The Chinese version of Post-traumatic Growth and Depreciation Inventory – Expanded version (PTGDI-X) for cancer survivors

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Abstract

Many patients with cancer report positive changes often refer to as posttraumatic growth (PTG). Some of these self-reported PTG may represent maladaptive illusions created by individuals to cope with the illness. A recently established Post-traumatic Growth and Depreciation Inventory – Expanded version (PTGDI-X) includes both PTG and post-traumatic depreciation (PTD) items. This inventory may provide a more balanced picture on the phenomenological world of cancer survivors. We examined the Chinese version of the PTGDI-X's applicability to cancer patients, and examine how PTG and PTD were related to posttraumatic stress symptoms. Two hundred sixty-five cancer survivors in Taiwan completed the Chinese version of the PTGDI-X, along with the PTSD Checklist for the DSM-5 to measure post-traumatic stress disorder (PTSD) symptoms. Confirmatory factor analysis showed that the factor structure of the PTGDI-X established in a multi-national study fit our data from cancer patients modestly well. The PTD score had a significant and positive correlation with PTSD symptoms, whereas the PTG and PTSD showed a significant curvilinear relationship in the form of an inverted U-shape. This study's results indicate that PTG and PTD are separated constructs with differential relationships with cancer outcomes.

The Chinese version of the PTGDI-X is a viable instrument for psycho-oncological research. The PTD scores can provide useful information to guide cognitive interventions to reduce distorted cognitions. In contrast, the PTG scores can provide further information on the phenomenological world of cancer survivors. In this study, clinical implications and future studies were considered.

1. Introduction

Many cancer patients and survivors report positive psychological changes after their diagnosis and treatment (Cordova, Cunningham, Carlson, & Andrykowski, 2001; Stanton, Bower, & Low, 2006). This phenomenon is known as post-traumatic growth (PTG) (Tedeschi & Calhoun, 1995, 2004) or stress-related growth (Park, 1998; Park & Fenster, 2004) in psychological literature. The PTG phenomenon affirms that psychopathology is not the only outcome of cancer diagnosis and treatment (Samuel M.Y. Ho, 2016). On the other hand, many researchers have proposed that self-reported PTG may be defensive self-enhancing cognitive biases to temporarily cope with distress rather than an indicator of genuine positive changes (Wortman, 2004). To support this hypothesis, Maercker and Zoellner (2004) suggested a two-component Janus face model of PTG, comprising a constructive and an illusory component. The constructive component represents a genuine and adaptive transformation of a cognitive schema. The illusory component represents a coping mechanism to maintain psychological equilibrium after a highly stressful event such as diagnosis of cancer (Affleck & Tennen, 1996). In a seven-year longitudinal study on a group of breast cancer survivors in Taiwan conducted between 2009 and 2016, the latent class growth analysis revealed both illusory and constructive growth patterns (C.-T. Cheng, Ho, Hou, Lai, & Wang, 2018). The researchers then conducted a follow-up study on the 10th anniversary of the project (C.-T. Cheng, Wang, & Ho, 2020). They reported that individuals in the illusory growth group, compared to those in the constructive PTG group, exhibited higher depression and anxiety levels in 2019 than they did in 2016. Supporting the above findings, a most recent study also reported a two-class model of long-term anxiety trajectory among breast cancer survivors, with a resistant group (85.2%) and a distress group (14.8%) (C.-T. Cheng, Ho, Lai, Zhang, & Wang, 2021).

