




## RESEARCH PAPER

# Well-Being and Generalized Anxiety in Japanese Undergraduates: A Prospective Cohort Study

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**Abstract** Psychological well-being is thought to protect against common mental health problems. This study investigated the buffering effects of psychological well-being on the relationships between cognitive vulnerabilities (fear of anxiety and negative beliefs about worry) and GAD symptoms among 297 Japanese undergraduates (female = 62%, age =  $18.91 \pm 1.61$ ) in a two-wave prospective cohort study. Participants completed the Generalized Anxiety Disorder Questionnaire for DSM-IV, Center for Epidemiologic Studies Depression Scale, anxiety control subscale of Affective Control Scale, negative belief about worry subscale of Meta-Cognitions Questionnaire, and Nishida's psychological well-being scale. A moderated regression analysis tested the buffering effect of psychological well-being sub-dimensions on the relationship between cognitive vulnerabilities and generalized anxiety symptoms. Fear of anxiety ( $\beta = 0.16$ ,  $p < 0.01$ ) and negative

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beliefs about worry ( $\beta = 0.16, p < 0.01$ ) at baseline predicted generalized anxiety at follow-up, after controlling for baseline symptoms, and three interaction terms significantly predicted generalized anxiety symptoms. Purpose in life and autonomy buffered the negative relationship between cognitive vulnerabilities and generalized anxiety symptoms. Contrary to the hypothesized relationship, positive relationships with others at baseline facilitated a positive relationship between fear of anxiety and generalized anxiety symptoms. Those results suggested that enhanced Purpose in life and Autonomy dimension of Psychological well-being may be useful in preventing GAD, while the enhanced positive relationship with others dimension of Psychological well-being may facilitate generalized anxiety, as a function of fear of anxiety. In a primary prevention setting, it may be useful to consider the dimensions of Psychological well-being.

**Keywords** Generalized anxiety disorder · Psychological well-being · Fear of anxiety · Negative beliefs about worry

## 1 Generalized Anxiety Disorder

Generalized anxiety disorder (GAD) is a highly prevalent and disabling disorder characterized by excessive and persistent worry about daily life events, in combination with various psycho-somatic complaints (American Psychiatric Association 2000). The lifetime prevalence of GAD has been estimated to be between 4.3 and 5.9% in the general population, and 7% in a college student sample (Tyrer and Baldwin 2006; Eisenberg et al. 2013) in the United States. A 1-year prevalence of a major depressive disorder (MDD) and social anxiety disorder (SAD) have been estimated to be 4.8 and 4.0 in a Japanese undergraduate student sample, respectively (Nishimura et al. 2008). Although there are no reports about the prevalence of GAD in a Japanese undergraduate sample, there may be considerable prevalence of GAD based on the findings about the high comorbid rate of GAD with MDD, and SAD (Carter et al. 2001).

GAD has been shown to lead to such impairments as serious as those attributed to major depressive disorder (Stein and Heimberg 2004). Recent research has shown that suffering from GAD is related to increased suicidal ideations or attempts, even after symptoms of comorbid Axis I disorders and stressful life events are statistically controlled (Boden et al. 2007). The typical age of onset for GAD occurs in adolescence and early adulthood (Kessler et al. 2007; Yonkers et al. 1996). The clinical course of the disorder is considered to be chronic because most patients are still affected 6–12 years after the initial diagnosis (Yonkers et al. 2000). Considering the typical age of onset and chronic nature of GAD, it is important to develop primary or secondary prevention strategies in a university student population. Although the model and treatment of GAD has been well established in clinical populations, few studies have investigated protective factors that may prevent the increase of generalized anxiety in healthy university populations.

## 2 Psychological Well-Being

With increasing study of positive psychological characteristics (Seligman and Csikszentmihalyi 2000) and the effects of negative life events and negative personal characteristics in the last decade, there has been increased interest in the contribution of the absence of positive characteristics (e.g., psychological well-being) to a variety of mental disorders

(Duckworth et al. 2005; Seligman et al. 2006). Thus, the development of interventions to increase positive characteristics for the prevention and treatment of common mental problems such as anxiety and depression has been increasingly encouraged. Bolier et al. (2013) found that these types of interventions were effective in reducing common mental problems and enhancing well-being in their systematic review (Bolier et al. 2013).

Psychological well-being (PWB) has recently attracted sustained empirical attention and has become the focus of preventive clinical treatments for emotional disorders (Ryan and Deci 2001). PWB is based on the eudemonic perspective of well-being, which emphasizes the importance of psychological thriving, especially in relation to the challenges of life. Ryff (1989) provided a widely used taxonomy of PWB, comprising autonomy, environmental mastery, personal growth, positive relations with others, purpose in life, and self-acceptance. The dimensions of PWB are drawn from prior theories of positive psychological functioning from developmental humanistic and clinical psychology and relate to different challenges individuals face as they strive to function positively (Ryff and Keyes 1995).

Evidence from a recent meta-analysis of randomized controlled trial revealed that psychological intervention that especially focused on psychological well-being was effective to prevent relapse of major depression during 2 year after treatment period (Clarke et al. 2016). Fava et al. (2005) developed well-being therapy (WBT), which focused on enhancing psychological well-being (based on Ryff's conceptualization of the concept), and applied it to the treatment of GAD. Twenty patients with GAD were randomly assigned to eight sessions of cognitive behavioral therapy (CBT) or the sequential administration of four sessions of CBT followed by another four sessions of WBT. Both treatments were associated with a significant reduction of anxiety. However, significant advantages of the WBT-CBT sequential combination over CBT were observed, in terms of improvements in both symptom reduction and psychological well-being. Also, WBT has been applied on school setting with primary preventive purpose (Ruini et al. 2009). Tomba et al. (2010) revealed that WBT was effective to reducing psychological distress and increasing PWB in adolescent sample in their controlled study.

