THE ROLE OF PERCEIVED STRESS AND FEAR OF NEGATIVE EVALUATION IN THE PROCESS FROM ALEXITHYMIA TO OVER-ADAPTATION

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The purpose of the present study is to clarify the process by which aspects of alexithymia lead to internal and external adaptation (which consists of over-adaptation) by examining a hypothetical model focused on perceived stress and fear of negative evaluation (FNE). Previous studies suggested that alexithymia, particularly the two characteristics of difficulty identifying feelings and difficulty describing feelings, may be related to over-adaptation and lead to physical and psychological problems. However, the process by which this occurs remains unclear and as a result, little progress has been made in finding an approach for improving over-adaptation. In order to establish such an approach, we conducted an online survey targeting a wide range of age groups and examined the hypothetical model. The results of a path analysis generally supported the model, which suggested that FNE and perceived stress have a mediating role and that FNE, in particular, has a strong influence on each aspect of over-adaptation. These results imply that approaches targeting reduction of FNE and stress might be important for improving over-adaptation.

**Key words:** alexithymia, fear of negative evaluation (FNE), perceived stress, over-adaptation

INTRODUCTION

Alexithymia is mainly a personality trait characterized by difficulties identifying, describing, and communicating one’s own emotions (Sifneos, 1973). Psychoanalytic practitioners who worked with patients with psychosomatic illnesses often found that the patients presented emotional processing deficits; these patients were unable to describe or differentiate among their feelings (e.g., Sifneos, 1973). Sifneos (1973) used the term of alexithymia in order to describe these phenomena. After Sifneos’s (1973) proposal, research on alexithymia has been mainly focused on psychoanalytic practitioners. In this vein, quantitative study on alexithymia has been ongoing since the 1990s, when Bagby et al. (1994) created the 20-item Toronto Alexithymia Scale (TAS-20). The TAS-20 is a 20-item self-report measure and presently one of the most widely used measures of

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alexithymia. This scale consists of three subscales, designed to measure difficulty identifying feelings (DIF), difficulty describing feelings (DDF), and externally oriented thinking (EOT). All items are also summed into a total scale score as an overall marker of alexithymia (Bagby et al., 1994; Nemiah et al., 1976; Taylor et al., 1991).

The development of the TAS-20 has enabled research studies to provide a number of insights into alexithymia. For example, Tsuyama and Nakamura (2012) argued that approximately 40% of college students have a score equal to or above the alexithymia cutoff point. Kachi et al. (2006) and Tanaka et al. (2013) pointed out that not only people who are above the cutoff point of alexithymia, but also those who score high on alexithymia’s subscale, are likely to have mental and physical problems. Furthermore, studies on alexithymia have been conducted in various countries (Franz et al., 2008; Frye-Cox & Hesse, 2013), and focused on differences based on age and gender (Moriguuchi et al., 2007). Baba et al. (2002) provided us with a noteworthy suggestion regarding interpersonal relationships for alexithymia individuals. Specifically, Baba et al. (2002) pointed out from the results of the EGOGRAM test that alexithymia individuals tend to adapt to surrounding opinions because they cannot express their feelings. In addition, Nemiah and Sifneos (1970) suggested that individuals with alexithymia tend to obey surrounding opinions. In sum, alexithymia individuals may have some characteristics of “over-adaptation.”

Over-adaptation is a tendency to try to live up to the roles and expectations of others at the expense of repressing one’s own feelings and thoughts (Ishizu, 2006). A normal state of adaptation occurs when internal and external adaptations are balanced. Internal adaptation refers to intra-personal elements such as psychological stability and satisfaction, and external adaptation refers to adaptation to social environments (Kitamura, 1965). For internal adaptation, it is necessary to express one’s own feelings and thoughts regarding one’s surroundings. However, this over-expression could lead to interpersonal conflict and difficulties, resulting in a failure to maintain good relationships with others. This also means that external adaptation is impaired. Individuals thus need to keep a balance between internal and external adaptations in their daily lives. In other words, individuals with over-adaptation are in a state of unbalanced internal and external adaptation; it is therefore important to find an approach for effectively addressing problematic over-adaptation.

