Criterion Validity of Prolonged Grief Disorder and Quality of Life: A Longitudinal Study

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Abstract

A minority of bereaved individuals experiences severe, persistent, and disabling grief, termed prolonged grief. This can lead to grave mental and physical consequences, specifically for an individuals' quality of life. In this study we aim to examine the predictive effects (criterion validity) of prolonged grief symptoms per the International Classification of Diseases 11th edition (ICD-11) and the Diagnostic and Statistical Manual of Mental Disorders, text revision, 5th edition (DSM-5-TR) on quality of life. A sample of 276 bereaved adults (mean age 54 years, 92% female) filled in a survey at baseline, 6 (n = 142) and 12 (n = 135) months later. The Traumatic Grief Inventory-Self Report Plus was used to measure the independent variables ICD-11 and DSM-5-TR prolonged grief symptoms. The European Health Interview Survey - Quality of Life 8-item index was used to measure the dependent variable QoL. Two simple linear regression analyses demonstrated that T1 ICD-11 and DSM-5-TR prolonged grief symptoms related negatively to T1 QoL, supporting concurrent test-criterion validity. Four hierarchical regression analyses demonstrated that T1 ICD-11 and DSM-5-TR symptoms significantly predict QoL at T2 and T3 whilst controlling for T1 QoL, supporting predictive test-criterion validity. Results show that DSM-5 and ICD-11 prolonged grief symptoms do predict lower QoL at later timepoints, while controlling for baseline QoL. We conclude that the analyses provide evidence for the criterion validity of the new prolonged grief symptom sets per ICD-11 and DSM-5-TR.

Keywords: prolonged grief symptoms, quality of life, ICD-11, DSM-5-TR, criterion validity

Criterion Validity of Prolonged Grief Disorder and Quality of Life: A Longitudinal Study

Grief is a nearly universal, largely unavoidable, painful part of life that is caused by the ending of meaningful relationships. For as long as people have loved and then lost persons, there has been grief. In the vast majority of cases, grief is most intense immediately after a loss and thereafter subsides over a period of months. However, a significant minority of bereaved people becomes stuck in a state of chronic grief. For these individuals, intense grief may persist for years and become dysfunctional and even dangerous, putting those afflicted at a significant risk of self-harm (Prigerson et al., 2021a).

Recently, diagnoses characterized by such prolonged grief responses have been added in the International Classification of Diseases, 11th edition (ICD-11: World Health Organization, 2018) and the Diagnostic and Statistical Manual of Mental Disorders, text revision, 5th edition (DSM-5-TR: American Psychiatric Association, 2022) in the form of prolonged grief disorder (PGD). According to the ICD-11 and the DSM-5-TR, PGD is understood to be severe, persistent, and disabling grief. Research by Lundorff et al. (2017) estimated that the prevalence rate of PGD among adults who have experienced natural loss is 9.8%. This suggests that one out of ten people experiencing bereavement as an adult will show clinically significant levels of PGD. The criteria set for PGD, as defined in the ICD-11 and the DSM-5-TR both follow similar core symptoms: longing for, and preoccupation with the deceased person. Another similarity is the cultural and context criterion. Both ICD-11 and DSM-5-TR state that a criterion for PGD is that the duration of the symptoms have exceeded the norms for the individual's culture and context (Killikelly & Maercker, 2017; Prigerson et al., 2021a). However, there are also multiple differences, examples lie in the onset of PGD and the interpretation by clinicians. Firstly, the onset of PGD is recognized by the ICD-11 to be six months after the loss, while the DSM-5-TR has set this limit at twelve months post-

loss. Secondly, the ICD-11 leaves more room for clinicians' interpretations compared to DSM-5-TR (Killikelly & Maercker, 2017).

Before the current symptom sets for PGD were formulated, there have been multiple attempts to define a diagnosis characterized by prolonged grief symptoms. Past proposals include acute grief (Lindeman, 1963), traumatic grief (Silverman et al., 2000), prolonged grief disorder (e.g., Prigerson et al., 2009) and complicated grief (Shear et al., 2011). These proposals differ in the number and sets of symptoms necessary to establish a diagnosis. Also, key characteristics of PGD vary based on the chosen diagnostic algorithm, used to give a diagnosis (Eisma et al., 2020). Research on pathological grief is based on different criteria sets, therefore the generalizability of the results is unknown and should be interpreted with caution (Lundorff et al., 2017). To surmise, since the past proposals and current symptom sets as recognized in the ICD-11 and DSM-5-TR differ on multiple levels, for example: the onset, symptoms and criteria sets, there are multiple definitions for pathological grief. One version of pathological grief is not the same as another.

Additionally, measuring prolonged grief symptoms with measures such as the Inventory of Complicated Grief (ICG) and Prolonged Grief Disorder-13 (PG-13) do not completely comprehend the assessment of PGD per ICD-11 and DSM-5-TR (Lenferink et al., 2022; Treml et al., 2020). The ICG, later called ITG, items do not cover the listed symptoms for either ICD-11 or DSM-5-TR. Although a degree of compatibility for the PG-13 is found with the DSM-5-TR PGD criteria, it is not perfect, and differences are larger for ICD-11 PGD symptoms (Treml et al., 2020; Prigerson et al., 2021b). Since the symptom sets in the ICD-11 and DSM-5-TR differ from each other and from previously proposed symptom sets, findings from past research might not generalize to the new versions of PGD. Previously used measurement does not fully capture current PGD definitions. Consequently, it is of value to

consider if past evidence for the validity of pathological grief applies to the current PGD definitions.