### 3 PWB as Resilience to Anxiety Symptoms: The Buffering Hypothesis

It has been suggested that cognitive vulnerabilities is related to the development and maintenance of psychological distress or generalized anxiety symptoms (Ingram and Luxton 2005; Behar et al. 2009). Also these vulnerabilities are stable and often remains even after CBT (Zuroff et al. 1999; Hankin et al. 2008). Considering the preventive efficacy of WBT among patients with residual symptoms, one possible explanation PWB has a buffering effect on the relationship between cognitive vulnerabilities and generalized anxiety symptoms; that is anxiety symptom will not increase in people with high cognitive vulnerability when PWB is high.

Fava et al. (2005) suggests that higher levels of PWB may buffer against or moderate the negative influences of vulnerability on anxiety symptoms (Fava et al. 2005). The relationship between PWB and generalized anxiety symptoms can be explained by the buffering hypothesis. PWB has been shown to enhance resilience in the context of the prevention of emotional disorders (Fava and Tomba 2009; Johnson et al. 2011; Sagone and De Caroli 2014). Resilience refers to a set of attributes and resources that prevent illness following adverse circumstances in the general population and prevent relapse after

symptomatic remission in a clinical population (Fava and Tomba 2009). Adverse circumstances include both poor external environments and individual characteristics including negative emotion, and, cognitive or behavioral predisposition (e.g., neuroticism, ruminative response style, or behavioral inhibition) (Johnson et al. 2011). In other words, people who are highly resilient tend not to have increased psychiatric symptoms despite adverse experiences or negative predisposition. This buffering hypothesis of resilience was supported in several studies. For example, negative life events or suicide-related negative cognitive tendency (e.g., hopelessness) increased suicidality among patients with psychosis, only when positive beliefs toward social supports were low (Johnson et al. 2010). Huta and Hawley (2010) revealed that depressive negative characteristics such as dysfunctional beliefs were negatively related to self-esteem or life satisfaction only when psychological strength was low. Based on the conceptualization of PWB as resilience, it is hypothesized that people who have high PWB tend not to have increased anxiety symptoms even if they have a negative predisposition.

Furthermore, Wood and Tarrrier (2010) found that a lack of psychological well-being at baseline prospectively predicted the onset of major depression even after socio-demographic factors, negative vulnerability (negative affectivity), and medical illnesses were partialled out. In a Japanese context, PWB was negatively correlated with anxiety and depression among undergraduate students (Kitamura et al. 2004; Liu et al. 2009). These findings indirectly support the buffering hypothesis that those low in PWB may be at risk of developing emotional disorders. However, the hypothesis that PWB moderates the relationship between negative characteristics and generalized anxiety symptoms has not yet been directly investigated.

### 3.1 Cognitive Vulnerability for the Development of GAD

Research has shown that excessive negative attitudes toward anxiety symptoms (such as anxiety or worry) strongly predict increased generalized anxiety symptoms among healthy individuals and GAD patients (for a review see Behar et al. 2009).

#### 3.1.1 Fear of Anxiety

The fear of anxiety is defined as the tendency to view anxiety as threatening and to fear losing control over the experience of anxiety (Williams et al. 1997). Given that one of the key diagnostic criteria for GAD is that worry is uncontrollable (American Psychiatric Association 2000), low perceived control is a construct that is relevant to GAD. Considered within a control framework, the chronic worry and behavioral avoidance associated with GAD can be conceptualized as reflecting persistent (and futile) efforts to gain control over future threat. According to Roemer and Orsillo (2002), individuals who try to alter the intensity or frequency of unwanted internal experiences (e.g., anxiety) may use strategies such as worry to avoid or minimize these experiences. The emotion dysregulation model of GAD suggests these individuals have limited access to regulation strategies, and experience emotions as threatening, difficult to understand, uncontrollable, and overwhelming. Consequently, individuals with GAD may be prone to using maladaptive coping strategies, particularly worry, in an effort to dampen or avoid negative affect and associated perceived negative outcomes (Borkovec et al. 2004; Mennin et al. 2002). This aversion to affective experience is thought to apply across a range of discrete emotional experiences, including those that are positive, although it may be most evident for anxious affect, given its prominence in GAD (Mennin et al. 2004). Roemer et al. (2005) found that the fear of

losing control over anxiety significantly predicted worry and GAD symptom severity in a non-clinical sample; the fear of losing control over depression also showed a unique association with both worry and GAD severity, and the fear of positive emotions predicted additional variance in worry. Only the fear of anxiety, however, predicted unique variance in GAD symptom severity when accounting for the effects of worry and the fear of other emotions. The relationship between fear of anxiety and generalized anxiety symptoms was also revealed in a 5-year prospective cohort study (Dugas et al. 2012) and a laboratory-based manipulation of fear of anxiety led to corresponding changes in worry (Buhr and Dugas 2009). These findings may also indicate that fear of anxiety may be causally related to GAD symptoms.

### 3.2 Negative Beliefs About Worry (NBW)

The metacognitive model of GAD (Wells 2006) suggests that both positive and negative beliefs about worry (NBW) are involved in the development and maintenance of GAD. Positive beliefs about worry center on the perceived utility of worrying, and are thought to motivate it. On the other hand, NBW involves the perception that worrying is uncontrollable and dangerous. The selection of worry as a coping strategy may be influenced by positive beliefs about worry, while negative beliefs about worry may amplify subjective distress by triggering “meta-worry” (worry about worry; Wells 1999). NBW is consistently and strongly related to generalized anxiety; although, conflicting results have been observed in research investigating the relationship between positive beliefs about worry and generalized anxiety (e.g., de Bruin et al. 2007; Ruscio and Borkovec 2004; Sugiura 2007; Wells and Carter 2002; Wells and Papageorgiou 1998). Furthermore, Sica et al. (2007) found that NBW prospectively predicted excessive worry assessed six weeks apart (when Time 1 excessive worry was partialled out), in an undergraduate student sample. These findings may also support the idea that NBW may be causally related to GAD symptoms.

