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Reliability and validity of the Japanese version of the experiential avoidance in caregiving questionnaire (EACQ)

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ABSTRACT

This study developed the Japanese version of the Experiential Avoidance in Caregiving Questionnaire (J-EACQ) and assessed its reliability and validity. A 2-wave longitudinal study with an interval of two weeks was conducted with Japanese dementia family caregivers (n = 355 at T1; n = 246 at T2). Confirmatory and exploratory factor analyses (CFA/EFA) were performed, and the internal consistency (Cronbach's alpha) and test-retest reliability were assessed. The convergent and discriminant validity were examined by correlations between the J-EACQ and the Acceptance and Action Questionnaire-II (AAQ-II) and measures assessing related constructs (e.g., cognitive fusion). The incremental validity was assessed through the hierarchical regression analysis examining whether the J-EACQ predicts depression/anxiety over and above the AAQ-II. The CFA demonstrated a poor fit to our data for the original factor model. The EFA resulted in a new factor model retaining a similar factor structure but with reduced items. Both models showed similar acceptable levels of internal consistency, test-retest reliability and convergent and discriminant validity. However, the original model had a less systematic error and a higher incremental validity. The J-EACQ has acceptable reliability and validity. It is recommended to use the original factor model to allow for international comparisons in future research.

1. Introduction

Dementia is a progressive condition, which can lead to deterioration in memory, thinking, behavior and the ability to perform everyday activities over time. Family caregivers are often required to provide increasing levels of personal care as the disease progresses (Connell et al., 2001) while managing the care recipient's behavioral and psychological symptoms of dementia (BPSD; Feast et al., 2016). As a result, dementia family caregivers often experience lower levels of psychological well-being (Collins & Kishita, 2020; Kaddour & Kishita, 2020; Lethin et al., 2020). One of the well-established models, the sociocultural stress and coping model for caregiving (Knight & Sayegh, 2010), suggests that impact of stressors on mental health outcomes is mediated by psychosocial resources (e.g., coping strategies, cultural values) and highlights the importance of addressing these personal resources for improving the family caregivers' psychological well-being.

Recent meta-analyses demonstrated that acceptance and commitment therapy (ACT; Hayes et al., 2012) is effective for improving the psychological well-being of dementia family caregivers (Cheng et al., 2020; Collins & Kishita, 2019: Kishita et al., 2018). ACT assumes that a specific situation or private event (e.g., thoughts, emotions and sensation) alone does not directly cause psychological pain, but an excessive effort to avoid or get rid of such unwanted private events plays a crucial role in developing and maintaining psychopathology (Hayes et al.,

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2012). Therefore, ACT aims to change the function of such private events rather than changing the frequency or form of private events per se. ACT achieves this by facilitating psychological flexibility, the ability to step back from restricting thoughts and allow painful emotions; to focus on the present; and to persist in behavior that reflects personal values (Hayes et al., 2012).

Experiential avoidance (EA), or "efforts to alter the frequency or form of unwanted private events … even when doing so causes personal harm" (Hayes et al., 2012, p. 981), is regarded as a major cause of psychopathology in ACT (Hayes et al., 2012). There is considerable evidence supporting that EA is strongly associated with a wide range of psychological disorders in various populations (Bluett et al., 2014; Ruiz, 2010). EA is also considered to have a significant association with depression and anxiety among dementia family caregivers (Kishita et al., 2020; Losada et al., 2014; Romero-Moreno et al., 2016; Spira et al., 2007). Furthermore, the previous literature suggests that EA can moderate the relationship between caregiving stressors and anxiety among dementia family caregivers (Romero-Moreno et al., 2016), and its impact on depression and anxiety is found to be significant even after controlling for the family caregiver- and care recipient-related factors such as caregiver age, dementia severity and BPSD (Kishita et al., 2020).

The Acceptance and Action Questionnaire (AAQ; Hayes et al., 2004) and the Acceptance and Action Questionnaire-II (AAQ-II; Bond et al., 2011) are widely used measures of EA in ACT research (Ong et al., 2019). However, both of these tools are generic measures of EA, and researchers have developed domain-specific AAQ measures to increase its sensitivity to detect EA among the population of interest (Ong et al., 2019). Among these AAQ variations, the Experiential Avoidance in Caregiving Questionnaire (EACQ; Losada et al., 2014) was developed to assess EA in the dementia caregiving context. More specifically, the 15-item EACQ, which comprises three subscales, assesses (1) active avoidant behavior (caregivers' behaviors aimed at avoiding negative thoughts and feelings related to caregiving) using six items; (2) intolerance of negative thoughts and emotions towards the relative (rigid rules about the experience of negative emotions and thoughts related to the care recipient) using four items; and (3) apprehension concerning negative internal experiences related to caregiving (reluctant and fearful attitudes towards negative private events related to the care recipient) using five items. The EACQ has acceptable internal consistency and good convergent and discriminant validity and has been validated in Spanish (Losada et al., 2014). The non-validated translated versions of the scale are also now widely used in research (e.g., Lappalainen et al., 2021; Quinlan et al., 2018).

In Japan, the number of people with dementia is projected to increase to 7 million by 2025 from 4.62 million in 2012 (Ministry of Health Labour and Welfare, 2016), meaning that one in five older adults will be living with dementia by 2025. There is also emerging evidence suggesting that ACT may be effective for improving the psychological well-being among Japanese dementia family caregivers (Morimoto & Nomura, 2022; Muto, 2015). Developing a scale, which can assess EA in the dementia caregiving context that can be utilized in Japan, will be beneficial for clinicians and researchers in the understanding of this key psychopathology and in evaluating evidence-based psychological interventions for this population. Thus, this study aimed to translate the EACQ into Japanese (J-EACQ) and examine its reliability and validity among Japanese dementia family caregivers.

