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Rumination, post-traumatic growth, and distress: structural equation modelling with cancer survivors. Psycho-Oncology

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Title: Rumination, posttraumatic growth, and distress: Structural equation modelling with cancer survivors

Running Title: Rumination, posttraumatic growth, and distress SEM

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Abstract

Objective: Theoretical models of posttraumatic growth (PTG) have been derived in the general trauma literature to describe the post-trauma experience that facilitates the perception of positive life changes. To develop a statistical model identifying factors that are associated with PTG, structural equation modelling (SEM) was used in the current study to assess the relationships between perception of diagnosis severity, rumination, social support, distress, and PTG. Method: A statistical model of PTG was tested in a sample of participants diagnosed with a variety of cancers ($N = 313$). Results: An initial principal components analysis of the measure used to assess rumination revealed three components: intrusive rumination, deliberate rumination of benefits, and life purpose rumination. SEM results indicated that the model fit the data well and that 30% of the variance in PTG was explained by the variables. Deliberately ruminating on benefits and social support were directly related to PTG. Ruminating on life purpose and intrusive rumination were associated with distress. Conclusions: The model showed that in addition to having unique correlating factors, distress was not related to PTG; thereby providing support for the notion that these are discrete constructs in the post-diagnosis experience. The statistical model provides support that the post-diagnosis experience is simultaneously shaped by the positive and negative life changes and that one or the other outcome may be prevalent or may occur concurrently. As such, an implication for practice is the need for supportive care that is holistic in nature.

KEYWORDS: Oncology, Cancer, Rumination, Posttraumatic Growth, Distress
Studies investigating post-trauma outcomes have shown that in addition to posttraumatic stress symptoms, the occurrence of positive outcomes is also prevalent [1]. Posttraumatic growth (PTG) describes the perception of positive life change occurring after struggling with a traumatic experience [2]. PTG is not an automatic post-trauma outcome and a number of factors influence whether positive life changes are perceived. A diagnosis, subsequent treatment, and potential for recurrence creates a shifting nature of stressors, making cancer survivors a unique population to investigate in terms of post-trauma outcomes and identifying the ways in which to provide supportive care [3]. Stanton and Revenson [4] indicate a number of reasons to investigate positive psychological adjustment to cancer, including the erroneous assumption that all cancer survivors experience long-term adverse outcomes and that positive adjustment is an absence of psychopathology. They further posit that positive and negative outcomes after being diagnosed with cancer can co-exist [4].

Calhoun and Tedeschi’s [2] model of PTG encapsulates the post-trauma process that can lead to positive life change and incorporates elements such as event severity, rumination, and social support. The foundation of the PTG model [2] encompasses Janoff-Bulman’s [5] work regarding traumatic events having a seismic nature, which can act as a catalyst for automatic and intrusive rumination. It is through this cognitive processing that existing schemas may become redundant in light of current events [2]. The sociocultural context can shape the appraisal of the event, act as a support, and potentially influence rumination and emotional expression [2]. The model shows that intrusive rumination regarding the traumatic event shifts and becomes more deliberate, contributing to the development of new schemas and life narrative, and acting as a potential catalyst for PTG and gaining general life wisdom [2]. This model is analogous with Folkman’s [6] cognitive theory of stress and coping, highlighting that deliberate rumination occurs through assessing resources and coping
strategies, and allows the individual to integrate the traumatic event and establish new meaning.

*Empirical Testing of PTG Model Components*

*Trauma Severity.* Subjective appraisal of cancer severity may be more important in predicting PTG than objective measures such as stage of disease [1; 7]. For example, Cordova et al. [1] found a positive relationship between subjective rating of diagnosis severity and PTG, while no relationship was evident between medical measures of disease severity and PTG. Using a longitudinal design, Widows et al. [7] also showed that bone marrow transplant recipients’ subjective perception of mortality risk was associated with PTG, whereas medical prognosis ratings were not. These studies are congruent with the PTG model, highlighting that if the diagnosis is not initially appraised as severe, regardless of objective assessments of disease severity, the individual is not motivated to reassess their life and make positive changes [2].