Another issue related to PTG is that all common instruments used to measure PTG, such as the Stress-Related Growth Scale (SRGS) (Park, Cohen, & Murch, 1996) and the Posttraumatic Growth Inventory (PTGI) (Tedeschi & Calhoun, 1996), only contain items related to growth. Therefore, the respondents focus more on the positive outcomes of their traumatic experience, which consequentially may increase the self-enhancing biases related to the illusory growth. Baker, Kelly, Calhoun, Cann, and Tedeschi (2008) attempted to address the issue by developing a Paired-Format Posttraumatic Growth Inventory (PTGI-42) that contains both positive and negative post-traumatic change items in a single instrument. The PTGI-42 is based on the original 21-item PTGI (Tedeschi & Calhoun, 1996), with an addition of 21 matched but negatively worded items to represent the negative changes, referred to as depreciation (in contrast to growth). For example, "I am more likely to try to change things that need changing (a growth item)" versus "I am less likely to try to change things that need changing (a depreciation item)." The growth and depreciation items are presented in pairs to encourage the participants to consider both types of change, growth and depreciation, at the same time (Cann, Calhoun, Tedeschi, & Solomon, 2010). It has been showed reported that putting the growth and depreciation items in the same domain in pairs did not create difficulties in responding for the participants, and indicated that PTG and PTD are separate constructs and independently influence psychological outcomes after a traumatic encounter (Baker et al., 2008; Cann et al., 2010). Taku et al. (2020) recently conducted an international study to examine the factor structure of the expanded version of the PTGI-42 in 10 countries (Australia, n = 2261; Germany, n = 202; Italy, n = 321; Japan, n = 130; Nepali, n = 196; Peru, n = 201; Poland, n = 287; Portugal, n = 181; Turkey, n = 169; and the USA, n = 214), which is called the Posttraumatic Growth and Depreciation Inventory – Expanded version (PTGDI-X). The inventory was based on the PTGI-42 with four additional spiritual–existential change (SEC) items developed by Tedeschi and colleagues (Tedeschi, Cann, Taku, Senol-Durak, & Calhoun, 2017). The resulting PTGDI-X has 25 items related to PTG and another 25 parallel items related to PTD. The PTG and PTD items of the same life domains were presented in pairs. The PTGDI-X was translated into the language of each country. A heterogenous sample was obtained in this study, in which most countries included undergraduate students, whereas the other countries included a community sample and emergency workers (e.g., firefighters). Most countries collected data online, whereas the paper-and-pencil survey was adopted by some (e.g., Japan and Nepali). The confirmatory factor analysis demonstrated that a standard factor structure

based on the theoretical model of the original PTGI (Tedeschi & Calhoun, 1996) fitted the data modestly well. In relation to the two previous studies on PTGI-42 (Baker et al., 2008; Cann et al., 2010), higher scores were observed in PTG than in PTD in all countries (Taku et al., 2020). Moreover, PTD had a positive correlation with PTSD symptoms in all countries, but the relationship between the PTG and PTSD symptoms was inconsistent across countries, with no correlations reported in the 5 countries, and the remaining 5 countries showed curvilinear correlations (Taku et al., 2020).

The psychometric properties of the Chinese version of the PTGI was first reported in 2004 in research on cancer patients in Hong Kong (Samuel M.Y. Ho, Chan, & Ho, 2004). Over the past 16 years, the inventory was validated among cancer survivors in Taiwan (Samuel M.Y. Ho et al., 2013) as well as patients with other types of chronic illnesses in Hong Kong (C. H. K. Cheng, Ho, & Rochelle, 2017). With the establishment of the PTGDI-X across cultures, it is necessary to examine the psychometric properties of the Chinese version of PTGDI-X to facilitate the clinical judgment and research in Chinese speaking communities. Furthermore, this study aims to examine the applicability and psychometric properties of the PTGDI-X among Chinese cancer survivors. Specifically, the goodness-of-fit of the factor structure proposed by Taku et al. (2020) will be examined in a sample of Chinese cancer survivors. This approach could facilitate the comparisons of the research findings across countries in future. Furthermore, the relationships between PTG and PTD as well as the relationship of each of them to PTSD symptoms among cancer patients will be investigated.

2. Methods

2.1. Participants and Procedures

The Research Ethical Committee of the Koo Foundation Sun Yat-Sen Cancer Center in Taiwan approved this study (reference number: 20191029A). In early 2020, 265 patients who had completed their cancer treatment at the center were recruited to participate in the study after informed consent. There were 58 men (21.9%) and 207 (78.1%) women. The mean age of the respondents was 51.02 years (SD = 10.33 years, range: 23.0–78.0 years). The duration of onset ranged from 0 to 19 years, with a mean of 3.70 years (SD = 3.94 years). Nearly half of the participants had breast cancer (n = 122, 46%) followed by colorectal cancer (n = 40, 15.1%), lymphoma/leukemia (n = 33, 12.5%), lung and esophageal cancer (n = 24, 9.1%), head and neck cancer (n = 16, 6.0%), gynecologic cancer (n = 8, 3.0%), URO/kidney cancer (n = 6, 2.3%), and other types of cancer (each less than 2%).

