closely related people with calm/anxious attitudes between the groups. Moreover, if what the IAT could capture were just the same aspect of psychological resilience measured by questionnaires, the results of the IAT and questionnaires should have indicated a similar tendency to each other. On the contrary, our results showed that when participants were grouped upon

companion factor scores, D scores for companion targets exhibited an opposite tendency to questionnaire scores. Therefore, we argue that the IAT in the present study successfully revealed characteristics of implicit processing for environmental resources of psychological resilience, which could not be assessed by using questionnaires.

Our results revealed a significant difference in IAT performance between high and low resilience groups when participants were divided in terms of the companion factor of the environmental resource recognition scale. The finding suggests that participants who explicitly answered that they did not recognize companion as resources for support implicitly associated the companion targets with calm attitudes. However, we acknowledged no significant differences in D scores between high and low resilience groups when participants were divided in terms of the other factors of the environmental resource recognition and utilization scales.

To the best of our knowledge, this is the first study to investigate implicit attitudes towards companions. Previous studies on the IAT have examined implicit attitudes towards family members (Devos, Blanco, Muñoz, Dunn, & Ulloa, 2008) and friends (Karpinski, 2004). However, companion resources have not been focused on in any IAT studies so far. We believed that implicit association of calm-anxious attitudes with companion was worth investigating because Ihaya and Nakamura (2008a) have indicated that the role of companion and friend was dissociated: They discussed that friend exerts roles for affective supports while companion plays roles as exemplars and supporters in solving individual's own problems. Thus, different implicit association of calm-anxious attitudes was expected between companion and friend targets. Consequently, the present study newly showed that calm attitudes were implicitly associated with companion targets more strongly in the lower resilience groups than in the higher resilience groups when participants were divided on the basis of companion factor score. On the other hand, the implicit association of calm attitudes with friend target was not statistically different between groups when participants were divided on the basis of companion factor score. The results, in a sense, lend additional support for Ihaya and Nakamura (2008a) in that companion and friend played a different role as resources of psychological resilience.

Then, how does explicit resilience relate to implicit one? The present experiment revealed that participants in the low explicit resilience group on companion implicitly associated companion targets with calm attitudes. We suggest that the results may reflect an implicit preference for the companion in people without explicit recognition and utilization of companion resources. Many previous IAT studies showed implicit attitudinal preference in consumer behavior (Brunel, Tietje, & Greenwald, 2004), prejudice (Dasgupta & Greenwald, 2001; Dasgupta et al., 2000; Greenwald et al., 1998), and voting behavior (Arcuri, Castelli, Galdi, Zogmaister, & Amadori, 2008) independent of explicit attitudes. Similar to these previous findings, in our experiment, participants who do not have companions would have implicit attitudinal preference or desire for a companion.

The results also showed D score significantly differed from 0 in the high-family and high-friend groups on explicit family factor and the low-family, low-companion, and low-friend groups on explicit friend factor. We speculate that the results involves with an

implicit desire for the environmental resources. For the family member factor, rather than desire, a well-established connection between family member and calm attitudes may emerge as the implicit association between them, especially for people in the high-family group. We suggest this is because most people (or at least in our participants) have their family member and its membership is permanent. However, the relationship of individuals with companions is formed in a fluid social connection, and hence, some individuals have companions but some other individuals do not. Individuals without their own companion may have little explicit and implicit ideas on how companion helps them in solving their own problems, therefore associating companion and calm attitudes based on an implicit desire. The same may be true for the friend factor: As in the case of the companion factor, an implicit desire associating friend and calm attitudes may exist in individuals without friends as resources of psychological resilience.

Additionally, we found interesting gender differences in implicit attitudes for friend. We performed post-hoc comparisons with a two-sample t-test on each target of each factor to detect the difference of D scores between men and women and revealed implicit association between friend and calm attitudes in women was stronger than men [$t(22) = 2.11, p < .05$]. In a previous study (Karpinski, 2004), the implicit association between friends and positive attitudes was robustly observed: In this study, most of participants were female. Our results explain the robustness of implicit association between friends and positive attitudes in terms of a male-to-female ratio.

Several issues remain unclear. First, we did not test implicit resilience based on other scales, personal resource recognition and personal resource utilization (Ihaya & Nakamura, 2008a). To address this issue, we are now investigating implicit association between the self and positive attitudes, and its relationship to explicit personal resource recognition and utilization. Second, although the present study elucidated the recognition and utilization of environmental resource by using an implicit measure (i.e. the IAT), it is still unclear whether the implicit aspect of the resources the IAT measured is actually useful for mental recovery. Supplemental studies with implicit as well as explicit test-batteries (such as measures of anxious, depression, or stress) are needed. Third, another route to implicit resilience should be explored. For example, recent researches on social cognition have used an affective priming task for understanding automatic affective processing of negative events (e.g. Ihaya, Yamada, Kawabe, & Nakamura, 2008; Degner & Wentura, 2010; Waugh, Fredrickson, & Taylor, 2008; see De Houwer, Teige-Mocigemba, Spruyt, & Moors, 2009 for review). We will employ the affective priming task to clarify the implicit processing of resources in psychological resilience in future.

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