Validity of a construct can be measured by ascertaining the degree of accuracy in which the test scores predict criterion performance (American Educational Research Association et al., 2022). Criterion validity is an aspect of predictive validity, this will show in which degree the construct PGD can predict other relevant variables. The criterion validity of PGD is not clear at this point, since it has not been investigated with the current criteria sets. In this study, the criterion validity will be assessed by examining if prolonged grief symptoms per ICD-11 and DSM-5-TR predict changes in quality of life (QoL).

Although there is no universally accepted definition for QoL, Patrick and Erickson (1988) define it as follows: "the value assigned to the duration of life as modified by the social opportunities, perceptions, functional states, and impairments that are influenced by disease, injuries, treatment or policies".

One of the reasons we expect PGD to predict QoL is the relationship PGD has with health impairments in daily life such as headaches, dizziness, indigestion, and chest pain. In addition, a higher intensity of grief heightens the likelihood of severe physical health conditions, for example cancer and heart attacks (Stroebe & Stroebe, 2007). There is strong evidence of the negative associations PGD can have with health, also QoL (Treml et al., 2020) QoL is an important measure for the degree of health someone is experiencing. Various diseases and disorders are in association with diminished QoL (Mendlowicz & Stein, 2000), it is to be expected this could be the case for PGD as well.

Preliminary research has been conducted on the effect of pathological grief and QoL by Silverman et al. (2000) and Boelen and Prigerson (2007). Firstly, the cross-sectional study by Silverman et al. (2000) suggest that a pathological grief diagnosis is associated with QoL. A limitation of the study is that it cannot determine whether a diagnosis for pathological

grief can predict impaired QoL. Secondly, in a prospective study by Boelen and Prigerson (2007) the relationship between pathological grief and QoL was investigated over time. This research shows that pathological grief predicts lower QoL outcomes over time (Boelen & Prigerson, 2007). A limitation of the study is that it does not control for baseline QoL. Consequently, it is unclear to which extent prolonged grief symptoms predict changes in QoL. Furthermore, preliminary studies have not investigated the current PGD criteria sets, and their relationship with QoL. Additionally, measuring QoL over time while controlling for baseline QoL could provide evidence towards the temporal precedence criterion for causality.

In the present study, we aim to examine the predictive effects of prolonged grief symptoms per ICD-11 and DSM-5-TR on quality of life, to shed light on the criterion validity of prolonged grief symptoms per ICD-11 and DSM-5-TR on QoL. First, we hypothesize that ICD-11 and DSM-5-TR PGD symptoms are significantly negatively associated with quality of life. Second, we hypothesize that ICD-11 and DSM-5-TR PGD symptoms significantly predict changes in quality of life over time.

Method

Procedure and Design

Data collection was part of a larger longitudinal survey on psychosocial adaptation to bereavement conducted between May 2019 and September 2021. The online platform Qualtrics was used to collect the data. Participants were led to this platform by advertisements presented on Google and via a website containing a grief self-test (www.psyned.nl). Both gave a link to the study's website where potential participants could read information on the study and fill in an online informed consent form. Informed consent was given on a participant information page. Four general themes that were covered were that participation was voluntary, the information was processed in a confidential manner, the research aims, and where to direct possible questions. After giving online informed consent,

the participants could start the study. The participants were given a code to ensure anonymity when the data was processed. To be eligible for study participation, people had to be able to read and answer questions in Dutch, had to have experienced the death of a partner, family member, or friend, and be 18 years or older. The Ethical Committee Psychology of the University of Groningen approved the study (registration number: PSY-1819-S-0173).

There were no mandatory breaks while filling out the survey and there was no time limit. Furthermore, the test took around half an hour to finish and was subdivided into several sections. At the end of the first survey (T1), participants were asked if they would be willing to complete two future surveys. Participants who agreed with this were sent an email with a link to the survey 6 (T2) and 12 months (T3) after they completed the first survey.

Participants

Baseline data was collected from 987 bereaved individuals. We excluded 671 people from the data analysis who did not meet the criteria of losing a loved one 12 or more months ago at baseline. Furthermore, 115 people did not give permission to be contacted for completing the second or third questionnaire and some people who did give permission did not complete one or more of the follow-up surveys. Therefore, our final sample consisted of 276 people who completed the QoL questionnaire at T1, 142 in T2, and 135 in T3.

The average age of the participants was approximately 54 years and 92% of the sample reported being female (Table 1 shows baseline sample characteristics). More than half of the participants have completed a college or university education. The majority of the participants had lost a partner, lover and/or spouse (46%), followed by the loss of a parent (28%), child (13%), brother or sister (9%), or other relationship (4%). Most of the deceased people were male (72%). The median time since loss was 27 months and ranged from 12 months to 5 years or longer. The majority of the participants (45%) indicated that they were between 12 months and 24 months after the loss. Most of the losses were due to a natural

cause such as an illness (76%), whereas a minority indicated having experienced a loss due to suicide (16%), an accident (8%), and murder (less than 1%). For most of the participants, the loss was unexpected (55%), while 27% of the participants had expected the loss, and 17% indicated the loss was expected nor unexpected or both.

Measures

We used prolonged grief symptoms as an independent variable and QoL as both an independent and dependent variable. In the T1 survey, participants were asked to fill in a self-constructed questionnaire about socio-demographic characteristics, such as sex, age, and education level. Loss-related characteristics (relationship with the deceased, sex of the deceased, time since loss, cause of death, and expectedness of the loss) were also registered using a self-constructed questionnaire. All answer categories for the categorical variables are listed in Table 1.

We used QoL assessments at T1, T2 and T3 and prolonged grief symptoms assessments at T1. This study has a longitudinal design, but some of the analyses are on cross-sectional data.