Measurement of over-adaptation is essential in order to develop an approach for addressing the problem. Ishizu (2006) developed a Japanese scale to measure over-adaptation, and this Over-Adaptation Scale was used in subsequent research. This scale is designed to assess internal and external adaptation or over-adaptation with five factors: “solictude for others,” “living up to one’s expectations,” “need for approval,” “self-doubt,” and “self-inhibition.” The first three factors (“solictude for others,” “living up to one’s expectations,” and “need for approval”) are composed of adaptive strategies to maintain or strengthen other-oriented attitudes to attain external adaptation, to give a good impression of surroundings, and to be approved. The latter two (“self-doubt,” and “self-inhibition”) are for internal adaptation (more precisely, internal maladaptation) and are made up of items that reflect the internal aspects within the individual, such as a lack
of confidence within the individuals themselves.

Here, turning again to a relationship between alexithymia and over-adaptation, several studies have reported results alongside Baba et al. (2002). For example, individuals with alexithymia modify their behavioral patterns in accordance with others, such as considering for other people’s conditions and repressing oneself and repressing oneself (Nemiah & Sifneos, 1970; Amemiya et al., 2016). In addition, alexithymia individuals tend to be recognized as being well-adapted by others, and have few opportunities to receive help until psychological symptoms or problems become salient in daily life (Nemiah et al., 1976). These studies suggest that alexithymia individuals have behavioral patterns that seem to be externally adaptive on the surface, despite their internal maladaptation. That is, there is a possibility that alexithymia leads to over-adaptation, or at least that it is positively related to over-adaptation.

Considering behavioral patterns relating to over-adaptation, where individuals may adapt to social environments through self-repression (Mashiko, 2013), the cognitive tendencies associated with alexithymia individuals may be an important factor. This is because interpersonal behavior depends on perceiving oneself and the surrounding environment (e.g., Bromley & Curley, 1992; Grusec & Redler, 1980). From this perspective, we focused on perceived stress and fear of negative evaluation from others (FNE) in alexithymia individuals, because these variables may have a mediating role for the process from alexithymia to over-adaptation.

First, regarding the relationship among alexithymia, perceived stress, and behavioral patterns for over-adaptation, it is reported that alexithymia individuals tend to perceive stressors more easily and experience more stress in their lives than other individuals (Goto, 2007). Furthermore, people who have experienced stress show behavioral patterns that are more adaptive to their surroundings than those who have not (Ishizu & Ambo, 2013), such that they tend to maintain a harmonious relationship with others (Miura & Agari, 2002). In other research, perceived stress has been shown to increase self-doubt (Nakashima et al., 2010; Zhao et al., 2015) and self-inhibition (Tomaka et al., 1999; Begley & Glacken, 2004). Based on these studies, we predicted that compared to non-alexithymia individuals, alexithymia individuals are more likely to perceive stress, and that this stress will lead to external (solicitude for others, living up to one’s expectations, and need for approval) and internal (self-inhibition and self-doubt) aspects of over-adaptation. In other words, there is a possibility that alexithymia is related to both aspects of over-adaptation via perceived stress.

Next, regarding a relationship among alexithymia, FNE, and behavioral patterns for over-adaptation, previous research showed that people are not willing to communicate with others when they have concerns over being rejected or evaluated negatively (which is regarded as FNE), and that this concern is salient in interpersonal situations (Clark & Wells, 1995; Wells & Clark, 1997). Considering that alexithymia individuals avoid interpersonal situations and that it is therefore difficult for them to establish good relationships with others (Koduka, 2004; Kojima et al., 2003), alexithymia individuals tend to have an interpersonal perception which includes concerns over being rejected or evaluated negatively by others. In other words, there is a possibility that alexithymia
individuals may have high FNE.

In addition, high FNE leads to suppressed self-assertion with respect to others and to lower self-efficacy (Werner et al., 2011). Based on aspects of over-adaptation (Ishizu, 2006), these tendencies correspond to high self-inhibition and self-doubt, respectively. In other words, high FNE would connect to behavioral patterns of internal adaptation. Moreover, previous research has shown that high FNE leads to consideration of others and behavior in line with social roles (Kendall et al., 1999). Based on aspects of over-adaptation (Ishizu, 2006), these behavioral patterns correspond to solicititude for others, living up to one’s expectations, and need for approval, respectively. That is, high FNE would connect to behavioral patterns of external adaptation. Considering that interpersonal behavior depends on individual cognitive patterns (e.g., Bromiley & Curley, 1992) as noted above, we predicted that FNE will lead not only to internal adaptation (self-inhibition, self-doubt) but also to external adaptation (solicititude for others, living up to one’s expectations, and need for approval). In other words, we predicted that alexithymia would be related to both external and internal aspects of over-adaptation via FNE.