2.2. Measures

The *Posttraumatic Growth and Posttraumatic Depreciation Inventory - Expanded version (PTGDI-X)* was used by Taku et al. (2020) in their international study (re Introduction). The participants indicated the degree to which they did or did not experience a particular change from 0 to 5, with separate scores calculated for PTG and PTD. Moreover, higher scores indicate greater growth or depreciation. It was showed that PTG and PTD consisted of 5 domains similar to the original PTGI: relating to others (RO, 7 items), new possibilities (NP, 5 items), personal strength (PS, 4 items), spiritual and existential change (SEC, 6 items), and appreciation of life (AL, 3 items)(Taku et al., 2020).

The World Health Organization procedure for the translation and back-translation of instruments was applied to develop the Chinese version of the PTGDI-X (World Health Organization, 2011). A clinical psychologist in Taiwan with more than ten years of clinical experience with cancer patients conducted a forward traditional Chinese translation of the English version of the PTGDI-X. A research assistant with a psychology degree conducted the back-translation. Triangulation meetings were conducted with an expert panel, including the clinical psychologist in Taiwan who did the forward translation, a psychiatrist who specialized in psycho-oncology in Taiwan, and a clinical psychology professor in Hong Kong. The English and Chinese versions of the PTGDI-X are provided in the Appendix.

The *Chinese version of the PTSD Checklist for DSM-5 (PCL-5)*(Fung, Chan, Lee, & Ross, 2019) was used to measure symptoms of post-traumatic stress disorder. The PCL-5 has 20 items, and the participants indicated how much they had been bothered by each symptom using a 5-point Likert scale from 0 to 4. The Cronbach's alpha of the PCL-5, according to the current sample, was .96.

Personal and medical data were retrieved from the hospital record.

2.3. Statistical Analysis

The Analysis of Moment Structures (AMOS) version 26 was used to perform the confirmatory factor analysis with a maximum likelihood optimization to examine the model established by Taku et al. (2020). We adopted a set of fit indices to evaluate the model and compared them with the results of Taku et al. (2020). χ^2/df less than 3 was employed to determine a good fit (Carmines & Mclver, 1981; Kline, 1998) since the null hypothesis of χ^2 test is often rejected with $p < 0.05$ for large samples (Marsh, Balla, & McDonald, 1988). The comparative fit index (CFI) (Bentler, 1990) and Tucker–Lewis index (TLI)(Bentler & Bonett, 1980; Bollen, 1989) ranged from 0 to 1. Their values above 0.9 demonstrate a good fit. The root mean square error of approximation (RMSEA)(Browne & Cudeck, 1992) was the discrepancy between the data and model per degree of freedom. We adopted the criteria in which a value lower than .08 is considered a mediocre fit and less than .05 a good fit (Hu & Bentler, 1999). Moreover, the Akaike information criterion (AIC) (Akaike, 1980; Byrne, 2001) was also used for comparing the non-nested models,

whereas $\Delta\chi^2$ and Δdf were used to compare the nested models. The goodness-of-fit index (GFI) and adjusted GFI (AGFI) (Jöreskog & Sörbom, 1982) were also reported in the current study but were not adopted as the main evaluation indices according to the guidelines suggested by some researchers (Hooper, Coughlan, & Mullen, 2007). Multivariate analyses including regression analysis were used to examine the relationships among variables.

3. Results

3.1 Confirmatory Factor Analysis (CFA)

We conducted the CFA to examine the factor structure of the PTGDI-X tested by Taku et al. (2020) in our current sample of Chinese cancer patients. (Table 1)

Table 1
Model fit indices of Taku et al. and Chinese cancer survivors of the present study

df	χ^2	χ^2/df	NFI	TLI	CFI	RMSEA [90%CI]	AIC
Best fitting model in Taku et al.'s study involving 10 nations, n = 2127							
11720	28772.610**	2.46	.677	.768	.778	.026 [.026, .027]	31832.610
Chinese cancer survivors of the Present study, n = 265							
1152	3102.964**	2.69	.743	.808	.820	.079 [.076, .083]	3348.964
Note: ** $p < .01$							
NFI = Normed-fit index; TLI = Tucker–Lewis index; CFI = Comparative fit index; RMSEA = Root mean square error of approximation; AIC = Akaike Information Criterion							