Prolonged Grief Symptoms

Prolonged grief symptoms were measured with the Traumatic Grief Inventory - Self Report Plus (TGI-SR+; Lenferink et al., 2022). The TGI-SR+ is the only validated instrument that is able to screen for prolonged grief symptoms according to both the ICD-11 and DSM-5-TR PGD criteria. This makes it the most appropriate instrument available due to this study thematizing the evolving criteria for prolonged grief and its effect on validity. There is evidence for the concurrent and criterion validity of the TGI-SR+ (Lenferink et al., 2022).

The TGI-SR+ is a 22-item self-report questionnaire using a 5-point Likert scale ranging from 1 (never) to 5 (always). Twelve of these items reflect the ICD-11 criteria while ten reflect the DSM-5-TR criteria. Examples of items for prolonged grief symptoms per

DSM-5-TR are: ‘I avoided places, objects, or thoughts that reminded me that the person I lost has died’ and ‘I felt that life is unfulfilling or meaningless without him/her’, and per ICD-11: ‘I had trouble accepting the loss’ and ‘I had negative thoughts about myself in relation to the loss (e.g., thoughts about self-blame)’. Item scores are summed to form two overall total severity scores, with one made up of the twelve items for the ICD-11 criteria and the other consisting of the ten items for the DSM-5-TR criteria.

Internal consistencies were previously examined using McDonalds omega, showing values > .70 (TGI-SR+ scores: ω = .97; ICD-11 criteria: ω = .95; DSM-5-TR criteria: ω = .95). The Cronbach's alpha, using this study's data set were .91 (ICD-11 criteria) and .90 (DSM-5-TR criteria) respectively. Together, these indices suggest very strong internal consistency for the TGI-SR+.

Quality of Life

QoL was assessed with the European Health Interview Survey - Quality of Life (EUROHISQOL) (Schmidt et al., 2005). This short version of the WHOQOL-100 has 8 items, and answers are given on a Likert scale ranging from 1 (not at all) to 5 (completely), where a higher score indicates a higher QoL. It measures QoL across four different domains, two items each: psychological, social, physical, and environmental. The World Health Organization names the four domains physical health (e.g., “How would you rate your quality of life?”), psychological health (e.g., “Do you have enough energy for everyday life?”), social relationships (e.g., “How satisfied are you with your personal relationships?”), and environmental health (e.g., “Have you enough money to meet your needs?”);Schmidt et al., 2005).

The EUROHIS-QOL 8-item index has strong associations with conceptually related measures, which supports the convergent validity of the EUROHIS-QOL (Schmidt et al., 2005). It was also able to reliably discriminate between ill and healthy individuals supporting

its discriminant validity. Cronbach's alpha for this instrument was .80 (Schmidt et al., 2005), indicating good internal consistency. In this study, a reliability analysis resulted in a Cronbach's alpha of .84.

Statistical Analyses

We calculated the association between prolonged grief symptoms and QoL for both ICD-11 and DSM-5-TR criteria across three time points. We calculated prolonged grief symptom levels at T1 for both ICD-11 and DSM-5-TR criteria based on the TGI-SR+ (for scoring rules: Lenferink et al., 2022). These ICD–11 prolonged grief symptoms and DSM-5-TR prolonged grief symptoms were computed as new variables for T1 (T1 ICD-11 prolonged grief symptoms and T1 DSM-5-TR prolonged grief symptoms). We checked the assumptions of our regression analyses (i.e., normality, linearity, homoscedasticity, outliers, and multicollinearity) before running our main analyses.

We ran a drop-out analysis to assess the differences in sample characteristics of people who dropped out and those who did not. The dropouts were categorized into two categories. The first one was for participants that opted to not continue with the study after baseline measurement (T1), who are called dropout group 1. The second category consisted of participants who opted to continue with the study, but did not complete one or two of the follow-up questionnaires in T2 or T3, who are called dropout group 2.

To check if there were significant differences between people who dropped out of the study and those who did not we used independent sample t-tests in the case of continuous variables (i.e., age, T1 ICD-11 prolonged grief symptoms, T1 DSM-5-TR prolonged grief symptoms and T1 QoL) and Chi-Square tests for categorical variables (i.e., sex, education level, time since loss, relationship with the deceased, cause of death, expectedness of death). . For those categorical variables that showed a significant effect, we ran additional Chi-square tests to check which categories were distributed differently between groups. If the assumption

of expected values (not less than 5 expected observations in every cell) within the cells was violated for the Chi-Square test, we used the Likelihood Ratio instead of the Chi-square test.

To test our first hypothesis, we used two simple linear regressions to assess the association between T1 ICD-11 prolonged grief symptoms and T1 QoL and the association between T1 DSM-5-TR prolonged grief symptoms and T1 QoL. For our second hypothesis, we ran two separate regression analyses per time-point to examine the extent to which T1 ICD-11 prolonged grief symptoms and T1 DSM-5-TR prolonged grief symptoms predicted QoL outcomes at T2 and T3 (T2 QoL and T3 QoL), whilst controlling for the baseline QoL (T1). So, we ran four hierarchical multiple regression analyses. In the first step of all regression analyses, we included T1 QoL as a control variable. Next, we added either T1 ICD-11 prolonged grief symptoms or T1 DSM-5-TR prolonged grief symptoms as a predictor of QoL at T2 or T3.