*Rumination.* Excessive rumination has traditionally been linked to increased distress, depression, and anxiety [e.g., 8; 9]. PTG research with cancer survivors has tended to assess rumination as intrusion, represented by a component of a PTSD measure [e.g., 1; 10]. However, recent studies indicate an importance in distinguishing between different styles and timing of rumination, and the impact this may have on post-trauma outcomes. For example, *reflection* is an active engagement of problem solving that decreases depression; whereas, *brooding* is a passive contemplation of expectations or goals that are not being achieved and is associated with depression [11]. A study with bereaved participants showed that deliberate rumination occurring soon after the death was related to PTG, while more recent intrusive rumination about the event was related to distress [12]. Results imply that continued rumination is indicative of distress as it signifies that the individual continues to struggle [12]. Based on previous research, the current study has used a measure of rumination
assessing levels and timing of cognitive processing since cancer diagnosis. This measure explores both intrusive and deliberate rumination, and whether this rumination involved trying to make sense of the cancer or perceiving benefits. Exploratory analyses will be conducted to assess the structure of this measure that is salient for cancer survivors.

**Social Support.** Social support is an important factor for reducing distress and predicting well-being in cancer survivors [13; 14]. **Instrumental social support can provide tangible assistance during a time when normal routine is in disarray and emotional social support can promote the expression of, and processing of, the variety of emotions experienced after being diagnosed with a life-threatening illness [13].** Social support may also assist in cognitively processing the cancer experience. For example, a study of men with prostate cancer showed that improved mental functioning was related to perceived levels of social support [15]. Research points to the importance of the perception of social resources in providing benefits post-trauma, rather than the utilisation of such resources [13]. Positive associations between PTG and support have been found in studies with cancer survivors, with support seeking behaviour [16] and a perception of received social support [17] being related to PTG. In contrast, satisfaction with support [18] has shown no relationship with PTG; hence it is important to be specific when operationalising social support [2]. The current study operationalises social support to be a perception of emotional and instrumental support seeking behaviour after the diagnosis of cancer.

**Distress.** The presence of PTG does not negate ongoing distress and the management of distress is indicated in the PTG model [2]. However, research specific to cancer survivors has shown mixed results when investigating the association between distress and PTG, with no relationship [e.g., 1; 18], a positive linear relationship [e.g., 19], a negative linear relationship [e.g., 20], and a curvilinear relationship between distress and PTG being proposed [21]. Variation in results can partly be attributed to the conceptualisation and measurement of
distress, with differing methodologies, cancer types, composite measures of distress and adjustment, and timing of post-diagnosis assessment contributing to diversity. For example, studies have utilised the Impact of Events Scale [22] or the revised version of this scale [23], negative coping styles, negative affect, anxiety or depression to indicate distress. In psycho-oncology research there appears to be an overall trend for PTG to be unrelated to PTSD symptoms, depression, and anxiety [1; 7; 16], highlighting that PTG and distress are discrete elements of the post-diagnosis experience.

**Rationale and aims.** The previous study reporting the design of the Rumination Inventory [24] focused on timing of rumination, rather than type, and has not been subject to rigorous statistical analysis. As previous research indicates different aspects of rumination may influence PTG (e.g., content and timing), the current study will initially conduct a principal components analysis (PCA) on the Rumination Inventory. These components will then be analysed via structural equation modelling (SEM) to test elements of the PTG model [2].