2. Methods

2.1. Development of the Japanese version of the EACQ

The original EACQ was developed in Spanish, but the authors included the English translation of each item in the published article (Losada et al., 2014). The translation of the EACQ from English to Japanese was completed following a guideline developed by the International Society for Pharmacoeconomics and Outcomes Research (ISPOR) taskforce (Wild et al., 2005). After obtaining permission from the original author, the forward translation was conducted by two independent Japanese bilingual translators (NK, HK). The first author, two translators and another researcher (TM), who is also an expert in ACT for dementia family caregivers particularly within the Japanese context, then discussed discrepancies and items for the initial version of the J-EACQ were finalized.

Given that the original scale was developed in Spanish, two Spanish-speaking translators (NT, YA) then carried out the back translation by independently translating the initial Japanese version of the scale to Spanish. Two translators then discussed discrepancies and the back-translated Spanish version of the scale was finalized. The original author then compared items of their original scale with items of our back-translated Spanish version of the EACQ to confirm the conceptual equivalence of measures. Some minor changes were made through discussion to ensure the consistency between the original scale and the Japanese version of the EACQ.

Finally, to check comprehensibility and cognitive equivalence of the translated measure (i.e., cognitive debriefing, Wild et al., 2005), seven Japanese dementia family caregivers (all of them were female) were asked to read each item of the J-EACQ and provide feedback on their readability. Some minor edits were made to the scale based on feedback received through discussion between the first author and three co-authors (NK, HK, TM). Finally, these modifications were discussed with the original author for final confirmation of the conceptual equivalence of the translated measure. The final version of the J-EACQ used in this study is presented in Appendix A.

2.2. Participants and procedure

This study used a 2-wave longitudinal design with an interval of two weeks. Eligible participants had to be: (a) providing care to a family member with a clinical diagnosis of dementia and (b) living with the care recipient, providing regular home care (>5 days/week). Participants were recruited through a Japanese online survey company (Cross Marketing Inc.), and thus potential participants had to be registered with the company to be invited to the study. Cross Marketing Inc. is one of the largest professional marketing research companies in Japan and specializes in recruiting research participants, with more than five million active volunteers registered. Before being invited to this study, a screening survey checking the eligibility criteria was carried out by Cross Marketing Inc. and only those who were eligible received further information about this study. The first survey, which included a consent form, was distributed to all eligible participants. Participants who provided consent and responded to the first survey were invited to the second survey two weeks later. Participants received tokens, which have no cash value but can be used to redeem for goods and services from Cross Marketing Inc., for their participation. Participants had to respond to all the questionnaire items to take part in the study, which was approved by the university's ethics committee (approval number 2020021).

In total, 394 family caregivers completed the first survey and 250 completed the second survey. Potentially unreliable responses were identified through a seriousness check (Aust et al., 2013), which involved asking participants to evaluate the seriousness of their responses at the end of the survey. After excluding responses, which were deemed unreliable, data from 355 participants and 246 participants were available for analysis from the first and second surveys respectively. The sample size of this study met a standard for measurement properties (The COSMIN checklist; Terwee et al., 2012). The attrition

analysis based on the Goodman and Blum procedure (1996) suggested that our data was missing at random.[1]

2.3. Measures

The first survey included all the questionnaires and the second survey only included the J-EACQ.

2.4. Sociodemographic variables

Sociodemographic information such as caregiver sex, age, their relationship to the care recipient, average number of caregiving hours per week, care recipient age and the type of dementia diagnosis was gathered.

2.5. Experiential avoidance

The J-EACQ and the Japanese version of the Acceptance and Action Questionnaire-II (AAQ-II; Shima et al., 2013) were used to measure EA. Each item of the J-EACQ is rated on a five-point scale (*1: not at all/definitely disagree, 2: a little/slightly disagree, 3: somewhat/slightly agree, 4: often/usually agree, 5: a lot/definitely agree*). The AAQ-II is a 7-item unidimensional scale of EA rated on a seven-point scale (*1: not at all* to *7: always*). The subscale and total scores of the J-EACQ and the total score of the AAQ-II ($\alpha = 0.95$) were used in the analyses. Higher scores indicate greater levels of EA on both scales.

2.6. Depression

The total score of the Japanese version of the Patient Health Questionnaire-9 (PHQ-9; Muramatsu et al., 2007) was used ($\alpha = 0.93$). The PHQ-9 asks participants to rate how each of nine DSM-IV criteria for depression affected them in the past week using a four-point scale (*0: not at all* to *3: nearly every day*). Higher scores indicate greater levels of depressive symptomatology.

2.7. Anxiety

The total score of the Japanese version of the Generalized Anxiety Disorder −7 (GAD-7; Muramatsu et al., 2009, September) was used ($\alpha = 0.94$). The GAD-7 asks participants to rate how often they have experienced seven symptoms of anxiety in the last two weeks using a four-point scale (*0: not at all* to *3: nearly every day*). Higher scores indicate greater levels of anxiety symptomatology.

2.8. Cognitive fusion

The total score of the Japanese version of the 7-item Cognitive Fusion Questionnaire (J-CFQ; Shima et al., 2016) was used ($\alpha = 0.96$). The CFQ assesses the degree of entanglement and effort to control distressing thoughts in general (i.e., not specific to caregiving) and is rated on a seven-point scale (*1: not at all* to *7: always*). Higher scores indicate greater cognitive fusion.

2.9. Automatic thoughts

The Japanese version of the Automatic Thoughts Questionnaire-Revised (ATQ-R; Kodama et al., 1994) was used to measure negative and positive automatic thoughts. This 38-item scale comprises three subscales: negative appraisal for future (15 items), self-blame (13 items) and positive thought (10 items). The ATQ-R asks participants to rate the frequency of occurrence of positive/negative thoughts in the last two weeks using a four-point scale (*0: never* to *3: quite frequently*). The subscale scores were used in the analyses ($\alpha = 0.91$–0.97). Higher scores indicate increased levels of automatic thoughts.