Furthermore, we ran an exploratory analysis comparing the effects of ICD-11 and DSM-5-TR prolonged grief symptoms on QoL. The exploratory analysis allows us to assess evidence for the convergent validity of both ICD-11 and DSM-5-TR prolonged grief symptoms, by comparing the longitudinal relationships each of these constructs has with QoL. We compared the confidence intervals of the standardized beta weights of associations between ICD-11 and QoL and DSM-5-TR and QoL across all relevant time periods, whilst controlling for the T1 QoL in longitudinal analyses. The rule of Cumming (2009) states that if the confidence intervals of the standardized beta weights of the variables overlap less than 50% with each other, the difference between the standardized beta weights is significant.

Results

Dropout analysis

A dropout analysis was run to examine whether there were differences in study completers (n = 120; 38%) versus non-completers (n = 196; 62%) for the EUROHIS 8-item

index in relationship with different variables. More specifically, 36% (n = 115) of participants opted to not participate for T2 and T3, i.e., dropout group 1, and 26% (n = 81) of participants said they would continue for T2 and T3 but did not finish, i.e., dropout group 2. We are analyzing these two groups by comparing them with their completer counterparts as specified in the paragraphs below. We tested whether T1 ICD-11 prolonged grief symptoms, T1 DSM-5-TR prolonged grief symptoms, T1 QoL, age, time since loss, sex, education, relationship with deceased, cause of death and expectedness of death was associated with dropping out.

In the first part of the dropout analysis, we compared dropout group 1 with those who opted to continue after T1 (n = 201; 64%). No significant differences were found across the two groups in this comparative analysis (Table 2).

In the second portion of the dropout analysis, we compared dropout group 2 with those who opted to continue after T1 and completed T2 and T3 (n = 120; 38%) (Table 3). Using a Chi-square test, a significant effect was found for sex ($\chi 2$ (1, N = 201) = 5.58, p = .02), with women making up 97% of dropout group 2 and 88% of study completers. Cause of death (natural cause, accident, murder, suicide) also had a significant difference in proportions (LR (3, N = 201) = 13.43, p < .01: Table 3) between the two groups compared. Specifically, the group bereaved through suicide was found to have more participants drop out after stating they wanted to continue for T2 and T3 compared with the other subcategories ($\chi 2$ (1, N = 201) = 11.41, p < .001). People bereaved through suicide made up 27% of dropout group 2 and 9% of study completers.

Assumption Checks

Details on the assumption checks can be found in Appendix A at the end of the manuscript. To investigate if the model assumptions for the regression analyses testing the first and second hypothesis were met several figures were made and analyses were executed

to check for outliers, normality, homoscedasticity, linearity, and an additional analysis to check for multicollinearity was conducted exclusively for the second hypothesis. For both hypotheses, some outliers were found. To check whether these outliers were influential, Cook's Distance was assessed. The Cook's distance values were not larger than one, therefore the outliers were not influential and thus were retained in the dataset. The assumptions for normality, linearity and homoscedasticity were not violated for the analyses on the two hypotheses. Moreover, there was no multicollinearity of predictors in the regression analyses conducted to answer the second hypothesis.

Hypothesis 1

Cross-sectional analysis

Two simple linear regression analyses were conducted to test the first hypothesis: ICD-11 and DSM-5-TR prolonged grief symptoms are both significantly negatively associated with QoL. T1 ICD-11 prolonged grief symptoms were indeed significantly negatively related to T1 QoL ($F(1, 274) = 120.49$, $\beta = -.55$, $p < .001$). This regression was also conducted for T1 DSM-5-TR prolonged grief symptoms and T1 QoL, again yielding a significant negative relationship ($F(1, 274) = 122.46$, $\beta = -.56$, $p < .001$).

Hypothesis 2

Longitudinal analysis

Four hierarchical regression analyses were run to examine if ICD-11 or DSM-5-TR prolonged grief symptoms predicted QoL at T2 and T3, while controlling for baseline QoL (T1) (hypothesis 2: ICD-11 and DSM-5-TR prolonged grief symptoms significantly predict changes in QoL over time). In all regression analyses, T1 QoL was entered as a control variable in step 1. In step 2, either T1 ICD-11 prolonged grief symptoms or T1 DSM-5-TR prolonged grief symptom scores were entered as a predictor of QoL at T2 or T3 (Table 4).

In the first regression analysis, we examined the association between T1 ICD-11

prolonged grief symptoms and T2 QoL. The overall model test was significant ($F(2, 139) = 101.85$, $p = .04$). In the first step of the model, T1 QoL predicted 58% of variance in T2 QoL. Adding T1 ICD-11 prolonged grief symptoms additionally explained 1% of variance in T2 QoL.

In the second regression analysis, we examined the association between T1 ICD-11 prolonged grief symptoms and T3 QoL. The overall model test was significant ($F(2 ,132) = 87.80$, $p = .03$). In the first step of the model, T1 QoL predicted 56% of variance in T3 QoL. Adding T1 prolonged grief symptoms additionally explained 2% of variance in T3 QoL.

In the third regression analysis, we examined the association between T1 DSM-5-TR prolonged grief symptoms and T2 QoL. The overall model test was significant ($F(2, 139) = 102.64$, $p = .02$). In the first step of the model, T1 QoL predicted 58% of variance in T2 QoL. Adding T1 DSM-5-TR prolonged grief symptoms additionally explained 2% of variance in T2 QoL.

In the fourth regression analysis, we examined the association between T1 DSM-5-TR prolonged grief symptoms and T3 QoL. The overall model test was significant ($F(2, 132) = 87.20$, $p = .04$). In the first step of the model, T1 QoL predicted 56% of variance in T3 QoL. Adding T1 DSM-5-TR prolonged grief symptoms additionally explained 2% of variance in T3 QoL.