In order to examine these predictions regarding relationships among alexithymia, stress, FNE, external, and internal aspects of over-adaptation, we conducted a questionnaire survey via a research company, targeting individuals between 20 and 60 years of age. In the survey, we focused on the DIF and DDF subscales of the TAS-20 (and not EOT) to assess aspects of alexithymia, for the following reasons. First, among the components of alexithymia, DDF and DIF are important in relation to interpersonal behavioral patterns in daily lives. For example, Lumley et al. (1996) report that characteristics of alexithymia (especially deficits in identifying and verbalizing one’s feelings) were related to less perceived support, fewer close relationships, and less social skills. Therefore, when people are unable to recognize or verbalize their emotions, even if they want to do so in a stressful situation, they are likely to show maladaptive behaviors (Okumura, 2008). The study by Fahy and Eisler (1993) focused on the tendency toward aggressive behavior (this was not the focus of our study) and suggested that high DIF was related to a tendency to engage in impulsive behavior such as physical attacks. Based on these findings, DIF and DDF are most relevant to interpersonal behaviors in individual’s daily lives.

The second reason to exclude the EOT subscale is related to the EOT subscale itself. Although the TAS-20 is useful for measuring alexithymia, one methodological problem is that the reliability of the EOT subscale is low. In one study, the total scale score and DIF and DDF subscales commonly had adequate factorial validity and reliability coefficients over .70, but the EOT subscale did not (Preece, Becerra, Robinson, & Dandy, 2018). Cronbach’s alpha reliability coefficients for the EOT subscale is often under .60, and many EOT items are poorly loaded (factor loadings < .40) on their intended factor (e.g., Kooiman et al., 2002; Preece, Becerra, Robinson, & Dandy, 2018). Therefore, previous research studies have mainly focused on relationships among DIF, DDF, and other relevant variables. In keeping with such studies, in the present study, we focus on DIF and DDF, and investigate the role of perceived stress and FNE in the process from alexithymia to over-adaptation in the present study. We predicted that perceived stress
and FNE would mediate relationships among DIF and DDF, and external and internal aspects of over-adaptation (our hypothesized model).

In examining our model of stress and FNE, we can consider effects of respondent age. For example, Mattila et al. (2006) analyze the prevalence of alexithymia in a wide age range (30–97 years) and report that the tendency to alexithymia was higher in individuals aged over 30. In contrast, Moriguch et al. (2007) report that the tendency to alexithymia was highest in adolescence than adulthood and late adulthood. Based on these incongruent findings, age might have some effect on our hypothetical model. However, there is little evidence that age would moderate relationships among the variables of interest in our model. Therefore, we assumed that the same model can be used for the path patterns and coefficient sizes for all ages.

**METHOD**

*Participants and Procedures*

Eight hundred and forty-nine Japanese individuals (423 males and 426 females) participated in the present study. The mean age of participants was 44.50 years (SD = 14.28). Participants were recruited from amongst those registered for participation in online surveys with the research company FASTASK (a Japanese online survey service). FASTASK has about 2.7 million registered individuals. Of these, 849 responded following a request for cooperation in the present study, with potential participants limited to those in their 20s and 60s. Participants recruited in this way are rewarded points according to the contents of the questionnaire and the number of questions (points can be exchanged for cash or electronic money); the survey company paid the participant after they completed the questionnaire. The present study was approved by the faculty ethics committee at our university, and all participants provided their informed consent.

*Measures*

**Alexithymia tendency.** We used the Japanese version of the TAS-20 (Bagby et al., 1994) created by Komaki et al. (2003). This questionnaire consists of 20 items with ratings made on a 5-point scale (0 = not at all, 4 = extremely), targeting three specific dimensions: DIF (e.g., “When I am upset, I do not know if I am sad, frightened or angry”), DDF (e.g., “I find it hard to describe how I feel about people”), and EOT (e.g., “I prefer talking to people about daily activities rather than their feelings”). As mentioned in the Introduction section, we did not use the EOT subscale. In the present study, the Cronbach’s alpha was .91 for DIF and .70 for DDF subscales.