2.10. Statistical analysis

2.10.1. Factor structure

A confirmatory factor analysis (CFA) using the maximum-likelihood method was conducted to examine whether the J-EACQ corresponded to the factor model of the original version of the EACQ (i.e., 3-factor structure) using data from the first survey (Wave 1). The following combination data were used to evaluate model fit: the Tucker-Lewis index (TLI), comparative fit index (CFI) and root mean square error of approximation (RMSEA). A good model fit was assumed when CFI and TLI were >0.95 and RMSEA was <0.06 (Hu & Bentler, 1999). This original 3-factor model resulted in a poor fit to the data, and thus an exploratory factor analysis (EFA) using the maximum-likelihood method with promax rotation was conducted to identify an appropriate factor structure using data from Wave 1. To evaluate the sampling adequacy and whether the correlations between the items were appropriate to perform the EFA, the Kaiser-Meyer-Olkin (KMO) statistic and Bartlett's test of sphericity were performed. If the KMO statistic was ≥ 0.80 and Bartlett's test was significant, the data were considered suitable for the EFA. The adequate number of factors was identified based on the following indices: a) Kaiser-Guttman criterion (eigenvalues ≥ 1); b) minimum average partial correlation (MAP); c) parallel analysis (Horn, 1965) based on squared multiple correlations (PA-SMC95); and d) interpretability of the factor. MAP suggests the smallest number of factors, while PA-SMC95 suggests the largest number of factors (O'connor, 2000). Two criteria for item retention were: a) factor loading to central factor ≥ 0.40; and b) factor loading to other factors ≤ 0.30. Given that the factor structure between the original factor model and the model derived from the EFA was similar, the examinations of reliability and validity were conducted for both factor models (i.e., the original 3-factor model and the factor model derived from the EFA).

2.10.2. Reliability

The internal consistency was examined by Cronbach's alpha coefficients using data from Wave 1. Differences in the total and subscale scores of the J-EACQ between Wave 1 and Wave 2 were calculated for each participant to identify outliers. Participants who presented difference values outside two standard deviations in any of the total or subscale scores for either of the two factor models were considered as an outlier, and those data were excluded from the analysis (Flansbjer et al., 2005). The test-retest reliability was examined by the intraclass correlation coefficient (ICC) using a two-way random effects model. An ICC value of 0.51–0.75 indicated moderate, 0.76 to 0.90 indicated good and

[1] To assess the presence of non-random sampling, in accordance with Goodman and Blum (1996), the multiple logistic regression analysis was conducted to explore which participants would respond to both two surveys (stayers, $n = 246$) and which would drop out (leavers, $n = 109$). We used five demographic variables (i.e., participants' sex [0 = male and 1 = female] and age, caregiver status [0 = primary caregiver and 1 = secondary caregiver], hours per week spent caregiving, and time since becoming a caregiver) and all indicator variables in Wave 1 as explanatory variables. Because there were moderate to strong correlations between subscale scores and total scores of the J-EACQ in both the original factor model ($r = 0.73$ to 0.91) and the current factor model ($r = 0.65$ to 0.86), subscale scores and total scores of the J-EACQ were treated in a separate model to avoid potential multicollinearity (i.e., total of four multiple logistic regression analyses were conducted). Results were similar in all models, and all models were not significant ($\chi^2 = 19.92$ to 23.73, $df = 13$ to 15, $p = .07$ to $.10$), while participants' sex was significant in all models (e.g., model for subscale's scores of the original factor model, $OR = 1.96$, $z = 2.55$, $p < .05$, CI for OR [1.17, 3.28]) which suggests that female participants were more likely to drop out from the study. Given that interpretation of the significance of each explanatory variable is not appropriate when the regression model is not significant, we regarded our data as missing at random. All estimates of the series of multiple logistic regression analysis are presented in Appendix B.

>0.90 indicated excellent test-retest reliability (Koo & Li, 2016). The absolute reliability was evaluated by checking systematic errors between the scores from Wave 1 and Wave 2 using Bland-Altman analysis (Bland & Altman, 1986).[2] In the case of no systematic error, the standard error of measurement (SEM $_{agreement}$) and smallest detectable change (SDC, also known as minimum detectible change [MDC95]) were calculated; SEM $_{agreement} = \sqrt{(\sigma_o^2 + \sigma_{residual}^2)}$ and SDC = 1.96*$\sqrt{2}$*SEM $_{agreement}$ (de Vet et al., 2011). If the systematic error was observed, 95% limits of agreement (LOA) was calculated; LOA = $(\bar{d} - 1.96*SD_d) + t*SE_{LOA} \sim (\bar{d} + 1.96*SD_d) - t*SE_{LOA}$, where $\bar{d}$ means the mean of the difference of the scores (i.e., scores in Wave 2 minus those in Wave 1), SD_d means the standard deviations of $\bar{d}$, and $SE_{LOA} = \sqrt{(3SD_d^2/n)}$ (Bland & Altman, 1986; Shimoi, 2011).

2.10.3. Validity

The convergent validity was assessed by examining the correlation between the J-EACQ and the AAQ-II. Given that the AAQ-II and the EACQ target EA in different populations (i.e., generic vs. domain-specific) and weak positive correlation reported between the Spanish version of the AAQ (Barraca, 2004) and the EACQ (Losada et al., 2014), a weak to moderate positive correlation was expected. The discriminant validity was assessed by examining correlations between the J-EACQ and measures that assess related constructs. Based on the previous literature on the AAQ (Ong et al., 2019) and the original EACQ (Losada et al., 2014), weak to moderate positive correlations between the J-EACQ and measures of depression, anxiety, cognitive fusion and negative automatic thoughts (i.e., negative appraisal for future and self-blame) were expected. The strength of the correlation was classified according to the following criteria: weak (<0.30), moderate (0.30 to 0.70) and strong (>0.70) (Gerstman, 2015). The incremental validity was assessed through the hierarchical regression analysis examining whether the J-EACQ score predicted depression and anxiety scores over and above the score of the AAQ-II. The AAQ-II was entered as the only independent variable for anxiety/depression in step 1, and the J-EACQ was entered with the AAQ-II in step 2. We expected a significant increase in predictive power in step 2 and that the J-EACQ would be positively associated with both depression and anxiety. To examine the associations between subscales of the J-EACQ and depression/anxiety, we also conducted the same analysis using subscale scores of the J-EACQ.