Exploratory analysis

The exploratory analysis consisted of implementing Cumming´s rule to determine if there was a statistically significant difference between the standardized beta coefficients of the effects of T1 ICD-11 and DSM-5-TR prolonged grief symptoms on EUROHIS for T2 and T3, while controlling for T1 QoL. As seen in Table 4, the confidence intervals overlapped to the degree that significance was not found. The confidence intervals of the standardized beta

coefficients of T1 DSM-5-TR prolonged grief symptoms and T1 ICD-11 prolonged grief symptoms on T2 QoL had a 93% overlap and close to 100% overlap on T3 QoL.

Discussion

We aimed to examine the predictive effects of prolonged grief symptoms per ICD-11 and DSM-5-TR on quality of life, to shed light on the criterion validity of prolonged grief symptoms per ICD-11 and DSM-5-TR on QoL. Our first hypothesis was: ICD-11 and DSM-5-TR prolonged grief symptoms are significantly negatively associated with quality of life. In two simple linear regression analyses we found a significant effect; this shows that both ICD-11 and DSM-5-TR prolonged grief symptoms are associated with QoL. Generally, people with higher prolonged grief symptoms per ICD-11 and DSM-5-TR, reported lower QoL. Our second hypothesis was: ICD-11 and DSM-5-TR prolonged grief symptoms significantly predict changes in quality of life over time. In four hierarchical regression analyses we found a significant effect for all the analyses. These showed that ICD-11 and DSM-5-TR prolonged grief symptoms do predict lower QoL at later timepoints while controlling for baseline QoL.

Considering the validity, we found evidence to support the assumption that prolonged grief symptoms predict residual symptom change in QoL over time. The analyses support criterion validity for the new criteria sets of prolonged grief.

Additionally, according to the Cummings rule (Cumming, 2009), confidence intervals were compared for the association of T1 ICD-11 and DSM-5-TR prolonged grief symptoms for T2 and T3, whilst controlling for T1 QoL. This comparison was conducted to examine if the associations that were found do not differ depending on the prolonged grief symptoms that were assessed. It was found that the confidence intervals are almost identical and overlap almost completely. Findings were comparable for both PGD criteria sets, and similar evidence was found towards the convergent validity for both ICD-11 and DSM-5-TR.

Furthermore, a dropout analysis was conducted to assess differences in sample characteristics of people who dropped out and those who did not, to shed light on which individuals dropped out of the study. Doing a dropout analysis will give more insight in the representativity of the sample, since the analysis will show which groups drop out of the study. This can affect the generalizability of the sample, if the sample is not representative for the population we are researching. Two different dropout analyses were conducted. In the first analysis it was examined who decided they wanted to participate in the longitudinal study in comparison those who did not. There were no significant effects found in this analysis. The second analysis pertains to who completed all three surveys compared to those who did not. For the second analysis experiencing a traumatic loss and sex were shown to be important predictors for dropping out. People who lost a loved one through suicide (vs. other causes) and women (vs. men) were more likely to not participate in the longitudinal study.

The findings regarding the main hypotheses are consistent with earlier studies that found a negative association between PGD and QoL (Silverman et al., 2000; Boelen & Prigerson, 2007). In accordance with Boelen and Prigerson (2007), we found that ICD-11 and DSM-5-TR prolonged grief symptoms predicted lower QoL at later timepoints. Unlike Prigerson and Boelen (2007), we controlled for baseline QoL and were able to assess evidence towards temporal precedence in this relationship.

According to Cumming's rule (Cumming, 2009), the longitudinal associations between prolonged grief symptoms and QoL are similar for both criteria sets. This leads to knowing these new criteria sets both appear to have a criterion validity, both ICD-11 and DSM-5-TR show similar results on the same test of criterion validity. This may have positive implications for future research and clinical practice. Regarding future research a first step has been made to establish the validity of these new versions of PGD. Other research can be conducted using other relevant criteria, such as general well-being, suicidal tendencies, etc.

and researching other types of validity. Since it provides evidence towards the validity of the construct, this can be a first step for clinical reassurance in using these prolonged grief symptom criteria sets in clinical practice.

Strengths of the study include using a relatively large sample of bereaved adults and a longitudinal design, in which we controlled for baseline levels of the dependent variable. Also, this study is the first to examine the relationship between prolonged grief symptoms and QoL for the newest criteria sets, ICD-11 and DSM-5-TR. However, there were some limitations in the present study to be considered. First, we cannot establish causality in the present study. Other variables that have not been taken into consideration could have influenced the relationships investigated in the study. For example, diagnoses or disease that a participant already had prior to bereavement could influence QoL drastically. Boelen and Prigerson (2007) controlled for other related mental health problems, however they did not control for baseline QoL. Future studies could control for related mental health problems while still controlling for baseline QoL. Second, the sample is self-selected. This has resulted in a sample consisting of 92% females, this raises the question if the sample is generalizable to the male bereaved population. Additionally, 55% of participants have completed a higher education, which is not representative of the general population. The effects of self-selection bias can be minimized in future research by asking participants why they decided to fill out the surveys, this way it can be evaluated to which degree the bias has influenced the results. Third, previous research established that prolonged grief symptoms diminish over time (Boelen & Prigerson, 2007). When selecting the sample, our study used the time criterion of 12-months, per DSM-5-TR. While using the time criteria of 12-months, instead of the 6-months which is the criterion for ICD-11, means we could have found a smaller effect compared to using the 6-month criterion. This could have influenced the main results if there is a difference between the effects found in prolonged grief symptom criteria sets when using

a 6-month and 12-month criterion. In future studies it would be interesting to see if there is a difference in results for prolonged grief symptom levels when using the different time criterion while still controlling for baseline QoL. Fourth, participants dropping out could have an influence on the results. Since particular sub-groups were more likely to drop out than other, this could lead to a misrepresentation of certain groups. Hence, this could result in a difficulty generalizing current results to the general bereaved population. Future research could try to use strategies to limit the dropout. For example, providing positive feedback or using personalized questions, is known to increase survey cooperation (De Leeuw, 2005). Last, being stringent while selecting the data, which resulted in a smaller sample, may have impacted the power of the performed analyses. The smaller sample makes it harder to find significant findings. Using a larger sample in future studies could result in a higher power. However, in the current research all the expected effects were found, which means this was likely not a problem in our study.