Both PTG and PTD dimensions have five parallel dimensions similar to the original PTGI:

1. PTG- Relating to Others (PTG-RO, 7 items, $\alpha = .88$) and PTD-Relating to Others (PTD-RO, 7 items, $\alpha = .89$) represent positive and negative changes in quality of relationship after the diagnosis of cancer respectively.
2. PTG-New Possibility (PTG-NP, 5 items, $\alpha = .87$) and PTD-New Possibility (PTD-NP, 5 items, $\alpha = .86$) represent more or less effort of finding a new path in life after the diagnosis of cancer respectively.
3. PTG-Personal Strength (PTG-PS, 4 items, $\alpha = .82$) and PTD-Personal Strength (PTD-PS, 4 items, $\alpha = .85$) indicates an increase or a decrease in sense of self-reliance or strength respectively after the diagnosis of cancer respectively.
4. PTG-Spiritual and Existential Changes (PTG-SEC, 6 items, $\alpha = .82$) and PTD-Spiritual and Existential Changes (PTD-SEC, 6 items, $\alpha = .89$) present positive and negative spiritual and existential changes after the diagnosis of cancer respectively.
5. PTG-Appreciation of Life (PTG-AL, 3 items, $\alpha = .74$) and PTD-Appreciation for Life (PTD-AL, 3 items, $\alpha = .74$) indicate an increased or decreased understanding on meaning and priority of life respectively.

PTG-Total and PTD-Total scores were calculated by summing the 25 item scores of the corresponding dimensions to represent the overall growth and depreciation respectively. The Cronbach's reliability alphas of both PTG-Total ($\alpha = .96$) and PTD-Total ($\alpha = .97$) were high.

3.2. Descriptive Statistics

Table 2 shows the mean and standard deviations of the psychological variables by gender. The independent samples t-tests revealed no significant differences between men and women cancer survivors in all variables.

Table 2
Mean (SD) of psychological variables by gender

	Men (n = 58)	Women (n = 207)	Total (n = 265)	t value
	Mean (SD)	Mean (SD)	Mean (SD)	
PTG-Total	77.43 (21.09)	80.74 (21.80)	80.02 (21.65)	-1.03
PTG-RO	21.64 (5.70)	22.34 (6.64)	22.18 (6.44)	- .73
PTG-NP	14.55 (4.93)	15.25 (5.13)	15.10 (5.08)	- .64
PTG-PS	12.95 (3.78)	13.80 (3.81)	16.92 (4.88)	-1.41
PTG-SEC	18.22 (5.54)	18.65 (5.44)	18.56 (5.45)	- .53
PTG-AL	10.07 (2.80)	10.70 (2.73)	10.56 (2.75)	-1.55
PTD-Total	42.40 (22.62)	43.21 (23.55)	43.03 (23.31)	- .23
PTD-RO	12.29 (6.99)	12.38 (6.89)	12.36 (6.90)	- .09
PTD-NP	8.76 (4.75)	8.61 (5.20)	8.64 (5.10)	.20
PTD-PS	6.34 (3.95)	6.73 (4.14)	6.65 (4.10)	- .64
PTD-SEC	9.67 (5.41)	9.95 (5.94)	9.89 (5.82)	- .32
PTD-AL	5.33 (2.87)	5.53 (2.98)	5.49 (2.95)	- .46
PCL-5	19.88 (12.72)	20.81 (15.10)	44.68 (24.34)	- .42
Note: PTG-Total – Posttraumatic Growth - Total score, PTG-RO = Posttraumatic Growth – Relating to Others, PTG-NP = Posttraumatic Growth – New Possibility, PTG-PS = Posttraumatic Growth – Personal Strength, PTG- SEC = Posttraumatic Growth – Spiritual and Existential Changes, PTG-AL = Posttraumatic Growth – Appreciation for Life, PTD-Total – Posttraumatic Depreciation - Total score, PTD-RO = Posttraumatic Depreciation – Relating to Others, PTD-NP = Posttraumatic Depreciation – New Possibility, PTD-PS = Posttraumatic Depreciation – Personal Strength, PTD- SEC = Posttraumatic Depreciation – Spiritual and Existential Changes, PTD-AL = Posttraumatic Depreciation – Appreciation for Life, PCL-5 = Posttraumatic Checklist – 5.				
Paired sample t-tests were conducted to compare the PTG and PTD scores among the participants. All the PTG scores were significantly higher than the PTD scores: PTG-Total versus PTD-Total, $t(264) = 17.86, p < .001$; PTG-RO versus PTD-RO, $t(264) = 15.99, p < .001$; PTG-NP versus PTD-NP, $t(264) = 13.76, p < .001$; PTG-PS versus PTD-PS, $t(264) = 17.97, p < .001$, PTG-SEC versus PTD-SEC, $t(264) = 17.29, p < .001$; PTG-AL versus PTD-AL, $t(264) = 18.93, p < .001$.				