Based on previous research and the PTG model [2], participants ratings of diagnosis severity, seeking social support, distress, and PTG will be included in the SEM, in addition to the components of rumination elicited from the PCA. It is hypothesised that trauma severity will be positively and directly related to social support, distress, and growth; while increased social support seeking behaviour will be directly associated with higher levels of rumination and PTG. As the overall trend appears to be a lack of relationship between distress, as represented by PTSD symptoms, and PTG, it is anticipated that a relationship between cancer-related distress and PTG will not be evident. However, as a curvilinear relationship between distress and PTG has been found in a previous study [21], this will be examined prior to inputting these variables into the SEM. It is predicted that rumination will be directly
related to both distress and PTG; however, direction of these relationships cannot be hypothesised prior to conducting a PCA of the Rumination Inventory.

Method

Participants

A survey package was mailed to every person treated for cancer in 2003 and 2004 at a regional hospital in Australia with 335 participants returning completed surveys. As 22 participants had systematic or missing data and the sample size was sufficiently large, cases that had a missing subscale or measure totals were deleted [25], resulting in a sample size of 313. Inspection of the data indicated no difference in means and frequencies of demographic data between the 335 responders and the final sample. Participants (137 male, 176 female) had a mean age of 62.41 years (SD = 12.06), were predominantly married (76%) and identified as Caucasian-Australian (90%). The range for time since diagnosis was 1.5 to 4 years (M = 2.92, SD = 1.86). Seventy percent of the sample considered themselves to be cancer-free at time of assessment.

The most frequently occurring diagnoses were breast (35%), prostate (16%), haematological (15%), and colorectal (10%) cancers. Survey return rates per cancer diagnostic group were generally comparable to rates of diagnosis at this hospital for these cancer diagnostic groups (28%, 14%, 10%, and 11% respectively). The only different group were patients with lung cancer who had a much higher rate of diagnosis (19%) than surveys returned (4%); perhaps indicative of the high incidence of mortality [26].

Materials

Participant’s perception of diagnosis severity was assessed via a 5-point Likert scale ranging from 1 (not at all traumatic) to 5 (severely traumatic). Standardised inventories included the Posttraumatic Growth Inventory (PTGI) [27] to obtain an overall assessment of post-diagnosis positive life changes. Participants answered on a six-point Likert scale (0 =
not at all to 5 = very great degree) indicating the degree to which each statement had occurred in their life post-diagnosis. Previous research has utilised total scores of the PTGI as an indication of a global measure of PTG, and found strong internal reliability in research with cancer survivors [e.g., 1], which was also shown in the current study (α = .94).

Impact of Event Scale – Revised (IES-R) [23] items are responded to on a five-point Likert scale (0 = not at all to 4 = extremely). Studies with cancer survivors have utilised total IES-R scores to indicate participant’s overall distress [e.g., 28] and robust reliabilities for the IES-R are consistently found in psycho-oncology [16], including in the current study (α = .94).

The emotional and instrumental social support subscales of the COPE Inventory [29] were used to represent a latent variable of seeking social support behaviour in the SEM. Items were answered on a four-point Likert scale (1 = I haven’t been doing this at all to 4 = I’ve been doing this a lot). The inventory is widely used in psycho-oncology, with studies showing acceptable to strong internal consistency for COPE subscales [e.g., 10; 16]. The current study elicited an alpha coefficient of .86 for the combined emotional and instrumental social support subscales of the COPE. The Rumination Inventory (RI) [24; A. Cann, personal communication, August 22, 2008] assessed rumination that may occur after a traumatic event with 14-items requiring a response on a four-point Likert scale (1 = not at all to 4 = often). The RI theoretically distinguishes between rumination that occurred soon after the event and rumination that occurred more recently with strong internal consistency [24].