To summarize, this study found evidence to support criterion validity of the new symptom sets of prolonged grief symptoms per ICD-11 and DSM-5-TR, which predicted QoL. Additionally, we found evidence towards the temporal precedence criterion of causality in the relationship between prolonged grief symptoms and QoL for the newest PGD criteria sets. Moreover, the Cummings rule (Cumming, 2009) provides evidence towards the convergent validity for both criteria sets, since the longitudinal associations between prolonged grief symptoms per ICD-11 and DSM-5-TR and QoL are similar. These findings can be important for future research as they provide a basis for establishing the validity of the construct of the new PGD versions. Future research can focus on conducting studies with other relevant criteria, for example general well-being, and examine other validity types.

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Table 1

Demographic and Loss-related Characteristics of the Sample (N=276)

Characteristics	Category	Valid *N*	Percentage	Mean	*SD*	Range
Sex	Male	22	8	-	-	-
	Female	254	92	-	-	-
Educational	Higher Education	152	55	-	-	-
level	Lower Education	124	54	-	-	-
Deceased is	Partner, lover, or spouse	126	46	-	-	-
	Parent	78	28	-	-	-
	Child	35	13	-	-	-
	Sibling	25	9	-	-	-
	Other	12	4	-	-	-
Sex of the	Male	199	72	-	-	-
deceased	Female	75	27	-	-	-
Cause of	Natural cause	209	76	-	-	-
death	Accident	23	8	-	-	-
	Suicide	43	16	-	-	-
	Murder	1	0	-	-	-
Death was:	Expected	75	27	-	-	-
	Unexpected	153	55	-	-	-
	Both or neither	48	17	-	-	-
Age in years	-	-	-	53.67	14.02	18-81
Time loss in months	-	-	-	32.29	17.21	12-61

Table 2

Dropout Analysis: Comparison between Dropout Group 1 and Opting to Continue after T1 on Sample Characteristics, T1 QoL, T1 ICD-11 Prolonged Grief Symptoms and T1 DSM-5-TR Prolonged Grief Symptoms

Variables	*t*	Pearson´s Chi-Square	Likelihood Ratio	Mean (dropout)	Mean (not dropout)
T1 ICD-11 prolonged grief symptoms	.45	-	-	38.94	39.61
T1 DSM-5-TR prolonged grief symptoms	.53	-	-	37.13	37.86
T1 QoL	-1.00	-	-	26.35	25.52
Age	.72	-	-	34.94	36.10
Time since loss	-.30	-	-	32.97	32.36
Sex	-	.56	-	-	-
Education	-	-	7.39	-	-
Relationship with deceased	-	4.25	-	-	-
Cause of death	-	-	1.58	-	-
Expectedness of death	-	5.79	-	-	-

Note. * $p < .05$. ** $p < .01$.

Table 3

Dropout Analysis: Comparison between Dropout Group 2 and Study Completers on Sample Characteristics, T1 QoL, T1 ICD-11 Prolonged Grief Symptoms and T1 DSM-5-TR Prolonged Grief Symptoms

Variables	*t*	Pearson´s Chi-Square	Likelihood Ratio	Mean (dropout)	Mean (not dropout)
T1 ICD-11 prolonged grief symptoms	-1.07	-	-	40.68	38.9
T1 DSM-5-TR prolonged grief symptoms	-.57	-	-	38.37	37.50
T1 QoL	1.50	-	-	24.74	26.06
Age	1.81	-	-	33.89	37.60
Time since loss	-1.61	-	-	34.74	30.75
Sex	-	5.58*[a]	-	-	-
Education	-	3.12	-	-	-
Relationship with deceased	-	8.80	-	-	-
Cause of death	-	-	13.43**[b]	-	-
Expectedness of death	-	1.03	-	-	-

Note. [a] Sex (females): 97% in dropout group 2, 88% in study completers; [b] Cause of death (suicide): 27% in dropout group 2, 9% in study completers

* $p < .05$. ** $p < .01$.

Table 4

Longitudinal Analyses of T1 ICD-11 Prolonged Grief Symptoms and T1 DSM-5-TR Prolonged Grief Symptoms on T2 QoL and T3 QoL while Controlling for T1 QoL

QoL	Time 2			Time 3			95% Confidence Interval for β Coefficient at T2		95% Confidence Interval for β Coefficient at T3	
	ΔF	ΔR^2	β	ΔF	ΔR^2	β	Lower	Upper	Lower	Upper
Step 1 T1 QoL	194.24	.58	.76	165.62	.56	.75	-	-	-	-
Step 2 T1 ICD-11 prolonged grief symptoms	4.54*	.01	-.14	5.00*	.02	-.15	-.27	-.00[a]	-.30	-.01
Step 1 T1 QoL	194.24	.58	.76	165.62	.56	.75	-	-	-	-
Step 2 T1 DSM-5-TR prolonged grief symptoms	5.20*	.02	-.14	4.47*	.02	-.14	-.27	-.02	-.30	-.01

Note. * $p < .05$.