## 4 Purpose and Hypothesis of the Current Study

The aim of this prospective study was to examine the moderating effect of PWB on the relationship between cognitive vulnerabilities [fear of anxiety (FA) and negative beliefs about worry (NBW)] and generalized anxiety. Given that the functions of PWB differ for each sub-dimension, greater understanding of which aspects of PWB have a buffering effect is needed to tailor interventions to enhance PWB. Therefore, we investigated moderation by PWB within each sub-dimension. In addition, previous research has shown that lack of PWB is prospectively related to increases in depression in the general population, and that depression and anxiety are highly correlated in general. Thus, we also investigated the buffering effect of PWB on the relationship between cognitive vulnerabilities and generalized anxiety after controlling for depressive symptoms.

We hypothesized that moderating effects are especially presented in purpose in life, autonomy, and positive relationship dimensions of PWB, because, those dimensions have demonstrated theoretically and empirically, their protective role on psychology distress. McKnight and Kashdan (2009) suggested that a clear purpose in life might facilitate the selection of goal-consistent behavior, which then may suppress goal-incongruent behavior (such as avoidance behavior evoked by negative affect), based on their review of recent findings about purpose in life. Also, Bronk et al. (2009) has found that having identified a

purpose is positively related with life satisfaction among various age groups; notably, searching for a purpose is especially positively-related with life satisfaction among adolescent and young adults groups. Autonomy reflects the self-endorsement of one's behavior and the accompanying sense of volition (Deci and Ryan 2008) in self-determination theory, and has demonstrated its protective role as an internal locus of control in relation to psychological distress. In their laboratory-based experimental study, Bollini et al. (2000) have shown that internal locus of control moderated the relationship between perceived control and the cortisol stress response during a cognitive task. Social support also has been well documented to be an important protective factor for anxiety disorders or general psychological distress in adults or a college population (a review Kawachi and Berkman 2001).

In this study, we focused the buffering effect on PWB, rather than other positive psychological constructs that are often documented in a university or college population (such as subjective well-being or hope). As previously mentioned, the intervention focused on enhanced PWB, which has demonstrated preventive efficacy for patients with residual symptoms and in healthy adolescents in controlled studies. In addition, PWB is a multi-dimensional construct, and these dimensions reflect and include similar aspects of other positive psychological characteristics. For example, hope is one of the most important positive psychological constructs in university samples, of which include future-oriented and goal-directed attitudes; additionally, it overlaps with the purpose in life dimension of PWB (Bronk et al. 2009). Finally, we focused on psychological (eudaimonic) well-being rather than subjective (hedonic) well-being, because several recent prospective studies suggested that PWB is a significant precursor of hedonic well-being (Burns and Anstey 2010; Burns and Machin 2012; Ciarrochi et al. 2015).

## 5 Method

### 5.1 Participants and Procedures

Four hundred and fifty university students in multiple introductory psychology classes participated in this study. Seventy-seven percent of participants completed all questionnaires without missing a response. Eighty-five percent of those participants completed the assessment at time 2; thus, the final sample size for statistical analysis was 297 students (women = 184, men = 113), with a mean age of 18.92 years ( $SD = 1.63$ ). Data at time 1 and time 2 were linked with linkable anonymization, using six-digit numbers that were selected by participants arbitrarily. Those numbers did not include personally identifiable information. As these classes were introductory, many participants were first or second-year students. Accordingly, 40.55% were age 18, 41.92% were 19, 15.46% were 20; the remaining students were age 21–42. The full data are available from the author upon request.

Participants completed a paper-and-pencil questionnaire in the classroom, which assessed cognitive vulnerabilities, PWB, and generalized anxiety and depressive symptoms (Time 1). Approximately 2 months later (Time 2), generalized anxiety symptoms were measured again.

### 5.2 Ethical Considerations

This study was approved by the institutional ethical review board at Hiroshima University Graduate School of Integrated Arts and Sciences. Prior to the start of the study, participants

were told the nature and purpose of the research and that they were free to refuse to participate at any time, at which point their data would be discarded. Participants were asked to return completed questionnaires only if they agreed to take part in the study. Therefore, the act of completing and returning questionnaires was considered consent. This procedure was adopted because the questionnaires were analyzed anonymously. The response rate was not recorded because of this procedure. The research protocol submitted to the IRB stated these anonymity procedures and received approval without the explicit use of written consent.

### 5.3 Measures

#### 5.3.1 GAD Symptoms

The Generalized Anxiety Disorder Questionnaire (GADQ-IV) is a self-report measure that assesses GAD symptoms. It consists of five dichotomous items that assess for the presence of GAD symptoms as defined by the DSM-IV; one open-ended item asking participants to list up to six of the most frequent worry domains that are experienced as excessive and uncontrollable; one item about the presence of six different physical symptoms often associated with worry; and two items on a 9-point Likert-type scale that assess the distress caused and interference experienced due to worry and associated physical symptoms. The GADQ-IV can be used both to compute dimensional symptom severity and to yield dichotomous GAD status by summing all items. This study used the dimensional scores. The original version instructs participants to skip questions about physical symptoms and distress, if one has not been bothered by excessive and uncontrollable worrying more days than not in the last six months. This specification was removed for the present study. We wanted all participants to complete all items because our focus was on a broad range of GAD symptoms (following the practice of Roemer et al. 2009). The reliability and factorial, convergent, and discriminant validity of the Japanese version of this scale have been confirmed in Japanese undergraduates (Takebayashi et al. 2012).