Procedure

Following ethical approval, in order to preserve the confidentiality of the patients, survey packages were mailed by the hospital to the target population. Surveys were returned anonymously to the researcher who did not have access to patient records. Cancer diagnoses were grouped into major categories in consultation with oncologists at the Clinic.
Data analyses

Initial analyses were conducted using the Statistical Package for the Social Sciences (SPSS, version 14). As subscales for the Rumination Inventory had only been published with a theoretical distinction based on timing of rumination [24], an exploratory principal component analysis (PCA) was conducted. Prior to model testing relationships between variables were assessed through bivariate correlations. Structural equation modelling was conducted using AMOS 6 (version 1.0) to test the proposed model of diagnosis severity, seeking social support, distress, and PTG. All variables, except for social support, were represented as observed variables. Similar to previous studies using total scores for the PTGI [e.g., 1] and the IES-R [e.g., 28], the current study used total scores in the SEM to represent PTG and cancer-related distress as observed variables. Perception of trauma severity and the three extracted rumination components were also included as observed variables in the SEM. To our knowledge previous studies have not used the COPE subscales to represent a global measure of social support; therefore, emotional and instrumental social support subscales are used to represent the latent variable of seeking social support. A number of indices were used to assess model fit as suggested by guidelines for SEM [30; 31]. A non-significant chi-square indicates no significant differences between the model-implied and the data covariance matrices [31]. In addition to the significance test, current general recommendations suggest multiple indices of fit, such as GFI (> .90), CFI (> .90), and RMSEA (< .05), to indicate the appropriateness of a model.

Results

Examination of frequencies, normal probability plots, scatterplots, and Mahalanobis distance revealed minimum breaches in assumptions; with the exception of the IES-R total score being negatively skewed (.86, SE = .14). This variable was transformed using a logarithm 10 transformation to show that significance p-values remained on all analyses.
Therefore, results were reported using the untransformed variable as it is recommended to preserve comparability when interpreting the data [32]. **Spearman’s rank correlation coefficients were conducted as this allows for skewed variables.** Assumption testing showed that multicollinearity or singularity were not evident between constructs, with correlation coefficients being below a suggested cut-off of .80) [33]. A moderate correlation was evident between distress and the intrusive subscale of the RI ($r = .61$). The Intrusion subscale of the IES-R is conceptually linked to the Rumination Inventory’s intrusive subscale. Therefore, this moderate correlation was expected but did not exceed multicollinearity limits. The moderate correlations shown between the three subscales of the Rumination Inventory do not exceed $r = .50$, indicating that these factors are related but distinct constructs. An analysis of the relationship between PTGI and IES-R scores and inspection of the scatterplot demonstrated there was no evidence of a curvilinear relationship.

**Principal Components Analysis of the Rumination Inventory**

The PCA with an oblimin rotation of the Rumination Inventory items revealed a three-component solution that focussed on the content, rather than the timing of rumination. The three components extracted were *intrusive rumination, deliberate rumination of benefits,* and *life purpose rumination.* The strong factorability of the data was demonstrated through a Kaiser-Meyer-Olkin measure of .82 and Bartlett’s test of sphericity with an approximate chi-square of 2838.50 ($df = 91, p < .001$). The components accounted for 67.33% of the variance in the data, with strong loadings (see Table 1).

| Item loadings equal to and above .40 were considered to exceed the minimum level of practical significance and were examined for potential complex loadings [32]. All |  |
items loaded above this level of significance and the structure matrix showed complex loadings for items 5 and 6 (Soon after my diagnosis and Recently “I decided to think about my cancer to try and make sense out of what happened”). These items were removed to increase interpretability and internal consistency coefficients. Cronbach's alpha was used to test internal consistency for each component and high coefficients were found for each RI subscale; intrusive rumination ($\alpha = .85$), deliberate rumination of benefits ($\alpha = .86$), and life purpose rumination ($\alpha = .87$). Descriptive statistics and correlation coefficients were then calculated for all measures, including the new RI components (Table 2).

Please insert Table 2 approximately here

**Structural Equation Modelling**

Trauma severity, intrusive rumination, deliberate rumination of benefits, life purpose rumination, distress, and PTG were entered as observed variables in the SEM. Seeking social support was a latent variable represented by emotional and instrumental social support. Several indices of fit indicated that this model did not fit the data well; GFI = .908, CFI = .876, RMSEA = .207. The CFI and RMSEA did not meet suggested cut-off criteria and this model also demonstrated a significant chi-square $\chi^2(8) = 111.42$, $p < .001$.