Appendix A

Assumption Checks

Hypothesis 1

To investigate if the model assumptions for the regression analyses on the first hypothesis were met, several analyses were executed to check for normality of residuals, homoscedasticity, linearity, and outliers. To start off with the outliers, the variables were investigated in Supplemental Figure 1 which showed an outlier for the T1 QoL. To check whether this outlier was influential, Cook's Distance was assessed in Supplemental Table 1 (*Cook's Distance* = .004). Since the value is not larger than one, the outlier is not influential and was kept in the data. As for the assumption of normality, multiple values and figures are assessed. Firstly, the data showed to be symmetrical as the skewness values lie within the range of -0.5 and 0.5. Secondly, the kurtosis values lie within the range of -1 and 1. The significance values of the Shapiro-Wilk test show significant values for both T1 DSM-5-TR prolonged grief symptoms (p = .002) and T1 ICD-11 prolonged grief symptoms (p = .005), which means the population of the data is not normally distributed for these variables. A significant Shapiro-Wilk test is common in larger samples as it is sensitive to sample size. However, the reasonably straight lines in Supplemental Figure 2 suggest a normal distribution. Therefore, the assumption of normality is met (see Supplemental Table 2). Finally, Supplemental Figures 2 and 3 indicate that the assumption for homoscedasticity and linearity were met as the data is spread along the lines equally.

Hypothesis 2

To analyze the model assumptions for the second hypothesis, we checked for outliers, normality, homoscedasticity, linearity, and multicollinearity. The outliers of the variables were investigated in Supplemental Figure 4, this shows an outlier for the T2 QoL and T3 QoL. Cook's Distance was assessed in Supplemental Table 1, since the values are not larger

than one, the outliers are not influential and were kept in the data. For the assumption of normality multiple values and figures are assessed. Firstly, the skewness values lie within the range of -0.5 and 0.5, except for the T2 QoL variable. Secondly, the kurtosis values lie within the range of -1 and 1. The significance values of the Shapiro-Wilk test show significant values for both T1 DSM-5-TR prolonged grief symptoms (p = .002), and T1 ICD-11 prolonged grief symptoms (p = .005), T2 QoL (p = .005), and T3 QoL (p =.013) which means the population of the data is not normally distributed for these variables (see Supplemental Table 2). A violation of the assumption of normality for the Shapiro-Wilk test is common in larger samples. The reasonably straight lines in Supplemental Figure 5 and 6 suggest a normal distribution. The assumption of normality is met. The assumption of homoscedasticity is not violated as there is no pattern shown as seen in Supplemental Figure 7 and 8. Similarly, the residuals showed to be spread along the line equally (Supplemental Figures 5, 6 ,7 ,8). Therefore, the assumption of linearity also appears met. Finally, tests used to check for multicollinearity showed that this was not in concern as the correlations are all below 0.7, the VIF levels were below 10 and scores for Tolerance were higher than 0.1 (see Supplemental Table 3 and 4).

Supplemental Table 1

Cook's Distance Values for T1 QoL, T2 QoL, and T3 QoL with T1 ICD-11 Prolonged Grief Symptoms and T1 DSM-5-TR Prolonged Grief Symptoms

Variables	T1 QoL	T2 QoL	T3 QoL
T1 ICD-11 prolonged grief symptoms	.00	.01	.01
T1 DSM-5-TR prolonged grief symptoms	.00	.01	.01

Supplemental Table 2

Skewness, Kurtosis, and Shapiro-Wilk Values for T1 QoL, T2 QoL, and T3 QoL with T1 ICD-11 Prolonged Grief Symptoms and T1 DSM-5-TR Prolonged Grief Symptoms

Variables	*N*	Skewness		Kurtosis		Shapiro-Wilk	
	Statistic	Statistic	Std. Error	Statistic	Std. Error	Statistic	Sig.
Time_since_loss_1=1 (FILTER)	316	.	.	.	.	.	.
T1 QoL	276	-.10	.15	-.26	.29	.99	.18
T2 QoL	142	-.62	.20	.72	.40	.97	.01
T3 QoL	135	-.48	.21	.39	.41	.98	.01
T1 ICD-11 prolonged grief symptoms	288	-.16	.14	-.67	.29	.99	.01
T1 DSM-5-TR prolonged grief symptoms	288	-.29	.14	-.50	.29	.98	.00
Valid *N* (listwise)	276						

Supplemental Table 3

Pearson's Correlations between Variables T2 QoL and T1 ICD-11 Prolonged Grief Symptoms, T3 QoL and T1 ICD-11 Prolonged Grief Symptoms, T2 QoL and T1 DSM-5-TR Prolonged Grief Symptoms and T3 QoL and T1 DSM-5-TR Prolonged Grief Symptoms

Variables	T2 QoL	T3 QoL
	Correlation	Correlation
T1 ICD-11 prolonged grief symptoms	-.50	-.47
T1 DSM-5-TR prolonged grief symptoms	-.50	-.46