3.3. Correlational analysis

The Pearson product-moment correlational analyses were conducted (Table 3). Both the age and duration of onset did not relate to any of the PTG and PTD scores. PCL-5 positively correlated with PTD-Total and its subscale scores, i.e., higher depreciation resulting from cancer diagnosis was related to more PTSD symptoms. PTG-Personal Strength was negatively related to the PCL-5 score, however, insignificant results were obtained for the other four PTG domain scores.

Table 3
Intercorrelation of variables (n = 265)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Age	1	.11	-.01	-.05	-.08	-.04	.02	-.01	-.11	-.06	-.06	-.08	-.08	-.04	.02
2. Duration of Onset		1	.03	.05	.02	.09	.08	.03	-.01	.01	.06	-.02	-.03	-.01	.07
3. PCL-5			1	-.04	-.00	-.05	-.13*	.04	-.06	.61**	.57**	.56**	.57**	.57**	.61**
4. PTG-Total				1	.95**	.95**	.90**	.92**	.85**	-.13*	-.13*	-.11	-.15*	-.10	-.12
5. PTG-RO					1	.87**	.79**	.85**	.76**	-.08	-.12*	-.04	-.08	-.05	-.07
6. PTG-NP						1	.84**	.82**	.77**	-.13*	-.12	-.13*	-.15*	-.09	-.10
7. PTG-PS							1	.74**	.75**	-.20**	-.14*	-.17**	-.29**	-.17**	-.18**
8. PTG-SEC								1	.75**	-.08	-.10	-.05	-.08	-.05	-.07
9. PTG-AL									1	-.16**	-.14*	-.15*	-.15*	-.15*	-.17**
10. PTD-Total										1	.95**	.94**	.93**	.96**	.89**
11. PTD-RO											1	.85**	.84**	.87**	.80**
12. PTD-NP												1	.83**	.88**	.81**
13. PTD-PS													1	.86**	.80**
14. PTD-SEC														1	.83**
15. PTD-AL															1
Note: * $p < .05$, ** $p < .03$															
PTG-Total – Posttraumatic Growth - Total score, PTG-RO = Posttraumatic Growth – Relating to Others, PTG-NP = Posttraumatic Growth – New Possibility, PTG-PS = Posttraumatic Growth – Personal Strength, PTG- SEC = Posttraumatic Growth – Spiritual and Existential Changes, PTG-AL = Posttraumatic Growth – Appreciation for Life, PTD-Total – Posttraumatic Depreciation - Total score, PTD-RO = Posttraumatic Depreciation – Relating to Others, PTD-NP = Posttraumatic Depreciation – New Possibility, PTD-PS = Posttraumatic Depreciation – Personal Strength, PTD- SEC = Posttraumatic Depreciation – Spiritual and Existential Changes, PTD-AL = Posttraumatic Depreciation – Appreciation for Life, PCL-5 = Posttraumatic Checklist – 5.															