3. Results

3.1. Demographic characteristics of participants and care recipients

Most caregivers were men (n = 218, 61.41%; mean age: 54.69 ± 11.16 years) and the most common relationship to the care recipient was son (n = 174, 49.01%). Most participants were primary caregivers[3] (n = 289, 81.41%), and the mean caregiving hours per week was 32.01 ± 26.73 h. The mean caregiving duration was 59.31 ± 49.78 months. Most care recipients were women (n = 257, 72.39%; mean age: 84.37 ± 9.07 years) and the majority had a clinical diagnosis of Alzheimer's disease (n = 203, 57.18%). The sociodemographic data are presented in Table 1.

3.2. Factor structure

The result of the CFA showed a poor fit to the data (TLI = 0.81, CFI = 0.86, RMSEA = 0.10) for the original 3-factor model proposed by Losada et al. (2014), and some items (i.e., item 3, 4, 13, and 14) loaded on different factors in the current study compared to the original study (Table 2). The KMO statistic was 0.86, and Bartlett's test of sphericity was significant (χ^2 = 2059.80, df = 105, p < .01), indicating that performing the EFA was appropriate. The Kaiser-Guttman criterion suggested a 3-factor solution (eigenvalues = 5.19, 2.34, 1.15, 0.92, 0.83 …) while MAP and PA-SMC95 suggested two and five factors respectively. Therefore, we compared the model fit of the 2- and 3-factor solutions. After removing items that did not meet the item retention criteria, the 3-factor solution (CFI = 0.97, RMSEA = 0.07, AIC = 104.87, BIC = 209.42) provided a better fit to the data when compared to the 2-factor solution (CFI = 0.89, RMSEA = 0.10, AIC = 235.71, BIC = 324.77), which accounted for 67.15% of the total variance (i.e., 37.37% by factor 1, 18.54% by factor 2, and 11.25% by factor 3). The factor loadings of the 3-factor solution are presented in Table 2.

Factor 1 comprised four items that were the same as in the original scale. This first factor was labelled *Active Avoidant Behaviors*. Factor 2, labelled *Intolerance of Negative Thoughts and Emotions Towards the Relative* (hereafter referred to as the "intolerance of internal experiences" subscale), comprised three items in which two of them (item 1 and 5) were the same as in the original scale. One item (item 3), which was included in Factor 1 in the original scale, was included in Factor 2 in this factor model derived from the EFA. Factor 3 comprised three items that were the same as in the original scale and was labelled *Apprehension Concerning Negative Internal Experiences Related to Caregiving* (hereafter referred to as the "apprehension concerning internal experiences" subscale). Five items (item 2, 4, 13, 14, 15) were excluded from any of the three factors due to insufficient factor loadings. Moderate interfactor correlations were observed between Factor 1 and both Factor 2 and 3 in both models.

3.3. Reliability

The Cronbach's alpha values of the original factor model ranged from 0.69 to 0.85, and the model derived from the EFA in the current study (i.e., current factor model) ranged from 0.70 to 0.83 (Table 3).

[2] The Bland-Altman analysis is a method to detect if two measurements have systematic errors using graphical and statistical methods (Shimoi, 2011). Measurements consist of true value and error, and error is divided into random error and systematic error. Although the random error is occurred at random and can be resolved by repeated measurements under identical conditions, the systematic error raises serious concerns since it is difficult to be resolved by repeated measurements and this can bias interpretation of the results (Shimoi, 2011). The systematic error refers to structural and systematic deviations from the true value and is divided into fixed error and proportional error (Shimoi, 2011). Fixed error is an error that occurs in the positive/negative direction regardless of the true value and is judged to be present when the 95% confidence interval of the difference between two measurements (i.e., $\bar{d}$) does not contain zero (Shimoi, 2011), which can be tested by one-sample T-test. If a fixed error is present in the positive direction (i.e., the Bland-Altman plot shows a positively deviated distribution from the x-axis), the values tend to increase in the second measurement relative to the first measurement. For example, when the score of the J-EACQ of an individual who received ACT increases following the intervention, we cannot necessarily attribute this increase to the intervention effect if a fixed error is present in the positive direction. Proportional error is an error increased in proportion to the true value and its presence can be determined when there is a significant correlation between the difference between two measurements (i.e., $\bar{d}$) and the average of the two measurements, which can be substituted by the regression analysis (Shimoi, 2011). If a proportional error is present, the error is increased as the values increase (i.e., the Bland-Altman plot shows an open fan-shaped distribution on the right side). In the above example, the higher scores of the J-EACQ, the more errors are contained, resulting in less reliability at higher scores. This makes it difficult to evaluate the intervention effect, especially for those with higher scores on the J-EACQ. Because calculation of the SDC is not appropriate when systematic error is present, the LOA is used as a substitute for the SDC (Shimoi, 2011). Interpretation of the LOA is similar to that of the SDC; if the change in scores is greater than the value of the LOA, the change can be regarded as a true change.

[3] Primary caregivers refer to caregivers providing the bulk of informal care for their care recipient (Gonçalves-Pereira et al., 2020). Alternatively, secondary caregivers refer to caregivers who support a primary caregiver and provide less intensive or frequent care for their care recipient than the primary caregiver (Gonçalves-Pereira et al., 2020).

Table 1
Sociodemographic characteristics of participants and their care recipients at Wave 1.

	n/M	*%/SD*		*n/M*	*%/SD*
Caregiver			Care recipient		
Sex			Sex		
Male	218	61.41	Male	98	27.61
Female	137	38.59	Female	257	72.39
Age (years)	54.69	11.16	Age (years)	84.37	9.07
Marital status			Type of dementia		
Unmarried	140	39.44	Alzheimer's disease	203	57.18
Married living with the spouse	169	47.61	Vascular dementia	35	9.86
Married not living with the spouse	4	1.13	Dementia with Lewy bodies	27	7.61
Divorced	35	9.86	Frontotemporal dementia	13	3.66
Bereaved	7	1.97	Others	4	1.13
			Unknown	73	20.56
Caregiver status					
Primary caregiver	289	81.41	Approved levels of care under LTCI		
Secondary caregiver	66	18.59	Not using public LTCI	9	2.54
			Requiring help 1	20	5.63
Relationship to the care recipient			Requiring help 2	25	7.04
Wife	2	0.56	Long-term care level 1	86	24.23
Husband	22	6.20	Long-term care level 2	75	21.13
Daughter	97	27.32	Long-term care level 3	68	19.15
Son	174	49.01	Long-term care level 4	38	10.70
Daughter-in-law	22	6.20	Long-term care level 5	34	9.58
Son-in-law	12	3.38			
Grandchild	21	5.92			
Others	5	1.41			
Hours per week spent caregiving	32.01	26.73			
Time since becoming a caregiver (months)	59.31	49.78			

Note. LTCI = long-term care insurance, M = mean, SD = standard deviation.