Examination of the modification indices signified the need for covariance parameters between rumination variables. Testing the model with covariance parameters resulted in a non-significant chi-square, which showed that the model fit the data well and there were no significant differences between the model-implied and the data covariance matrices, $\chi^2(5) = 7.33$, $p = .20$. Several indices of fit showed the appropriateness of this model; GFI = .994, CFI = .997, RMSEA = .039, accounting for 30% of the variance in
PTG and 45% of the variance in distress. The covariance parameters were significant (all at $p < .001$) between the three types of rumination (Intrusive Rumination - Deliberate Rumination on Benefits, .28; Intrusive Rumination - Life Purpose Rumination, .37; Deliberate Rumination on Benefits - Life Purpose Rumination, .42).

Results indicated that deliberately ruminating on benefits and social support was positively related to PTG and ruminating on life purpose and intrusive rumination was positively associated with distress. Perception of trauma severity was positively related with seeking social support, intrusive rumination, life purpose rumination, and distress. Higher levels of social support seeking behaviour were related to all three components of rumination. When investigating the standardised indirect effects on PTG, results showed trauma severity ($\beta = .19$, $p < .01$) and social support ($\beta = .19$, $p < .01$) both had a significant indirect effect on PTG. Other significant indirect effects were found in the model between seeking social support and distress ($\beta = .01$, $p < .05$), and seeking social support and PTG ($\beta = .15$, $p < .01$).

Discussion

The principal components analysis on the Rumination Inventory showed a clear three-component structure, including intrusive rumination, deliberate rumination of benefits, and life purpose rumination. These results indicated that the content of rumination was salient for cancer survivors rather than the timing of rumination as originally proposed [24]. Previous research has indicated rumination to be associated with increased distress, depression, and anxiety [e.g., 8; 9]. However, the results from the current study show the importance of considering different facets of rumination in terms of both growth and distress. Deliberately
ruminating on benefits was associated with PTG; whereas, intrusive rumination and ruminating on the purpose of life were associated with distress.

The results from the current study are synonymous with studies highlighting a lack of relationship between intrusive rumination and PTG [e.g., 1; 18]. This is also consistent with Manne et al.’s [10] finding that cancer survivors differentiate between types of rumination and that intrusive cancer thoughts do not predict growth. Rather, as shown in the current study, deliberate rumination on potential benefits were related to increased positive life change. The IES-R was used to measure post-diagnosis distress and a factor of the RI reflected intrusive rumination, hence the expectation that distress and intrusive rumination would be associated was supported in the SEM. The initial correlation coefficients revealed that multicollinearity was not present between these variables, suggesting that although these variables are related, the inventories used to assess these variables measured different constructs.

Ruminating on life purpose approximately three years post-diagnosis may reflect a brooding and moody style of rumination [11]. As the mean time since diagnosis in the current study was approximately three years post-diagnosis, these results may indicate that persistent intrusions and life purpose rumination occurring years later are more likely to be associated with distress rather than growth at this time [15]. Differentiating between cognitions that are adaptive and maladaptive allows for the possibility to assist post-diagnosis adjustment [34]. Identifying health behaviours and cognitions that can be modified enables interventions to be designed that can be used to aid adjustment and increase the long-term well-being of people diagnosed with cancer [35]. For example, psycho-education is important for survivors to not only understand the potential for adjustment difficulty but also the potential for personal development and growth. Patients may be encouraged to engage in reflective practices and to
identify strategies such as cognitive restructuring, that have been shown to relate to positive adjustment [36].