3.4. Curvilinear Relationship

Two regression analyses were performed to examine the curvilinear relationships between PCL-5 and PTG-Total as well as between PCL-5 and PTD-Total, respectively. In both analyses, PCL-5 was the dependent variable. In Step 1, PTG-Total or PTD-Total was entered, whereas in Step 2, the PTG-Total squared or PTD-Total squared was entered. Based on the results, a significant quadratic relationship was observed between PTG-Total and the PCL-5 scores: Step 1, $F(1,255) = .271$, $p = .60$; Step 2, $F(2, 254) = 7.02$, $p < .001$, $\Delta R^2 = .05$, F Change = 13.75, $p < .001$. This curvilinear relationship is in the form of an inverted U-shape, as depicted in Fig. 1.

As expected, the quadratic relationship between PTD-Total and the PCL-5 scores was not significant: Step 1, $F(1,255) = 149.67$, $p < .000$; Step 2, $F(2, 254) = 76.01$, $p < .001$, $\Delta R^2 = .01$, F Change = 1.85, $p = .18$.

Finally, a significant inverted U-shape quadratic relationship was obtained between PTG-Total and the PTD-Total scores: Step 1, $F(1,263) = 4.04$, $p < .05$; Step 2, $F(2, 262) = 42.48$, $p < .001$, $\Delta R^2 = .25$, F Change = 79.72, $p < .001$.

4. Discussion

4.1. Factorial equivalence of the PTGDI-X among cultures and types of traumatic events

In the current study, we compared our fit indices with the findings of Taku et al. (2020) to examine whether the standard scoring method of the PTGDI-X could be applied to Chinese cancer survivors. It should be considered that Taku et al. (2020) used a heterogeneous sample (mainly consisting of undergraduate students) and a variety of data collection methods (online surveys and paper-and-pencil surveys) in their study. In contrast, this study involved only cancer survivors and used face-to-face paper-and-pencil surveys in an outpatient clinic. Despite the differences, Table 2 shows that the NFI, TLI, and CFI in this study had higher values than those of Taku et al. (2020), although such values in our study were below the traditional cutoff criterion of .9 (re Table 1). The RMSEA value (.079) in this study was higher (hence poorer) than that of Taku et al. (2020) (.026) but still below the cutoff value of .08 for a moderate fit (MacCallum, Browne, & Sugawara, 1996). The value of χ^2/df in this study was less than the acceptable value of 3 and indicated a good fit (Carmines & Mclver, 1981; Kline, 1998). Both the GFI (.69) and AGFI (.66) in this study were not satisfactory but the same issues applied to those of Taku et al. (2020). Moreover, GFI and AGFI have become less popular in recent years, and some researchers suggested not to use them anymore (Hooper et al., 2007; Sharma, Mukherjee, Kumar, & Dillon, 2005). Nevertheless, the reliability alphas of all the PTGDI-X scores were very good in this study. We concluded that our model fit indices were comparable to those of Taku et al.'s (2020) and the same scoring method used in Taku et al.'s (2020) study could be applicable to the Chinese version of the PTGDI-X. Our findings suggested the PTGDI-X might show factorial equivalence among different types of trauma and data collection methods (online, paper-and-pencil, etc.). However, more studies are needed to confirm this.

4.2. PTG and PTD among cancer survivors

In corroboration with the results of other studies (Baker et al., 2008; Cann et al., 2010; Taku et al., 2020), all the PTG scores were significantly higher than the PTD scores in our sample of cancer survivors. This result could imply that all the PTG items were presented before the paired PTD items in the PTGDI-X, and this made the respondents focus more on the positive than negative changes. However, Baker et al. (2008) reported that the ordering effect of the PTG and PTD items did not affect the responses of the inventory. It should, however, be noted that our participants are cancer survivors. The current results may not apply to cancer patients in early diagnosis or during active treatment. It would be interesting important to determine whether the relative degree of PTG and PTD would fluctuate during the different stages of cancer treatment.

A significant positive correlation was observed between the PTD total scores and PTSD symptoms. This finding is consistent with the cognitive model that negative (and distorted) appraisals are always related to higher distress among cancer patients (Moorey & Greer, 2012). PTG did not show a significant linear relationship with PTSD symptoms in this study ($r^2 = .00$). Other studies on cancer patients have also reported similar results (Chan, Ho, Tedeschi, & Leung, 2011; Cordova et al., 2001; Koutrouli, Anagnostopoulos, & Potamianos, 2012). Furthermore, this study's results indicated that PTG showed a curvilinear relationship with PTSD in the form of an inverted U-shape (Kleim & Ehlers, 2009). The same curvilinear relationship occurred in a previous meta-analysis of 42 studies (Shakespeare-Finch & Lurie-Beck, 2013). The above findings support the concurrent validity of the Chinese version of the PTGDI-X. Accordingly, only beyond certain threshold of PTG that more self-perceived positive change will lead to less posttraumatic stress symptoms.