Forty-seven participants were considered as outliers, and those data were excluded from the analysis of the ICC agreement and the absolute reliability. The remaining data from 199 participants were used for these analyses. The ICC agreement of the original factor model ranged from 0.59 to 0.65, and the current factor model ranged from 0.59 to 0.65.

The Bland-Altman analysis showed that the intolerance of internal experiences and apprehension concerning internal experiences subscales of the original factor model and the intolerance of internal experiences subscale of the current factor model had no systematic error (Table 4).[4] SEM and SDC were calculated for these factors (Table 3). The remaining factors and the total score for both models showed fixed error (i.e., active avoidant behaviors and apprehension concerning internal experiences subscales of the current factor model) or both fixed and proportional errors (i.e., active avoidant behaviors subscale and the total score of the original model, and the total score of the current factor model), while observed fixed errors were marginal or below one measurement unit. LOA was calculated for these factors and the total scores. The SDC and LOA suggested that if there is a change in scores over 7 points for the active avoidant behaviors subscale, over 6 points for the intolerance of internal experiences and apprehension concerning

[4] The Bland-Altman plots are presented in Appendix C.

Table 2
Factor structure of the J-EACQ.

Item		CFA			EFA			
		F1	F2	F3	F1	F2	F3	h^2
12.	I tend to 'ignore' the negative thoughts that come to me about my relative.	**.80**			**.88**	−.02	−.09	.70
11.	If a caregiver has negative thoughts toward his/her relative, the best thing to do is try to ignore them.	**.74**			**.74**	.09	−.09	.58
10.	When I have negative emotions in relation to the caregiving, I try to occupy myself with some other activity to make them go away quickly.	**.73**			**.73**	−.05	.09	.55
7.	Every time I start to have bad thoughts about my relative or my situation as a caregiver, I try to escape from them and distract myself.	**.67**			**.57**	.03	.23	.49
3.	I avoid thinking that other relatives are behaving selfishly, and always tend to excuse them by thinking things like 'they're busier, poor guys, …they have their own lives … '	**.08**	.14		.07	**.54**	.02	.33
15.	In difficult caregiving situations where I need some type of support, I prefer not to talk about it with other relatives if it might lead to conflict.	**.32**		.30				
5.	One should not feel rejection or other unpleasant emotions about the person you are caring for.		**.86**		.08	**.84**	−.13	.78
1.	One should not have bad thoughts about the person you are caring for.		**.67**		−.11	**.75**	.13	.50
4.	I cannot bear it when I get angry with my relative.	.15	**.22**	.43				
2.	I have never felt bad in relation to caring for my relative.		**.62**					
8.	It is normal to feel stress and depression when you are caring for a dependent relative.			**.68**	−.10	.12	**.81**	.61
9.	I am scared by the emotions and thoughts I have about my relative.			**.68**	.27	−.01	**.45**	.36
6.	It is normal for a caregiver to have negative thoughts about the person they are caring for.			**.61**	.02	−.09	**.69**	.49
14.	Thinking too much about what a caregiver feels and	.48		**.14**				

(*continued on next page*)

Table 2 (*continued*)

Item		CFA			EFA			
		F1	F2	F3	F1	F2	F3	h^2
	thinks about his/her caregiving situation is harmful.							
13.	It is harmful for a caregiver to stop and analyze his/her negative feelings toward his/her ill relative or another relative.	.52		**.22**				
Interfactor correlations								
F1. Active avoidant behaviors		–			–			
F2. Intolerance of internal experiences		.54	–		.49	–		
F3. Apprehension concerning internal experiences		.51	.02	–	.39	.04	–	

Note. J-EACQ = Japanese version of the experiential avoidance of caregiving questionnaire, CFA = confirmatory factor analysis.
(Original factor model), EFA = exploratory factor analysis.

Table 3
Reliability and measurement error of the J-EACQ.

	α	ICC $_{agreement}$ (95% CI)	SEM $_{agreement}$	SDC	95% LOA
Original factor model					
Active avoidant behaviors	.79	.63 (.55, .70)	–	–	−4.87, 6.12
Intolerance of internal experiences	.69	.63 (.55, .69)	1.87	5.18	–
Apprehension concerning internal experiences	.73	.59 (.50, .66)	2.01	5.58	–
Total score	.85	.65 (.58, .71)	–	–	−9.58, 11.54
Exploratory factor analysis					
Active avoidant behaviors	.83	.59 (.50, .66)	–	–	−3.91, 5.04
Intolerance of internal experiences	.75	.61 (.53, .67)	1.59	4.41	–
Apprehension concerning internal experiences	.70	.65 (.57, .70)	–	–	−2.90, 3.75
Total score	.80	.61 (.52, .68)	–	–	−6.56, 8.76

Note. J-EACQ = Japanese version of the experiential avoidance of caregiving questionnaire, ICC = intraclass correlation coefficient, CI = confidence interval, SEM = standard error of measurement, SDC = smallest detectable change, LOA = limits of agreement.

internal experiences subscales and over 12 points for the total score of the original factor model, as well as over 6 points for the active avoidant behaviors subscale, over 5 points for intolerance of internal experiences subscale, over 4 points for apprehension concerning internal experiences subscale and over 9 points for the total scores of the current factor model derived from the EFA, the change can be regarded as a true change. Descriptive statistics of the indicator variables are presented in Table 5.