#### 5.3.2 Psychological Well-Being (PWB)

The Psychological Well-being Scale is a self-report measure that assesses six elements of psychological well-being using 43 items rated on a scale from 1 to 6 (Nishida 2000). It was constructed by Nishida (2000), and was based on Ryff's (1989) conceptualization of well-being: self-acceptance (a positive attitude toward oneself and one's life), positive relations with others (warm, trusting, and satisfying relationships), autonomy (independence, ability to follow one's own standards, and resist social pressures), environmental mastery (competence in managing life's demands), purpose in life (sense of meaning, goals, and direction), and personal growth (openness to new experiences and a view of oneself as developing and growing). The content and factorial validity of this scale has been confirmed using factor analysis in the Japanese population (Nishida 2000). The sufficient reliability (Cronback's  $\alpha$  coefficient  $\geq 0.70$  in each sub-scales) and construct validity of this scale (e.g., negatively correlated with depression or anxiety, and positively correlated with satisfaction with life, self-esteem, and sense of authenticity) also have been supported by several studies with the Japanese population including undergraduates (Hosogoshi and Kodama 2006; Ito and Kodama 2005; Nishida 2000). In the current study, we conducted an analysis of the sub-dimensions of this scale. All subscale were revealed sufficient internal consistency in current sample (Cronback's  $\alpha$  coefficient  $\geq 0.80$  presented in Table 1).

## 5.4 Cognitive Vulnerabilities

### 5.4.1 *Negative Beliefs About Worry (NBW)*

The Meta Cognitions Questionnaire (MCQ-30), which is the abbreviated version of the full MCQ (Cartwright-Hatton and Wells 1997), assesses beliefs about worry and intrusive thoughts with 30 items rated on a scale from 1 to 4. We used one subscale of the MCQ, which consists of 6 items, and reflects negative beliefs about the uncontrollability and danger of worry. Higher scores on this subscale reflect the existence of negative beliefs about worry. Sugiura et al. (2003) translated the full MCQ into Japanese, and confirmed good reliability for each subscale.

### 5.4.2 *Fear of Anxiety*

The Affective Control Scale (ACS) assesses negative appraisals of emotions with 42 items rated on a scale from 1 to 7 (Williams et al. 1997). We used one of the four subscales of the ACS consisting of 13 items, for which higher scores reflect more fear of anxiety. The Japanese version has shown acceptable to good internal consistency, and correlations with measures of other emotion regulation variables (Kanetsuki and Kanetsuki 2010).

### 5.4.3 *Depressive Symptoms*

The Center for Epidemiological Studies Depression Scale is one of the most widely used depression scales, particularly in nonclinical populations (CESD; Radloff 1977). Higher scores reflect more depressive symptoms. The Japanese version has shown good internal consistency and construct validity (Shima et al. 1985).

## 5.5 Statistical Analysis

We conducted three-step hierarchical regressions to predict change in generalized anxiety between the two time points. T2 levels of generalized anxiety were regressed on T1 levels of the variables, along with the other predictors. Thus, the analysis predicted residualized changes in the outcome variable over time, or the variance in the T2 level of generalized anxiety that was not shared with T1 (Zapf et al. 1996). Depression, other sub-dimensions of PWB, and other cognitive vulnerabilities, along with T1 levels of generalized anxiety, were entered in the first step of the regression model as covariates. To test for psychological well-being as a moderator, it was necessary to enter the cross-product terms of cognitive vulnerability and sub-dimensions of psychological well-being in a separate block in the hierarchical regression analysis (Step 3), following the entry of those variables as first-order terms (Step 2) (Baron and Kenny 1986). Variables were mean-centered to reduce the effects of multicollinearity. The variance inflation factors (VIF) were below the standard of 10.0 (Kleinbaum et al. 1988) in all regression models, indicating that multicollinearity did not present a biasing problem in the data.

Significant interaction effects were subsequently graphed to view the nature of the interaction. The multiple regression moderation analysis (Aiken and West 1991) used in this study allowed the slope of the predictor to be plotted at different levels of the moderator variable. Using the regression prediction equation for high (1 standard deviation above the mean) and low (1 standard deviation below the mean) values of the sub-



**Table 1** Summary of Pearson correlations, means, standard deviations, skew, and Cronbach's alpha for study measures

Measures	1	2	3	4	5	6	7	8	9	10	11	12
1. GADQ-IV (T1)	-											
2. GADQ-IV (T2)	0.72***	-										
3. CES-D	0.43***	0.44***	-									
4. ACS-ANX	0.58***	0.56***	0.44***	-								
5. MCQ-NBW	0.69***	0.59***	0.39***	0.58***	-							
6. PWB	-0.29***	-0.30***	-0.11 <sup>†</sup>	-0.47***	-0.31***	-						
7. Purpose in life	-0.32***	-0.34***	-0.51***	-0.43***	-0.29***	0.64***	-					
8. Personal growth	-0.13*	-0.24***	-0.75***	-0.28***	-0.17***	0.18***	0.59***	-				
9. Autonomy	-0.19***	-0.22***	0.02	-0.39***	-0.25***	0.65***	0.29***	0.04	-			
10. Environmental mastery	-0.13*	-0.06	0.33***	-0.21***	-0.15*	0.72***	0.10 <sup>†</sup>	-0.42***	0.45***	-		
11. Positive relationship	-0.17***	-0.19***	-0.13*	-0.24***	-0.15*	0.61***	0.30***	0.14*	0.10 <sup>†</sup>	0.38***	-	
12. Self-acceptance	-0.06	-0.02	0.53***	-0.08	-0.07	0.58***	-0.07	-0.59***	0.36***	0.78***	0.32***	-
M	4.27	4.01	27.78	39.51	11.79	184.73	28.9	29.02	30.71	32.71	27.7	35.68
SD	2.69	2.63	12.2	10.53	4.24	26.28	7.7	9.2	5.93	9.7	4.97	9.95
Skew	0.46	0.51	0.26	0.09	0.69	-0.11	0.02	0.47	0.26	0.15	-0.61	-0.45
Cronbach's $\alpha$	0.8	0.82	0.92	0.89	0.86	0.94	0.9	0.83	0.83	0.84	0.83	0.89

GADQ-IV Generalized Anxiety Disorder Questionnaire for DSM-IV, ACS-ANX Affective Control Scale, Anxiety subscale, MCQ-NBW Meta-Cognitions Questionnaire, Negative beliefs about worry subscale, PWB Psychological Well-Being Scale

<sup>†</sup>  $p < 0.10$ ; \*  $p < 0.05$ ; \*\*  $p < 0.01$ ; \*\*\*  $p < 0.001$

dimensions of psychological well-being, graphs were created using R3.0.1. Simple slope analyses allowed for direct comparison of the effect at high and low levels.