**Perceived stress.** We used the Experienced Stressful-event Scale (Nakashima et al., 2010). Participants indicated to what degree they had experienced task-oriented or interpersonally stressful events in the past three months. This scale consists of 16 items with ratings made on a 5-point scale (0 = not at all, 4 = extremely), targeting two specific dimensions: interpersonal stressful-events (e.g., “I was neglected by people”) and task-oriented stressful-events (e.g., “I had many tasks to do”). In stress research (e.g., Cohen & Wills, 1985; Lazarus & Folkman, 1984), stressful events are divided mainly into task-oriented and interpersonal domains. In order to refine the stress scale, Nakashima et al. (2013) ran a confirmatory factor analysis for each item of the scale. It was confirmed that this scale consists of separate factors for task-relevant stress (eight items) and interpersonal stress (eight items). The reliability of items for both factors was generally high (task-relevant: $\alpha = .78$, interpersonal: $\alpha = .83$). In order to focus on the entirety of the negative experience, we computed an index of the experienced stressful-event scale so that higher scores reflected the experience of multiple negative life events. In the present study, Cronbach’s alpha was .94.

**Fear of negative evaluation.** We used the Japanese version of the short version of the FNE Scale (Sasagawa et al., 2004). This scale consists of 12 items on a 5-point scale (0 = not at all, 4 = extremely), targeting one specific dimension: FNE (e.g., “If someone is evaluating me I tend to expect the worst”). In
the present study, the Cronbach’s alpha was .87.

Over-adaptation. We used the Over-Adaptation Scale as a measure of tendency to obey the desires and expectations of the environment, and to make efforts to respond to external expectations and demands by forcibly suppressing internal desires (Ishizu, 2006). This questionnaire consists of 33 items to be rated on 5-point scale (0 = not at all, 4 = extremely), targeting five specific dimensions: solicitude for others (e.g., “I often think what kind of feelings the other person feels”), living up to one’s expectations (“I feel sensitive to expectations from others”), need for approval (“I would like people to acknowledge me”), self-doubt (“I have no confidence in myself”), and self-inhibition (“I will not tell others my thoughts”). In the present study, the Cronbach’s alpha was .84 for solicitude for others, .87 for living up to one’s expectations, .89 for need for approval, .90 for self-doubt, and .90 for self-inhibition.

Results

Structural equation modeling (SEM) was used for examining our hypothesis with Mplus software V7.4. Table 1 presents the means, standard deviations, and correlations of the measures used in the present study. In addition, the means and standard deviations of five age groups (from twenties to sixties) are presented in Table 2.

Testing the Path Coefficients and Covariance for Our Hypothesis

We conducted multiple group SEM by age (i.e., multiple-group SEM), and evaluated the overall pattern of the fit indices. After we divided the variable of age into five categories from 20 to 60, the five-group analysis was conducted to determine whether the parameter estimates of the model were consistent across the five groups.

Detailed procedures for model testing have been described by Pentz and Chou (1994). The five-group analysis in the present study included the following main steps. In Step 1, the model M0 (configural invariance model), was obtained so as not to be equal across the five groups. In Step 2, the model M1 (factor covariance invariance model), was obtained by constraining covariance to be equal across the five groups. In Step 3, the model M2 (factor model), was obtained by constraining covariance and the path coefficients to be equal across the five groups. Given that the overall constraints were not acceptable (i.e., \( p < .05 \)), Lagrange Multiplier (LM) tests were then used to guide the model modifications. The retained equality constraints indicated that the parameters were not significantly different across two groups.

Our model with standardized maximum likelihood estimates for the parameters is shown in Fig. 1. For building the path model, we used an exploratory approach based on both our hypothesis and the obtained correlation patterns between relevant variables. The model showed an adequate fit \( \chi^2(175) = 4168.989, p < .000 \), comparative fit index [CFI] = .979, root-mean-square error of approximation [RMSEA] = .070, standardized root-mean-square residual [SRMR] = .064). The path coefficients indicate the direction and magnitude of the associations. The results of the LM tests supported model M2 regarding our applied model. Hence, the same model was used for the path patterns and coefficient sizes for all ages.