3.4. Validity

The total score of the J-EACQ had a significant weak to moderate positive correlation with the score of the AAQ-II, depression, anxiety, cognitive fusion and negative automatic thought while no significant correlation was observed for positive automatic thought for both factor models (Table 6). The score of the active avoidant behaviors and apprehension concerning internal experiences subscales demonstrated similar results, except that the score of the apprehension concerning internal experiences subscale also showed a significant weak negative correlation with the score of positive automatic thought for both factor models. The score of the intolerance of internal experiences subscale in the original factor model showed significant weak positive correlations with the score of depression, anxiety and positive automatic thought while only a significant weak positive correlation was observed for the

Table 4
The results of Bland-Altman analysis of the J-EACQ.

	Fixed error			Proportional error		
	$\bar{d}$	95% CI		r		
Original factor model						
Active avoidant behaviors	0.62	0.18, 1.07	Yes	−.22	[a]	Yes
Intolerance of internal experiences	0.05	−0.32, 0.42	No	−.05		No
Apprehension concerning internal experiences	0.31	−0.09, 0.70	No	−.12		No
Total score	0.98	0.12, 1.84	Yes	−.18	[a]	Yes
Exploratory factor analysis						
Active avoidant behaviors	0.56	0.20, 0.93	Yes	−.13		No
Intolerance of internal experiences	0.12	−0.20, 0.43	No	−.10		No
Apprehension concerning internal experiences	0.42	0.15, 0.69	Yes	−.03		No
Total score	1.10	0.48, 1.72	Yes	−.14	[a]	Yes

Note. CI = confidence interval, LOA = limit of agreement.
$\bar{d}$ means the mean difference in the scores of Wave 1 and Wave 2 (i.e., Wave 2 minus Wave 1). r represents correlations between the difference in the scores of Wave 1 and Wave 2 and the mean between the scores of Wave 1 and Wave 2.
[a] $p < .05$.

Table 5
Descriptive statistics of the indicator variables.

	Range	Wave 1 (n = 355)		Wave 2 (n = 199)	
		M	*SD*	*M*	*SD*
Experiential avoidance					
J-EACQ: original factor model					
Active avoidant behaviors	6–30	15.70	4.56	16.83	3.41
Intolerance of internal experiences	4–20	10.61	3.29	11.20	3.00
Apprehension concerning internal experiences	5–25	13.65	3.75	14.58	2.97
Total score	15–75	39.95	9.47	42.61	6.88
J-EACQ: exploratory factor analysis					
Active avoidant behaviors	4–20	10.43	3.46	11.34	2.74
Intolerance of internal experiences	3–15	8.44	2.81	8.94	2.43
Apprehension concerning internal experiences	3–15	8.43	2.61	9.33	2.31
Total score	10–50	27.31	6.58	29.62	4.82
AAQ-II	7–49	21.63	10.80	–	–
Depression	9–36	8.24	7.19	–	–
Anxiety	7–28	6.44	6.03	–	–
Cognitive fusion	7–49	19.37	10.58	–	–
Automatic thoughts					
Negative appraisal for future	15–60	33.03	11.85	–	–
Self-blame	13–52	30.10	9.79	–	–
Positive thought	10–40	22.31	6.32	–	–

Note. J-EACQ = Japanese version of the experiential avoidance of caregiving questionnaire, AAQ-II = acceptance and action questionnaire-II, M = mean, SD = standard deviation.

score of positive automatic thought for the current factor model derived from the EFA. The results of hierarchical regression analysis showed a significant increment in the prediction of depression and anxiety with the addition of the J-EACQ for the original factor model, and the J-EACQ was positively associated with the scores of depression and anxiety while a significant increment in the prediction was only observed for depression for the current factor model (Table 7). The additional analysis using subscales demonstrated only the apprehension concerning internal experiences subscale was significantly positively associated with depression in both factor models.

4. Discussion

The purpose of this study was to develop the Japanese version of the EACQ (J-EACQ) and examine its psychometric properties. The CFA showed a poor fit to our data for the original 3-factor model proposed by Losada et al. (2014). The EFA resulted in a new 3-factor model in which the factor structure was similar to the original model but with reduced items. Furthermore, the results showed that both versions of the J-EACQ had acceptable levels of internal consistency and test-retest reliability. The examination of the validity of the scale provided similar expected results for both factor models. These results provide preliminary evidence of good psychometric properties of the J-EACQ. The findings also support that experiential avoidance in caregiving is a multidimensional construct comprised of three dimensions regardless of cultural differences.

When the original scale was developed by Losada et al. (2014), some items loaded equally on multiple factors (i.e., items 3, 4, 14), and some of these items were included in a factor in which the items had low factor loadings because of the priory on the interpretability of the factor (i.e., items 13, 15). This may have resulted in a poor fit to the data in the CFA in the current study. Similar patterns of findings (i.e., low factor loadings) were observed in our data and five items were excluded from the factor model derived from the EFA in the current study (i.e., items 2, 4, 13, 14, 15). Since the item retention criteria employed in this study was more rigorous than that of the original study (Losada et al., 2014), the EFA demonstrated a better model fit in the current study.

Item 3 (I avoid thinking that other relatives are behaving selfishly, and always tend to excuse them by thinking things like 'they're busier, poor guys, … they have their own lives … ') belonged to the intolerance of internal experiences subscale in the EFA in the current study. This item belonged to the active avoidant behaviors subscale in the original study with equally loading on the active avoidant behaviors (0.29) and intolerance of internal experiences (0.26) subscales (Losada et al., 2014). Item 3 represents both absolutistic thoughts, such as thinking that it is wrong to have negative thoughts about other family members' behavior, and the person's tendency to avoid having such thoughts. Based on the results of the EFA, it is possible that Japanese family caregivers who participated in the study solely focused on the aspect of absolutistic thoughts of the item, rather than avoidant behavior.