Statistical significance was set at  $p < 0.05$  (two-tailed). All analyses were conducted with R3.0.1.

## 6 Results

### 6.1 Preliminary and Correlational Analyses

Means, standard deviations, skew, zero-order correlations, and Cronbach's alpha coefficients of all the variables are presented in Table 1. The mean scores of all variables were representative of scores obtained in previous Japanese undergraduate student samples. Skewness statistics ranged between  $-0.61$  and  $0.69$ , well below the threshold of 3, indicating that all variables were normally distributed in the present sample. All internal consistency coefficients exceeded 0.80, indicating sufficient reliability.

Although the age distribution was highly skewed (10.0), there was no significant correlation between age and the study variables. However, there were gender differences for PWB measures. The PWBS total score, environmental mastery subscale, and positive relationships with others subscale were higher for men. Controlling for age and gender in the subsequent analysis did not change the overall pattern of results; therefore, age and gender were not included in the analysis.

Table 1 summarizes the correlations among study variables. PWB was significantly negatively correlated with generalized anxiety and cognitive vulnerabilities. Sub-dimensions of PWB were also significantly negatively correlated with T1 generalized anxiety and cognitive vulnerabilities, except for self-acceptance. T2 generalized anxiety was significantly negatively correlated with sub-dimensions of PWB, except for environmental mastery and self-acceptance. The magnitudes of correlations were relatively higher between cognitive vulnerabilities and generalized anxiety than between PWB and generalized anxiety or cognitive vulnerabilities.

### 6.2 Moderated Regression

A three-step, hierarchical regression analysis was performed to predict change in generalized anxiety from cognitive vulnerabilities, sub-dimensions of psychological well-being, and their interaction (as well as T1 generalized anxiety). Moderating effects were investigated for each moderator.

Entering the interaction in the third step further improved the model with the interaction terms of "fear of anxiety and purpose in life," "fear of anxiety and positive relationships," and "autonomy and negative beliefs about worry" (Tables 2, 3, 4). Note that in the moderation analysis, the relevant effect size was not the change in  $R^2$ , which is always low in this type of analysis, but rather the relative difference in the slope of the relationship between the predictor and the outcome at different levels of the mediator (Aiken and West 1991). These relationships are depicted in Figs. 1, 2 and 3. The figures were constructed for low (1 standard deviation below the mean) and high (1 standard deviation above the mean) levels of fear of anxiety and purpose in life in Fig. 1, negative beliefs about worry and autonomy in Fig. 2, and fear of anxiety and positive relationships in Fig. 3. The interaction between cognitive vulnerabilities and other dimensions of psychological well-being did not

**Table 2** Moderated multiple regression analysis predicting T2 GAD symptoms from the interaction between cognitive vulnerability and purpose in life

Predictor	$\Delta R^2$	<i>B</i>	$\beta$	95% <i>CI</i>
Step 1	0.568***			
GADQ-IV (T1)		0.544***	0.554	[0.441, 0.667]
CES-D		0.026 <sup>†</sup>	0.120	[-0.023, 0.264]
MCQ-NBW		0.081*	0.131	[0.022, 0.239]
Personal growth		-0.022	-0.076	[-0.215, 0.063]
Autonomy		-0.034	-0.075	[-0.169, 0.019]
Environmental mastery		0.030 <sup>†</sup>	0.112	[-0.021, 0.245]
Positive relationships		-0.023	-0.043	[-0.138, 0.051]
Self-acceptance		-0.036 <sup>†</sup>	-0.137	[-0.286, 0.012]
Step 2	0.008 <sup>†</sup>			
ACS-ANX		0.032**	0.130	[0.019, 0.240]
Purpose in life		0.001	0.002	[-0.110, 0.114]
Step 3	0.015*			
ACS-ANX X Purpose in life		-0.002*	-0.074	[-0.142, -0.006]
Total $R^2$	0.583***			
Step 1	0.571***			
GADQ-IV (T1)		0.564***	0.574	[0.472, 0.675]
CES-D		0.021	0.099	[-0.046, 0.244]
ACS-ANX		0.038**	0.151	[0.044, 0.259]
Personal growth		-0.019	-0.067	[-0.206, 0.071]
Autonomy		-0.021	-0.048	[-0.145, 0.049]
Environmental mastery		0.032 <sup>†</sup>	0.116	[-0.017, 0.249]
Positive relationships		-0.018	-0.034	[-0.129, 0.060]
Self-acceptance		-0.034 <sup>†</sup>	-0.130	[-0.279, 0.019]
Step 2	0.005			
MCQ-NBW		0.064 <sup>†</sup>	0.103	[-0.008, 0.213]
Purpose in life		0.001	0.002	[-0.110, 0.114]
Step 3	0.001			
MCQ-NBW X Purpose in life		-0.002	-0.027	[-0.101, 0.046]
Total $R^2$	0.577			

*GAD-Q* Generalized Anxiety Disorder Questionnaire for DSM-IV, *CES-D* Center for Epidemiological Studies of Depression Scale, *MCQ-NBW* Meta-Cognitions Questionnaire, Negative beliefs about worry subscale, *ACS-ANX* Affective Control Scale, Anxiety subscale

<sup>†</sup>  $p < 0.10$ ; \*  $p < 0.05$ ; \*\*  $p < 0.01$ ; \*\*\*  $p < 0.001$

predict T2 generalized anxiety. The results of these analyses are presented in the Supplementary Material Tables A1 to A3.