Similar to the result of five countries in the study of Taku et al. (2020), PTD and PTG formed a strong inverted U-shape quadratic relationship, i.e. only among cancer survivors with high level of PTG that more self-perceived positive change will lead to less post-cancer depreciation appraisal.

4.3. Limitations

This study has several limitations that should be considered. First, the ranges of the duration of onset and age were large in our sample. Survivors with different types of cancer were included, and there were more women than men in our sample. We could not ascertain that the current results are replicable for future studies with more homogeneous samples of cancer patients. Second, two written forms of Chinese characters, often referred to as traditional Chinese and simplified Chinese, are used in the translation of instruments. The former is used in some communities such as Taiwan and Hong Kong, whereas the latter is used in other places like Mainland China. The Chinese version of the PTGDI-X used in this study is set in traditional Chinese characters. We are confident that this inventory is applicable to patients in Taiwan and Hong Kong. Some modifications may be necessary for the inventory to be used in places using simplified Chinese. Furthermore, the sample size of this study was not enough for both exploratory and confirmatory factor analyses. It would be better to use an etic-emic approach (Samuel M.Y. Ho & Cheung, 2007) to develop a scoring system of the PTGDI-X with universal and culture-/trauma-specific components in future international studies.

4.4. Clinical Implications

PTG and PTD are related but separate constructs that exert differential effects on the mental adjustment to cancer. Because of the robust relationships between PTD (and its five domains) and mental adjustment to cancer, the PTD scores could provide important information that is useful in cognitive therapy (CT) to reduce psychopathology (Moorey & Greer, 2012). The PTG scores provide a more comprehensive picture of the phenomenological world of the patients to guide other modalities of intervention, such as supportive-expressive therapy (SET) (Samuel M.Y.

Ho, Saltel, Machavoine, Rapoport-Hubschman, & Spiegel, 2004). Both CT and SET are evidence-based interventions in psycho-oncology (Samuel M. Y. Ho, 2017). The two scores together might potentially provide useful information to distinguish cognitively biased sense of growth from constructive PTG.

4.5. Conclusion

In conclusion, cancer survivors report no difficulty in rating both the growth and depreciation items in pairs. The PTGDI-X is a potentially useful instrument to gauge into a balanced phenomenological world of individuals with cancer. The Chinese version of the PTGDI-X, when applied to cancer survivors, has shown factorial equivalence to other language versions of the inventory. The same scoring method proposed by Taku et al. (2020) could be used to facilitate the comparison of the findings. However, some goodness-of-fit issues should be investigated further. We recommended that the total PTG and PTD scores should be used for clinical assessment and research investigation as far as possible.

Declarations

This is an unfunded project.

All authors declare that they have no conflict of interest.

The Research Ethical Committee of the Koo Foundation Sun Yat-Sen Cancer Center in Taiwan approved this study (reference number: 20191029A).

Written informed consent was obtained from all participants.

All authors agree to this publication.

Authors have full control of all primary data and allow the journal to review the data.

Code availability: N/A

Authors' contributions: Prof. Samuel M.Y. Ho conducted data analysis and wrote the manuscript; Dr. Chih-tao Cheng supervised data collection; Mr. Shih-ming Shih translated the English version of PTGDI-X into Chinese and coordinate the back-translation of the questionnaire; Dr. Kanako Taku shared the English version of PTGDI-X, shared her experience in conducting the international validation study and gave comments to the manuscript; and Prof Richard G. Tedeschi gave consent to translate the English version of the PTGDI-X into Chinese and provided guidance on the conceptualization of the manuscript.

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Figures

Figure 1

Level of PTSD as a function of posttraumatic growth. Note: PTG-Total = Posttraumatic Growth – Total Score; PCL-5 = PTSD Checklist – 5 score

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