A series of results of multiple-group SEMs generally supported the hypothesized
### Table 1. Descriptive Statistics and Correlations Among Measures (N = 849)

|                  | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   |
|------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 1. DIF           | 1.00|     |     |     |     |     |     |     |     |
| 2. DDF           | .55**| 1.00|     |     |     |     |     |     |     |
| 3. Perceived stress | .43**| .33**| 1.00|     |     |     |     |     |     |
| 4. Fear of negative evaluation | .41**| .44**| .46**| 1.00|     |     |     |     |     |
| 5. Solicitude for others | .01| .11' | .16* | .17**| 1.00|     |     |     |     |
| 6. Living up to one’s expectations | .32**| .32**| .28**| .60**| .35**| 1.00|     |     |     |
| 7. Need for approval | .24**| .27**| .32**| .68**| .35**| .60**| 1.00|     |     |
| 8. Self-inhibition | .17**| .40**| .22**| .20**| .22**| .07| .15*| 1.00|     |
| 9. Self-doubt    | .43**| .39**| .55**| .54**| .06| .32**| .29**| .32**| 1.00|

|                  | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   |
|------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Reliability (α)  | .91 | .70 | .94 | .86 | .84 | .89 | .87 | .90 | .90 |
| Mean             | 17.10| 14.46| 2.00| 2.86| 3.21| 2.89| 3.22| 3.05| 2.99|
| SD               | 6.26 | 3.63 | 0.81| 0.83| 0.68| 0.81| 0.84| 0.78| 0.90|

**p < .01, *p < .05, +p < .10.
Table 2. The Means and Standard Deviations of 5 Groups

| Variables                        | twenties (n = 173) | thirties (n = 168) | fourties (n = 169) | fifties (n = 170) | sixties (n = 169) |
|----------------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
|                                  | Mean   | SD          | Mean   | SD          | Mean   | SD          | Mean   | SD          | Mean   | SD          |
| 1. DIF                           | 19.66  | 6.58       | 17.96  | 6.22       | 16.63  | 6.10       | 15.71  | 5.70       | 15.50  | 5.74       |
| 2. DDF                           | 15.44  | 3.45       | 14.77  | 3.58       | 14.41  | 3.44       | 13.68  | 3.67       | 13.99  | 3.78       |
| 3. Perceived stress              | 2.43   | 0.91       | 2.10   | 0.84       | 1.96   | 0.76       | 1.82   | 0.67       | 1.67   | 0.66       |
| 4. Fear of negative evaluation   | 3.22   | 0.73       | 3.09   | 0.84       | 2.88   | 0.77       | 2.69   | 0.79       | 2.42   | 0.76       |
| 5. Solicitude for others         | 3.31   | 0.69       | 3.23   | 0.71       | 3.16   | 0.73       | 3.21   | 0.60       | 3.11   | 0.66       |
| 6. Living up to one’s expectations | 3.21  | 0.73       | 3.11   | 0.83       | 2.80   | 0.77       | 2.79   | 0.75       | 2.54   | 0.76       |
| 7. Need for approval             | 3.50   | 0.79       | 3.46   | 0.87       | 3.12   | 0.84       | 3.13   | 0.74       | 2.88   | 0.81       |
| 8. Self-inhibition               | 3.25   | 0.73       | 3.10   | 0.78       | 3.01   | 0.76       | 2.95   | 0.76       | 2.92   | 0.82       |
| 9. Self-doubt                    | 3.43   | 0.82       | 3.14   | 0.91       | 3.04   | 0.83       | 2.75   | 0.84       | 2.58   | 0.85       |
Fig. 1. The Process From Alexithymia to Over-Adaptation

Note. From the top to the twenties to the sixties.

**p < .01, *p < .05, +p < .10.
model, suggesting that FNE and perceived stress have a mediating role. FNE was positively related to the five factors of over-adaptation (solicitude for others, living up to one’s expectations, need for approval, self-doubt, and self-inhibition). In addition, perceived stress was positively related to self-doubt and solicitude for others. However, perceived stress was not positively related to living up to one’s expectations, need for approval, and self-inhibition. The results were partly consistent with our hypotheses. For other results, DIF was positively related to self-doubt and living up to one’s expectations. Furthermore, DDF was positively related to self-doubt, self-inhibition and solicitude for others.