Simple slope analyses were then conducted, which indicated that when purpose in life was low, fear of anxiety led to significant increases in generalized anxiety (standardized simple slope:  $b = 0.208$ ,  $p < 0.001$ ). In contrast, when purpose in life was high, fear of anxiety did not contribute to increases in generalized anxiety (standardized simple slope:  $b = 0.060$ ,  $p = 0.345$ ). The same pattern of findings also emerged when comparing the effects of negative beliefs about worry on changes in generalized anxiety at high and low

**Table 3** Moderated multiple regression analysis predicting T2 GAD symptoms from the interaction between cognitive vulnerability and autonomy

Predictor	$\Delta R^2$	<i>B</i>	$\beta$	95% <i>CI</i>
Step 1	0.564***			
GADQ-IV (T1)		0.548***	0.557	[0.443, 0.672]
CES-D		0.023	0.108	[-0.036, 0.251]
MCQ-NBW		0.086*	0.140	[0.031, 0.248]
Purpose in life		-0.005	-0.013	[-0.126, 0.099]
Personal growth		-0.030	-0.105	[-0.260, 0.049]
Environmental mastery		0.022	0.081	[-0.049, 0.212]
Positive relationships		-0.013	-0.024	[-0.116, 0.068]
Self-acceptance		-0.041*	-0.156	[-0.305, -0.008]
Step 2	0.012*			
ACS-ANX		0.032*	0.130	[0.019, 0.240]
Autonomy		-0.020	-0.045	[-0.142, 0.052]
Step 3	0.004 <sup>†</sup>			
ACS-ANX X Autonomy		-0.002 <sup>†</sup>	-0.055	[-0.120, 0.010]
Total $R^2$	0.580***			
Step 1	0.570***			
GADQ-IV (T1)		0.565***	0.575	[0.472, 0.677]
CES-D		0.019	0.089	[-0.055, 0.233]
ACS-ANX		0.042**	0.167	[0.063, 0.270]
Purpose in life		0.001	0.003	[-0.109, 0.115]
Personal growth		-0.026	-0.092	[-0.246, 0.062]
Environmental mastery		0.026	0.097	[-0.034, 0.227]
Positive relationships		-0.012	-0.022	[-0.114, 0.069]
Self-acceptance		-0.038 <sup>†</sup>	-0.143	[-0.291, 0.006]
Step 2	0.006			
MCQ-NBW		0.064 <sup>†</sup>	0.103	[-0.008, 0.213]
Autonomy		-0.020	-0.045	[-0.142, 0.052]
Step 3	0.006*			
MCQ-NBW X Autonomy		-0.007*	-0.072	[-0.140, -0.003]
Total $R^2$	0.582***			

*GAD-Q* Generalized Anxiety Disorder Questionnaire for DSM-IV, *CES-D* Center for Epidemiological Studies of Depression Scale, *MCQ-NBW* Meta-Cognitions Questionnaire, Negative beliefs about worry subscale, *ACS-ANX* Affective Control Scale, Anxiety subscale

<sup>†</sup>  $p < 0.10$ ; \*  $p < 0.05$ ; \*\*  $p < 0.01$ ; \*\*\*  $p < 0.001$

levels of autonomy. Simple slope analyses indicated that when autonomy was low, negative beliefs about worry led to significant increases in generalized anxiety ( $b = 0.160$ ,  $p < 0.05$ ). In contrast, when autonomy was high, negative beliefs about worry did not contribute to increases in generalized anxiety ( $b = 0.017$ ,  $p = 0.806$ ). The opposite pattern of findings emerged when comparing the effect of fear of anxiety on changes in generalized anxiety at high and low levels of positive relationships. Simple slope analyses indicated that when positive relationships was high, fear of anxiety lead to significant increases in generalized anxiety ( $b = 0.192$ ,  $p < 0.01$ ). In contrast, when positive

**Table 4** Moderated multiple regression analysis predicting T2 GAD symptoms from the interaction between cognitive vulnerability and positive relationships

Predictor	$\Delta R^2$	<i>B</i>	$\beta$	95% <i>CI</i>
Step 1	0.567***			
GADQ-IV (T1)		0.544***	0.554	[0.440, 0.668]
CES-D		0.027.	0.125	[-0.019, 0.269]
MCQ-NBW		0.080*	0.130	[0.021, 0.239]
Purpose in life		-0.003	-0.007	[-0.120, 0.105]
Personal growth		-0.026	-0.091	[-0.245, 0.063]
Autonomy		-0.028	-0.064	[-0.155, 0.027]
Environmental mastery		0.026	0.097	[-0.034, 0.228]
Self-acceptance		-0.041*	-0.155	[-0.299, -0.010]
Step 2	0.009*			
ACS-ANX		0.032*	0.130	[0.019, 0.240]
Positive relationships		-0.020	-0.037	[-0.131, 0.057]
Step 3	0.007*			
ACS-ANX X Positive relationships		0.004*	0.072	[0.005, 0.139]
Total $R^2$	0.583***			
Step 1	0.570***			
GADQ-IV (T1)		0.564***	0.574	[0.472, 0.677]
CES-D		0.022	0.103	[-0.042, 0.249]
ACS-ANX		0.038**	0.154	[0.046, 0.261]
Purpose in life		0.002	0.006	[-0.107, 0.118]
Personal growth		-0.025	-0.087	[-0.241, 0.066]
Autonomy		-0.017	-0.039	[-0.133, 0.055]
Environmental mastery		0.028	0.102	[-0.029, 0.233]
Self-acceptance		-0.039*	-0.146	[-0.290, -0.002]
Step 2	0.006			
NCQ-NBW		0.064 <sup>†</sup>	0.103	[-0.008, 0.213]
Positive relationships		-0.020	-0.037	[-0.131, 0.057]
Step 3	0.005 <sup>†</sup>			
MCQ-NBW X Positive relationships		0.007 <sup>†</sup>	0.059	[-0.005, 0.123]
Total $R^2$	0.581***			