The Cronbach's alpha values of the total and subscale scores were higher than 0.70 for both factor models, except for the intolerance of internal experiences subscale in the original factor model (i.e., $\alpha = 0.69$). These Cronbach's alpha values were equal to or higher than those reported in the original study (Losada et al., 2014), indicating that the J-EACQ has acceptable internal consistency. The results also showed that the test-retest reliability of the J-EACQ was moderate. Although the test-retest reliability is not reported in the original study (Losada et al., 2014), given that the test-retest reliability of the AAQ variants generally range from moderate to good (Ong et al., 2019), the J-EACQ has the comparable test-retest reliability to other scales measuring EA in other populations.

This study also calculated the SDC or LOA for the J-EACQ. Given that measurements contain true value and error (Shimoi, 2011), when the J-EACQ total score decreases five points following the ACT intervention, it is not possible to conclude whether the pre-post change observed is true decline in EA (i.e., the intervention was effective) or with in the error margin of the J-EACQ (i.e., the intervention was not effective). The SDC and LOA provide indices determining whether the change in scores in a scale can be considered true change or not (Shimoi, 2011) and play similar roles to the reliable change index (Jacobson & Truax, 1991). If a change in scores on the scale is greater than the value of the SDC or LOA, this change can be regarded as a true change (Shimoi, 2011). The SDC or LOA can be used to augment traditional effect sizes (e.g., Cohen's *d*), providing real-world information on treatment effects (Quintana et al., 2005). Thus, the values of the SDC or LOA shown in Table 3 are useful indicators for future researchers and clinicians to determine the impact of psychological interventions (e.g., ACT) on EA measured by the J-EACQ. Note that the active avoidant behaviors subscale and the total score of the original factor model and the total score of the current factor model presented both fixed and proportional errors. Because there is still no consensus on the calculation procedure of the LOA when both these

Table 6
Zero-order correlations between J-EACQ and other variables.

Variables	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.
1. Caregiver sex [a]	–	−.29	−.13	.05	−.07	−.01	.03	.00	−.02	−.01	−.01	.05	−.01	−.16	.03	−.05
2. Caregiver age	−.29	–	−.14	.08	.10	−.21	−.34	−.30	−.31	−.20	−.18	.15	.00	.15	−.01	.05
3. Caregiver status [b]	−.13	−.14	–	−.14	.02	.05	−.01	.00	.06	.04	.05	.00	.00	−.08	−.03	−.04
4. Hours per week spent caregiving	.05	.08	−.14	–	.23	.08	.16	.13	.09	.10	.09	−.05	.09	.09	.09	.11
5. Time since becoming a caregiver	−.07	.10	.02	.23	–	−.01	.03	−.06	−.03	.01	.04	.01	.12	.06	.06	.10
6. AAQ-II	−.01	−.21	.05	.08	−.01	–	.65	.72	.85	.73	.74	−.33	.35	.10	.48	.40
7. Depression	.03	−.34	−.01	.16	.03	.65	–	.86	.69	.71	.65	−.36	.34	.14	.45	.39
8. Anxiety	.00	−.30	.00	.13	−.06	.72	.86	–	.77	.70	.68	−.29	.32	.13	.41	.37
9. Cognitive fusion	−.02	−.31	.06	.09	−.03	.85	.69	.77	–	.69	.70	−.30	.36	.10	.42	.37
10. Negative appraisal for future	−.01	−.20	.04	.10	.01	.73	.71	.70	.69	–	.93	−.37	.27	.04	.39	.30
11. Self-blame	−.01	−.18	.05	.09	.04	.74	.65	.68	.70	.93	–	−.32	.25	.06	.36	.28
12. Positive thought	.05	.15	.00	−.05	.01	−.33	−.36	−.29	−.30	−.37	−.32	–	−.02	.17	−.17	−.02
13. Active avoidant behaviors	.02	.00	.00	.09	.12	.31	.30	.28	.32	.24	.22	.01	–	.56	.59	.91
14. Intolerance of internal experiences	−.17	.20	−.03	.06	.06	.05	.08	.07	.04	.01	.02	.17	.41	–	.28	.73
15. Apprehension concerning internal experiences	.07	−.05	−.05	.07	.02	.49	.42	.39	.43	.40	.37	−.24	.41	.09	–	.78
16. J-EACQ total score	−.03	.06	−.03	.10	.10	.38	.35	.33	.36	.29	.27	−.02	.86	.68	.65	–

Note. All correlations with absolute values ≥ 0.11 were significant at $p < .05$ and those with absolute values ≥ 0.14 were significant at $p < .01$. The results for the original factor model of the J-EACQ are shown above the diagonal, and those for the factor model derived from the exploratory factor analysis are shown below the diagonal. J-EACQ = Japanese version of the experiential avoidance of caregiving questionnaire, AAQ-II = acceptance and action questionnaire-II.

[a] 0 = male and 1 = female.

[b] 0 = primary caregiver and 1 = secondary caregiver.

Table 7
Incremental validity of the J-EACQ above the AAQ-II.

	Depression						Anxiety					
	R^2		ΔR^2		β		R^2		ΔR^2		β	
Original factor model												
Step 1	.43	a	.43	a			.51	a	.51	a		
AAQ-II					.65	a					.72	a
Step 2	.45	a	.02	a			.52	a	.01	b		
AAQ-II					.59	a					.68	a
Total scores of J-EACQ					.16	a					.10	b
Step 1	.43	a	.43	a			.51	a	.51	a		
AAQ-II					.65	a					.72	a
Step 2	.45	a	.03	a			.52	a	.01			
AAQ-II					.56	a					.67	a
Active avoidant behaviors					.04						.04	
Intolerance of internal experiences					.02						.02	
Apprehension concerning internal experiences					.15	a					.06	
Exploratory factor analysis												
Step 1	.43	a	.43	a			.51	a	.51	a		
AAQ-II					.65	a					.72	a
Step 2	.44	a	.01	a			.52	a	.00			
AAQ-II					.61	a					.69	a
Total scores of J-EACQ					.12	a					.07	
Step 1	.43	a	.43	a			.51	a	.51	a		
AAQ-II					.65	a					.72	a
Step 2	.44	a	.02	a			.52	a	.01			
AAQ-II					.58	a					.68	a
Active avoidant behaviors					.07						.05	
Intolerance of internal experiences					.01						.01	
Apprehension concerning internal experiences					.11	b					.04	

Note. J-EACQ = Japanese version of the experiential avoidance of caregiving questionnaire, AAQ-II = acceptance and action questionnaire-II.
[a] $p < .01$.
[b] $p < .05$.

errors are present, we calculated the LOA of fixed error for these scores. Therefore, interpretation of the true change in these scores requires caution.