The results of examining the indirect effects are as follows. Regarding perceived stress, analysis was performed with DIF as an explanatory variable, perceived stress as a mediator, and solicitude for others as the objective variable. As a result, the indirect effect was significant (indirect effect = .003, 95% confidence interval [CI; .001, .005]). In this case, the indirect effect was also significant when the objective variable was replaced with a sense of self-doubt (indirect effect = .003, 95% CI [.001, .006]). However, the indirect effect was not significant when DDF was an explanatory variable, perceived stress was a mediator, and solicitude for others was the objective variable (indirect effect = .002, 95% CI [.000, .004]). This was also the case for a sense of self-doubt (indirect effect = .002, 95% CI [.000, .004]).

Regarding FNE, analysis using DIF as an explanatory variable, FNE score as a mediator, and solicitude for others as the objective variable, revealed that the indirect effect was significant (indirect effect = .011, 95% CI [.006, .017]). Indirect effects were also significant when the objective variables were replaced with the following variables: Living up to one’s expectations (indirect effect = .011, 95% CI [.006, .017]), need for approval (indirect effect = .016, 95% CI [.008, .024]), self-inhibition (indirect effect = .006, 95% CI [.003, .009]), and self-doubt (indirect effect = .009, 95% CI [.005, .014]). The indirect effect was also significant when DDF was an explanatory variable, FNE score was a mediator, and solicitude for others was the objective variable (indirect effect = .039, 95% CI [.029, .050]). Indirect effects were also significant when the objective variables were replaced with the following variables: Living up to one’s expectations (indirect effect = .039, 95% CI [.029, .050]), need for approval (indirect effect = .055, 95% CI [.042, .069]), self-inhibition (indirect effect = .020, 95% CI [.013, .028]), and self-doubt (indirect effect = .030, 95% CI [.022, .039]).

**DISCUSSION**

The purpose of the present study was to clarify how DIF and DDF aspects of alexithymia were related to external and internal adaptation, focusing on perceived stress and FNE. To test the invariance of parameter estimates among age groups from 20 to 60, multiple-group SEM was conducted. In the results, higher DIF and DDF was associated with higher perceived stress and FNE. High perceived stress was associated with solicitude for others and self-doubt, and high FNE was associated with the five aspects of
over-adaptation. These patterns were not affected by participants’ age, suggesting that our model for how DIF and DDF aspects of alexithymia were related to external and internal adaptation, was robust across a wide range of age groups. There were unpredicted direct paths in our model, and these will be addressed after discussion of the indirect effects of perceived stress and FNE.

The indirect effects showed that perceived stress had mediating roles for DIF that led to self-doubt. These results are in agreement with the findings of Goto (2007) who showed a positive association between alexithymia and perceived stress, and a positive association between perceived stress and self-doubt (Ishizu & Ambo, 2008). In contrast, indirect effects of DDF were not featured. Regarding the difference between DIF and DDF in relation to perceived stress, Hua et al. (2014) conducted an experiment focusing on changes in salivary cortisol and amylase in speech behavior, and showed that participants with high levels of alexithymia had higher cortisol secretion as an indicator of stress responses than those with low levels of alexithymia. Importantly, the higher the DIF, the higher the amount of secreted cortisol, suggesting that DIF is more strongly positively associated with perceived stress than DDF. DIF in relation to difficulties in identifying emotion, thus seems to be more stressful for individuals than DDF in relation to difficulties in verbalizing emotion.

Considering that solicitude for others is needed to maintain good interpersonal relationships (Kato, 2001; Miura & Agari, 2002), the mediating effects of perceived stress regarding a link between DIF and solicitude for others implies that consideration of others may be a means of relieving stress caused by non-identification of emotions. However, because being in a stressful state could lead to a loss of self-confidence (Ishizu & Ambo, 2008), we should verify whether these behaviors enable individuals to relieve their stress, or to improve internal (mal)adaptations such as self-doubt. This point needs to be resolve in future research.

Regarding FNE, this had a mediating role for DDF and DIF leading to external and internal adaptation. These results correspond with the findings of Abe et al. (in press) and Kendall et al. (1999) who show positive associations between FNE and over-adaptation. Relatedly, individuals with high FNE worry about whether their behavior meets the expectations of others around them (Raee & Heimberg, 1997); they may set an overly high standard for their behavior, and may fail to attain the standard (Clark & Wells, 1995) in interpersonal situations where they have to communicate with others. Considering that this worry-related setting of standards is connected to external adaptations such as solicitude for others and living up to one’s expectations, in addition to the failure being connected to internal adaptations such as self-doubt, it seems that FNE’s mediating role corresponds to relevant findings, as noted above.