*GAD-Q* Generalized Anxiety Disorder Questionnaire for DSM-IV, *CES-D* Center for Epidemiological Studies of Depression Scale, *MCQ-NBW* Meta-Cognitions Questionnaire, Negative beliefs about worry subscale, *ACS-ANX* Affective Control Scale, Anxiety subscale

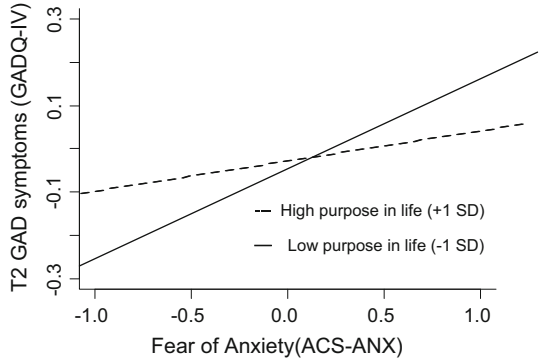
<sup>†</sup>  $p < 0.10$ ; \*  $p < 0.05$ ; \*\*  $p < 0.01$ ; \*\*\*  $p < 0.001$

relationships was low, fear of anxiety did not contribute to increases in generalized anxiety ( $b = 0.048$ ,  $p = 0.476$ ).

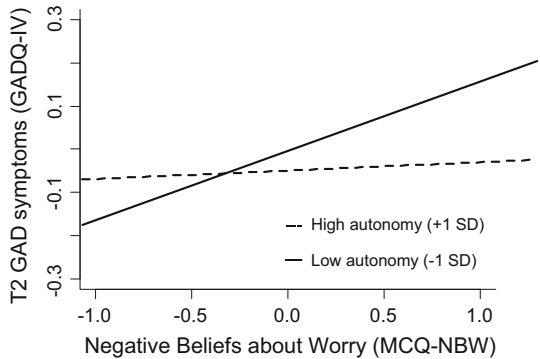
## 7 Discussion

It has been suggested that psychological well-being may be a protective factor in the development of generalized anxiety. However, the moderating effect of PWB on the relationship between cardinal vulnerability and generalized anxiety has yet to be revealed.

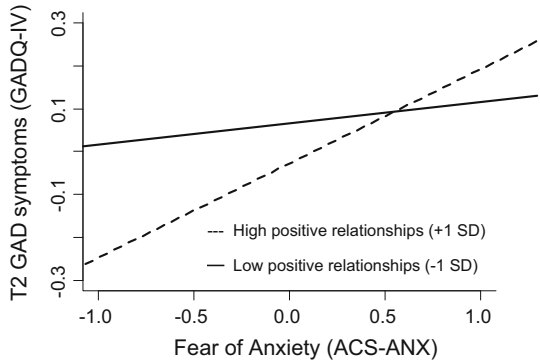
**Fig. 1** The effect of fear of anxiety on change in generalized anxiety at high and low levels of the purpose in life dimension of psychological well-being. *GADQ-IV* Generalized Anxiety Disorder Questionnaire for DSM-IV, *ACS-ANX* Affective Control Scale, Anxiety subscale



**Fig. 2** The effect of negative beliefs about worry on change in generalized anxiety at high and low levels of the autonomy dimension of psychological well-being. *GADQ-IV* Generalized Anxiety Disorder Questionnaire for DSM-IV, *MCQ-NBW* Meta-Cognitions Questionnaire, Negative beliefs about worry subscale



**Fig. 3** The effect of fear of anxiety on change in generalized anxiety at high and low levels of the positive relationships dimension of psychological well-being. *GADQ-IV* Generalized Anxiety Disorder Questionnaire for DSM-IV, *ACS-ANX* Affective Control Scale, Anxiety subscale



The present study shows that purpose in life and autonomy, which are sub-dimensions of PWB, moderate the relationship between cognitive vulnerabilities and change in generalized anxiety. These results support our hypothesis that PWB may be a key protective factor against the development of generalized anxiety disorder. Contrary to our hypothesis, a higher level of positive relationships with others at baseline facilitated a positive relationship between fear of anxiety and generalized anxiety symptoms.

## 7.1 The Role of Purpose in Life

This study revealed that the purpose in life dimension of psychological well-being moderated the relationship between fear of anxiety and increased generalized anxiety. While a significant positive relationship between fear of anxiety and increased generalized anxiety was observed for a low level of purpose in life, the same was not true for the high level of the dimension. This result suggests that purpose in life may buffer the negative effect of fear of anxiety on generalized anxiety. According to Roemer et al. (2005) and Mennin et al. (2002), the perception of anxiety as threatening and uncontrollable may facilitate the selection of behavior to avoid or minimize the anxiety response, which actually sustains and increases anxiety. On the other hand, it is suggested that a clear purpose in life may facilitate the selection of goal-consistent behavior, which then suppresses goal-incongruent behavior (McKnight and Kashdan 2009). Bronk et al. (2009) has found that having identified a purpose is positively-related with life satisfaction among various age groups; notably, searching for a purpose is especially positively-related with life satisfaction among adolescent and young adult groups. The acceptance-based model of GAD suggests that commitment to goal-consistent behavior may suppress the relationship between negative appraisal for uncomfortable internal states, such as anxiety and GAD (Roemer et al. 2005). Räsänen et al. (2016) conducted RCT to examine the efficacy of an online guided intervention program for university students based on acceptance and commitment therapy; researchers especially focused on clarifying and revealing their participants' purpose in life. The results revealed that the enhancing purpose in life intervention is effective in promoting well-being, and reducing psychological distress in RCT. These findings support that the role of purpose in life buffers the relationship between fear of anxiety and generalized anxiety.