The hypotheses regarding relationships between variables were only partially supported by the SEM. Previous studies with cancer survivors have found that the subjective assessment of disease severity is positively associated with PTG [1; 7]. Initial correlation coefficients indicated that trauma severity had a small significant relationship with PTG. Contrary to predictions trauma severity was not directly related to PTG in the SEM, a significant indirect effect was evident between these variables. For example, cancer survivors’ perception of trauma severity was related to an increase in support seeking behaviour, which in turn was associated with PTG. These results highlight the potential for direct and indirect relationships of variables in Calhoun and Tedeschi’s [2] model. Trauma severity was also associated with intrusive and life purpose rumination, and cancer-related distress.

Seeking social support was related to the rumination subscales and, as hypothesised, was directly related to PTG. Social support was also indirectly related to PTG, suggesting that support seeking may promote deliberately ruminating on benefits, which is associated with PTG [16]. These results are consistent with the direct and indirect effects of social support proposed in Calhoun and Tedeschi’s [2] model of PTG and support previous PTG research with cancer survivors investigating the benefits of supportive care [17]. However, as social support was related to intrusive and life purpose rumination and had an indirect effect in distress, seeking social support may also act as a reminder to the individual that they have cancer and indirectly lead to increased levels of distress [37].

As hypothesised, distress measured as PTSD symptoms, was not directly related to PTG in the context of the SEM, which is consistent with the overall trend within psycho-oncology [4]. Distinct variables were associated with PTG and distress, showing the
independence of these constructs and suggesting that alleviating distress symptoms will not necessarily lead to PTG, nor will promotion of PTG necessarily reduce distress [38].

Strengths and Limitations of Current Study Leading to Future Directions

Through the PCA of the Rumination Inventory and the SEM, this study provides an assessment of salient variables associated with growth and distress for cancer survivors. The SEM provided statistical testing of components that have been identified by Calhoun and Tedeschi [2] as integral components in their PTG model. SEM provides a robust assessment, allowing for multiple relationships to be tested simultaneously and provide a more thorough picture than that afforded by univariate analyses.

The SEM results have implications in a therapeutic context. For example, clinicians can guide patients through the transition of brooding rumination into a more reflective type of cognitive processing [39]. By listening to the patient work through their feelings about being diagnosed, a therapist can identify maladaptive cognitions and assist the patient to identify ways in which to constructively ruminate [39]. It could be argued that clinicians are largely trained within a pathogenic framework and therefore when treating clients, may tend to assume that a negative sequelae is inevitable, even if only in the shorter term, and that a positive outcome would equate to a reduction in distress. However, the results from the current study show that PTG and distress are not necessarily related and the clinician cannot assume that a reduction of distress will be related to an increase of PTG, and vice-versa [39].

Relationships between variables were proposed from previous research and the PTG model [2]. However, in cross-sectional data collection causal relationships cannot be inferred. For example, the SEM shows the impact that seeking social support has on the rumination components. It may be that rumination influences social support seeking behaviour. Also, potential biases in recall could influence responses to the Rumination Inventory. Longitudinal research would be beneficial in mapping the trajectory of post-diagnosis adjustment, growth
and distress. A further limitation is evident due to the recruitment of participants with a variety of cancer diagnoses. Factors such as disease severity, type and invasiveness of treatment, and disease trajectory, may contribute differently to post-diagnosis adjustment. Further research can verify the results from the current study with homogenous samples of cancer survivors.

**Conclusion**

Testing a statistical model of PTG augments the univariate research that has characterised previous investigations of PTG in cancer survivors. The results of this study have provided a picture of cognitions and behaviours associated with PTG. The SEM has provided support for aspects of the comprehensive model of PTG proposed by Calhoun and Tedeschi [2], embracing a salutogenic approach in investigating the post-diagnosis experience. The research acknowledges that the individual’s journey can comprise both positive and negative sequelae after cancer and that distinct types of rumination have been identified that are differentially associated with growth and distress. Such information may be used to inform interventions that target these cognitions and behaviours to promote post-diagnosis well-being and conversely, alert us to those who may not be on a path to psychological recovery.
References