Regarding direct effects, DIF was directly and positively related to self-doubt and living up to one’s expectations. Similarly, DDF was related to self-inhibition, self-doubt, and solicitude for others. This means that DIF and DDF were directly related to aspects of internal and external adaptation, such as self-doubt and living up to one’s expectations, regardless of perceived stress and FNE, suggesting a direct link from alexithymia to over-adaptation. However, we also acknowledge that variables other than
stress and FNE may mediate this link.

One of the potential mediators may be sense of coherence (SoC). In a variety of suggestions about SoC, Antonovksy (1987) pointed out that clarifying and verbalizing one’s own thoughts and feelings are important for dealing smoothly with stressors. This is because SoC is necessary to deal smoothly with stressors and, additionally, people need to clarify and verbalize their thoughts and feeling in order to acquire SoC. Considering this nature of DIF and DDF, individuals with high DIF or DDF have low SoC and as such it would not be easy for them to deal with stressors. Furthermore, people fall into low states of mental health when they cannot deal with stressors (see Okayasu et al., 1992; Shimada, 1998). Considering that the internal aspects of over-adaptation correspond to maladaptive states (low mental health), SoC may be a potential mediator (on which we did not focus) for the link between DIF and living up to others’ expectations, or for the link between DDF and solicitude for others.

In addition, considering that over-adaptation is one (maladaptive) strategy for maintaining interpersonal relationships to satisfy the needs and expectations of others, for individuals with high DIF and DDF, this strategy may be easier than other strategies for managing relationship with others. This speculation is derived from that individuals with high DIF and DDF seem to have low SoC and therefore perceive themselves as having low abilities to deal with stressors. As a result, it may emerge as the link between DIF and living up to others’ expectations. If this is the case, SoC may also be a potential mediator for the link between DIF and self-doubt, or for the link between DDF and self-inhibition and self-doubt. These possibilities need to be examined further in future research.

To our knowledge, the present study is the first to clarify the relationship between important aspects of alexithymia and over-adaptation via perceived stress and FNE in a broader sample: some indirect effects were not significant (i.e., a process leading to a sense of self-doubt and solicitude for others through perceived stress from DDF), but other indirect effects were significant at all ages. In other words, perceived stress and FNE are interpreted as key factors which account for alexithymia individual’s over-adaptation. In particular, interventions or psychological education programs for lowering perceived stress and FNE may be useful. Future research should seek to develop such programs to address over-adaptation in alexithymia individuals.

Nonetheless, the present study is not without limitations, and it is necessary to conduct further research in order to confirm and refine our model before developing these intervention approaches. There are three main areas of limitation. First, these data are cross-sectional; it is impossible to determine whether external and internal aspects of over-adaptation would be caused by DIF and DDF. In order to solve this, it will be necessary to conduct additional experiments to determine causality, such as experimental investigations focusing on the relationship between specific variables in our model, or longitudinal investigations that take time into consideration.

Second, with respect to potential methodological or measurement issues, future research should make measures of alexithymia tendency to confirm our model. In Japan, as for the EOT as a subscale of alexithymia, problems on the scale structure have been
pointed out for the Japanese translation version and it is thus difficult to examine an effect of EOT (Komaki et al., 2003), as noted in the Introduction. Recently, a new scale for measuring alexithymia has been developed (Preece, Becerra, Robinson, Dandy, & Allen, 2018). In order to understand more clearly the characteristics of alexithymia, it is necessary to refine EOT sub-scale components.

Finally, a cross-cultural approach is needed to generalize our findings. Previous research suggested that over-adaptation may be constructed differently by East Asian and Western cultures or in other countries (Ishizu et al., 2007). It is thus necessary to verify whether our model is also confirmed in the Western region using the English version of the Over-Adaptation Scale. We believe that these endeavors would lead to the development of useful intervention and education programs for over-adaption in alexithymia individuals.

AUTHOR’S CONTRIBUTION

N.A.: Methodology, Investigation, Writing- Original draft preparation. K.A.: Writing- Reviewing and Editing. K.N.: Supervision.

CONFLICT OF INTEREST

The authors declare no conflicts of interest associated with this manuscript.

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