## 7.2 The Role of Autonomy

This study also revealed that the autonomy dimension of psychological well-being moderated the relationship between negative beliefs about worry and increased generalized anxiety. While a significant positive relationship between negative beliefs about worry and increased generalized anxiety was observed for low level of purpose in life, the same was not true for the high level of the dimension. This result suggested that autonomy might buffer the negative effect of negative beliefs about worry on generalized anxiety. Based on the meta-cognitive model of GAD (Wells 2006), negative beliefs about worry facilitated a rigid coping strategy focused on regulating worry (e.g., thought suppression). Hallion et al. (2014) demonstrated that these rigid and excessive efforts to control worry exhaust the general cognitive resources needed for adaptive and flexible coping among healthy university student in their experimental study. On the other hand, autonomy reflects freedom from norms and specific cognitive perspectives (Ryan and Deci 2001). Indeed, autonomy has been found to be related to cognitive flexibility and mindfulness, which are psychological constructs involved in a non-persistent cognitive style, in both a university and community sample (Brown and Ryan 2003; Ryan and Deci 2001). People with high autonomy may use cognitive resources voluntarily; therefore, they do not persevere in the regulation of worry, even if they hold negative beliefs about worry.

### 7.3 The Role of Positive Relationships

Although the positive relationships dimension of PWB moderated the relationship between fear of anxiety and change in generalized anxiety, the pattern of the interaction was in the opposite direction of our prediction. Interpersonal problems such as marital conflict and dissatisfaction have been found in patients with GAD (McLeod 1994; Whisman et al. 2000). In addition, individuals with GAD tend to have few friends (Whisman et al. 2000). These findings suggest that poor interpersonal relationships contribute to the development and maintenance of generalized anxiety. Consistent with these previous findings, simple slope analysis revealed that the intercept of T2 generalized anxiety was higher when the level of positive relationships was low, than when it was high. This suggests that people with worse interpersonal relationships tend to be prone to more generalized anxiety. Interestingly, fear of anxiety was related to increased generalized anxiety when the positive relationships dimension of PWB was “high” in the present study. It has been revealed that positive interpersonal relationship, such as social support, is generally positively related to mental health, but also indicated that it is also positively related to anxiety within particular context (Rapee et al. 2015). Rapee et al. (2015) revealed that significant others’s support of anxiety avoidance behavior is positively related to social anxiety. Similarly, in the context of Obsessive Compulsive Disorder, it has been revealed that family or romantic partner accommodation is positively related to impairment from symptom. Further, Cogle et al. (2012) excessive reassurance seeking to others is positively related to generalized anxiety, social anxiety, and obsessive–compulsive symptom among university student. *When fear of anxiety is high, people tend to perceive their anxiety outside their control. Thus fear of anxiety may increase or maintain their anxiety even though they have positive relationship with significant others through negative reinforcement by support of avoidance behavior from significant others.* However, the existence of such mechanism mentioned above is only speculative; further studies are needed to investigate the role of the positive relationships dimension of PWB in the development of GAD.

### 7.4 Clinical Implications

Our findings revealed that the purpose in life and autonomy dimensions of psychological well-being buffered the negative effects of fear of anxiety or negative beliefs about worry on increased generalized anxiety. Considering these buffering effects, interventions focused on enhancing these dimensions of psychological well-being may be effective to prevent generalized anxiety among young adults. In well-being therapy, these dimensions are included as the target of intervention (Fava and Tomba 2009); therefore, it may be useful to adapt well-being therapy for primary or secondary preventive purposes. Some cognitive behavior therapies, such as behavioral activation or acceptance and commitment therapy, also include procedures to clarify the client’s purpose in life, to facilitate motivation to select adaptive rather than avoidant behavior. These interventions also include a procedure to promote mindfulness, which has been found to be positively related to autonomy. In well-being therapy, procedures to enhance psychological well-being are based on an intensive observation of an individual’s daily well-being experience. An intensive observation of one’s internal and external experiences is suggested as a fundamental process of mindfulness. Therefore, mindfulness-based interventions also may be useful in the prevention of GAD. The well-being therapy and mindfulness based



intervention has been shown to be effective for GAD in clinical samples; however, no research has investigated its effects in primary or secondary preventive settings.

Considering the findings that fear of anxiety and generalized anxiety symptoms were positively-related when the positive relationship dimension of PWB was high, the simple strategy to induce social support may be not effective if students have fear of anxiety. It may be useful for those students to assess their motivation behind their interactions with friends or family (e.g., to avoid fear of negative evaluation from others), and to modify their communication patterns based on their value.

## 7.5 Limitations

Beyond these considerations, some limitations should be considered when interpreting the results of this study. First, some degree of sample selection bias may have existed in the present analysis because participants were recruited from only one university. The sample characteristics also limit the generalizability of our findings to a wider population. Furthermore, it has been suggested that there are age and cultural differences in psychological well-being; therefore, the buffering effect of psychological well-being may also vary across age or culture. Third, although our findings are based on a prospective cohort design, the inference of causality was limited because we did not control unmeasured confounding and did not confirm reverse relationships between cognitive vulnerabilities and generalized anxiety. Further studies are needed to clarify causality, including analysis of potential confounders such as depression or other psychological vulnerabilities. Fourth, the items of PWB measure in this study are not perfectly equivalent to Ryff's PWB scale. To discuss the cross-cultural transparency of this finding, further research are needed to confirm the comparability between Ryff's PWB scale and Nishida's PWB scale. Finally, all measures used in the present study were self-reported questionnaires; thus, our findings may be biased. Further studies are needed to confirm our findings with assessment methods used to minimize recall bias, such as structured interviews or experience sampling methods.

## 7.6 Conclusion

This is the first study to demonstrate a buffering effect of psychological well-being in the context of the development of generalized anxiety among Japanese undergraduates. Our findings contribute to advancing knowledge about the clinical preventive role of psychological well-being and provide a basis on which to develop prevention strategies for GAD.

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