Table 1

**Component Loadings of the Rumination Inventory**

<table>
<thead>
<tr>
<th>Item and Component</th>
<th>Component Loadings</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td><strong>Intrusive Rumination (43.61% variance)</strong></td>
<td></td>
</tr>
<tr>
<td>1. Soon after my diagnosis, I thought about my cancer when I didn’t mean to</td>
<td>.88</td>
</tr>
<tr>
<td>2. Recently, I have thought about my cancer when I didn’t mean to</td>
<td>.86</td>
</tr>
<tr>
<td>3. Soon after my diagnosis, thoughts about my cancer about my cancer came into my mind and I could not get rid of them</td>
<td>.80</td>
</tr>
<tr>
<td>4. Recently, thoughts about my cancer about my cancer came into my mind and I could not get rid of them</td>
<td>.78</td>
</tr>
<tr>
<td><strong>Deliberate Rumination of Benefits (14.02% variance)</strong></td>
<td></td>
</tr>
<tr>
<td>7. Soon after my diagnosis, I tried to make something good come out of my struggle</td>
<td>.77</td>
</tr>
<tr>
<td>8. Recently, I tried to make something good come out of my struggle</td>
<td>.80</td>
</tr>
<tr>
<td>9. Soon after my diagnosis, I reminded myself of some of the benefits that came from adjusting to my cancer</td>
<td>.90</td>
</tr>
<tr>
<td>10. Recently, I reminded myself of some of the benefits that came from adjusting to my cancer</td>
<td>.87</td>
</tr>
<tr>
<td><strong>Life Purpose Rumination (9.70% variance)</strong></td>
<td></td>
</tr>
<tr>
<td>11. As a result of what happened, soon after my diagnosis I found myself automatically thinking about the purpose of life</td>
<td>-.62</td>
</tr>
<tr>
<td>12. As a result of what happened, recently I find myself automatically thinking about the purpose of life</td>
<td>-.66</td>
</tr>
<tr>
<td>13. As a result of what happened, soon after my diagnosis I deliberately</td>
<td>-.93</td>
</tr>
</tbody>
</table>
would think about and ask questions about whether or not life has a meaning or purpose

14. As a result of what happened, recently I will deliberately think about and ask questions about whether or not life has a meaning or purpose
### Table 2

*Descriptive Statistics and Spearman’s rank Correlation Coefficients between Variables in PTG Model (N = 313)*

<table>
<thead>
<tr>
<th>Scale</th>
<th>Range</th>
<th>M (SD)</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. PTGI</td>
<td>0-105</td>
<td>59.29 (22.36)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Trauma Severity</td>
<td>1-5</td>
<td>2.75 (1.04)</td>
<td>.17**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Intrusive Rumination</td>
<td>4-16</td>
<td>10.50 (3.30)</td>
<td>.27***</td>
<td>.64***</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Deliberate Rumination of Benefits</td>
<td>4-16</td>
<td>10.43 (3.82)</td>
<td>.47***</td>
<td>.12*</td>
<td>.31***</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Life Purpose Rumination</td>
<td>4-16</td>
<td>9.54 (3.77)</td>
<td>.39***</td>
<td>.32***</td>
<td>.50***</td>
<td>.49***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Social Support</td>
<td>8-32</td>
<td>17.55 (6.25)</td>
<td>.37***</td>
<td>.34***</td>
<td>.36***</td>
<td>.32***</td>
<td>.31***</td>
<td></td>
</tr>
<tr>
<td>7. Distress</td>
<td>0-82</td>
<td>23.80 (17.18)</td>
<td>.27***</td>
<td>.59***</td>
<td>.63***</td>
<td>.27***</td>
<td>.46***</td>
<td>.35***</td>
</tr>
</tbody>
</table>

*Note. PTGI = Posttraumatic Growth Inventory, SD = standard deviation, * p < .05, ** p < .10, *** p < .001.*
Figure 1. Structural equation model of posttraumatic growth. Note. Standardised regression weights in bold font are significant at $p<.001$. Covariance parameters between rumination subscales have been left out due to better readability.