As expected, the correlation analyses demonstrated weak to moderate positive correlations between the J-EACQ and the AAQ-II and other variables that assess related constructs such as depression, anxiety, cognitive fusion and negative automatic thought for both factor models. These results suggest that J-EACQ has sufficient convergent and discriminant validity. Furthermore, the hierarchical regression analysis showed a significant increment of the prediction of depression and anxiety with the addition of the J-EACQ for the original factor model. A significant increment of the prediction of depression was also observed for the current factor model, indicating that the J-EACQ has acceptable incremental validity. However, the reduced number of items in the current factor model might have affected the predictive ability of the J-EACQ beyond that of the AAQ-II for anxiety. The additional analysis using subscales demonstrated that only the apprehension concerning internal experiences subscale was positively associated with depression in both the original and current factor models. Given that this subscale showed relatively stronger correlations with depression, anxiety, cognitive fusion and negative automatic thought than other subscales of the J-EACQ for both factor models, apprehension concerning internal experiences may play an important role in understanding mental health problems in Japanese dementia family caregivers. However, although the variance inflation factor (VIF) suggested there is no multicollinearity issue (i.e., VIF <2.08), the moderate correlations observed among three subscales may have affected the results of the hierarchical regression analyses.

Interestingly, positive automatic thought had a significant positive correlation with the intolerance of internal experiences subscale and a significant negative correlation with the apprehension concerning internal experiences subscale for both factor models, although the degree of these correlations were very weak. This may suggest that family caregivers who believe that they should not have negative thoughts and emotions toward their care recipient and other family members (i.e., intolerance of internal experiences) may tend to hold positive thoughts more frequently as a way to avoid such internal experiences (i.e., EA). Equally, family caregivers who hold fearful attitudes towards their negative internal experiences (i.e. apprehension concerning internal experiences) are more likely to engage in EA, and therefore they may not be able to direct their attention to other types of experiences such as positive automatic thoughts. The sociocultural stress and coping model for caregiving (Knight & Sayegh, 2010) suggests the impact of stressors on mental health outcomes through their association with coping strategies may be affected by cultural factors. A recent study (Kishita et al., 2022), which compared the association between the EACQ and depression across three different countries, demonstrated that this association was not significant in the Spanish sample while a significant association was observed for the sample from Japan and the UK. Therefore, it is possible that the effects of EA on the stress process is affected by cultural factors.

Taken together, the original factor model provided a poor fit to our data due to the characteristics of the original scale, which prioritizes the interpretability of the factors. The original factor model and the current factor model derived from the EFA in our study showed similar results in terms of the factor structure and psychometric properties. However, the original factor model had a less systematic error and a higher incremental validity when compared to the current factor model. Based on these results, it is recommended to use the original factor model to allow for international comparisons of the findings on EA in the dementia caregiving context.

4.1. Strengths and limitations

The translation of the EACQ was carried out using rigorous procedures, which followed the ISPOR guidelines (Wild et al., 2005), and its validity was examined using a wide range of scales related to EA similar to those used in the original study (Losada et al., 2014). This study also recruited a large number of young male caregivers, a population that is often understudied. The number of Japanese male caregivers, especially

in their 50's and 60's, is rapidly increasing due to a decline in the number of family members within a single household (nuclear households) and the growing participation of females in the society in recent years (Saito, 2011). The successful recruitment of young male caregivers is another key strength of this study.

However, there were several limitations. The dropout rate from Wave 1 to Wave 2 (36.55%) was relatively high, with female participants more likely to drop out, while the logistic regression models used in the attrition analysis were not significant. Given that the test-retest interval was short (i.e., two weeks), we are unsure of the reasons for this high rate of dropout. The number of items included in the first survey may have affected the motivation to participate in the second survey as participants were required to complete all the items to take part in the study. The sample of this study was not necessarily representative of common dementia family caregivers (i.e., the majority were young male caregivers in this study). Such differences in sociodemographic characteristics might have led to the different results from the original EACQ study. Therefore, the generalizability of our results may be limited.

Furthermore, considering systematic errors observed in some of the subscale and total scores of the J-EACQ, the short test-retest interval might have led to a learning effect. Therefore, additional examination using a longer test-retest interval is needed. Since this study did not examine the responsiveness (Terwee et al., 2012) of the J-EACQ, future research should assess this by examining whether the score of the J-EACQ change through psychological intervention (e.g., ACT) for dementia family caregivers. Although we confirmed the comprehensibility of the J-EACQ before conducting the main survey, the participants may have faced some difficulties in fully understanding its items since EA is a complex construct.

Finally, recent studies (Ong et al., 2020; Rogge et al., 2019; Tyndall et al., 2019) raise concerns regarding the construct validity of the AAQ-II, and recommend researchers to include recently developed more comprehensive measures of psychological flexibility, such as the Comprehensive Assessment of ACT Processes (CompACT; Francis et al., 2016), the Multidimensional Psychological Flexibility Inventory (MPFI; Rolffs et al., 2016), and the Brief Experiential Avoidance Questionnaire (BEAQ; Gámez et al., 2014). Therefore, re-examining the validity of the J-EACQ using these scales is recommended in future studies.

5. Conclusion

The J-EACQ has a similar factor structure as the original scale and acceptable reliability and validity, which allows for international comparisons of data on EA in the dementia caregiving context. There is emerging evidence that ACT may be effective for improving the psychological well-being of Japanese dementia family caregivers. However, fundamental research of ACT in the dementia caregiving context is still limited, particularly in Japan, and the development of the J-EACQ is a crucial step for future research. The J-EACQ will be a useful tool not only for research but also for detecting clinical presentations and monitoring treatment outcomes in practice.

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Declaration of competing interest

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Appendix A. Supplementary data

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