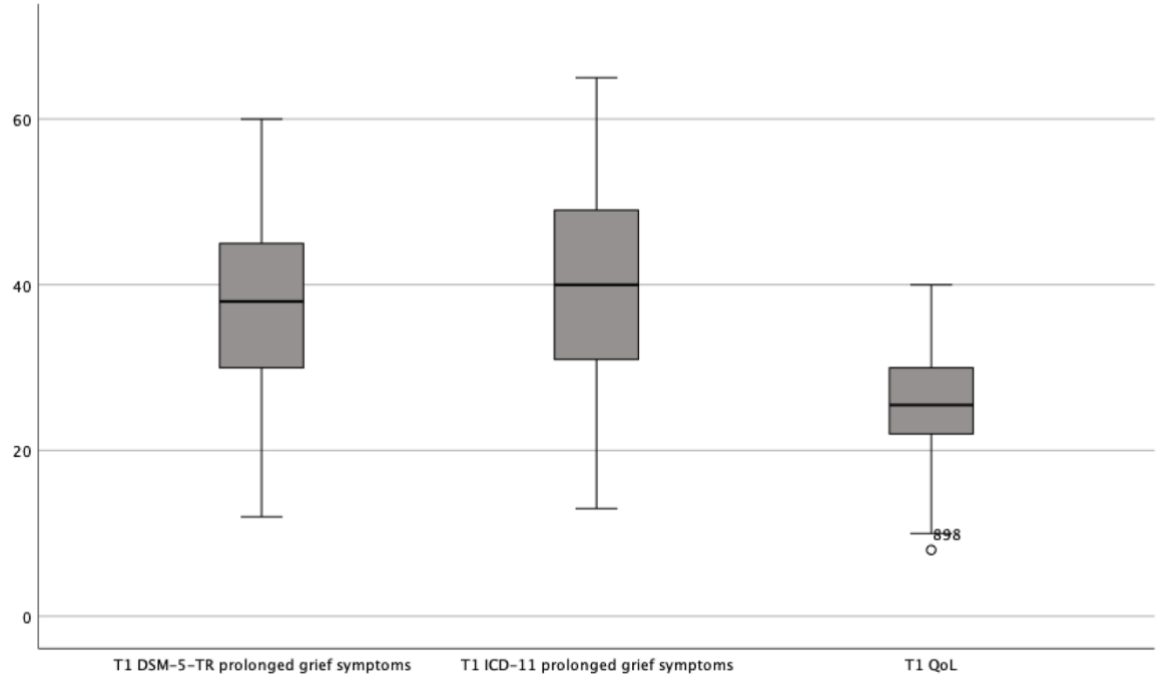
Supplemental Table 4

Tolerance and VIF Scores for the Variables T2 QoL, T3 QoL, T1 ICD-11 Prolonged Grief Symptoms and T1 DSM-5-TR Prolonged Grief Symptoms

Variables	T2 QoL		T3 QoL	
	Tolerance	VIF	Tolerance	VIF
T1 ICD-11 prolonged grief symptoms	.72	1.39	.77	1.30
T1 DSM-5-TR prolonged grief symptoms	.73	1.36	.78	1.28

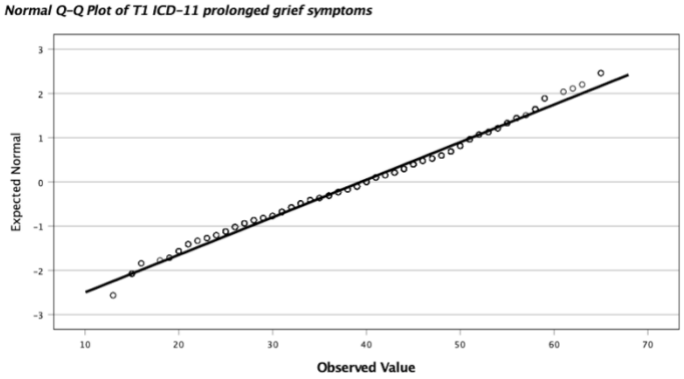
Supplemental Figure 1

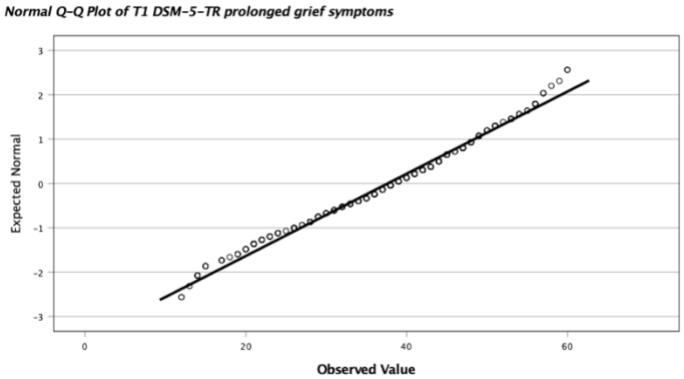
Boxplots for T1 DSM-5-TR Prolonged Grief Symptoms, T1 ICD-11 Prolonged Grief Symptoms, and T1 QoL

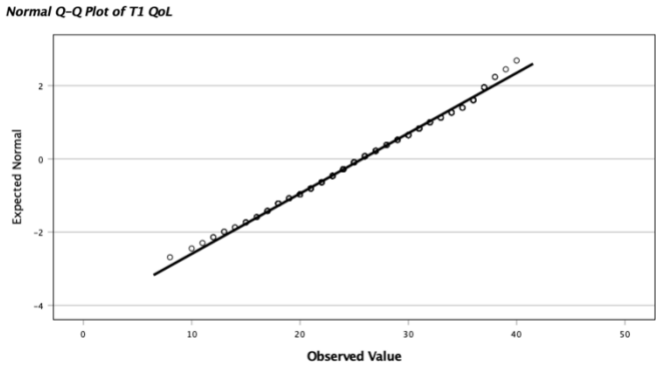


Supplemental Figure 2

Normal QQ-plots for T1 QoL, T1 ICD-11 Prolonged Grief Symptoms, and T1 DSM-5-TR Prolonged Grief Symptoms

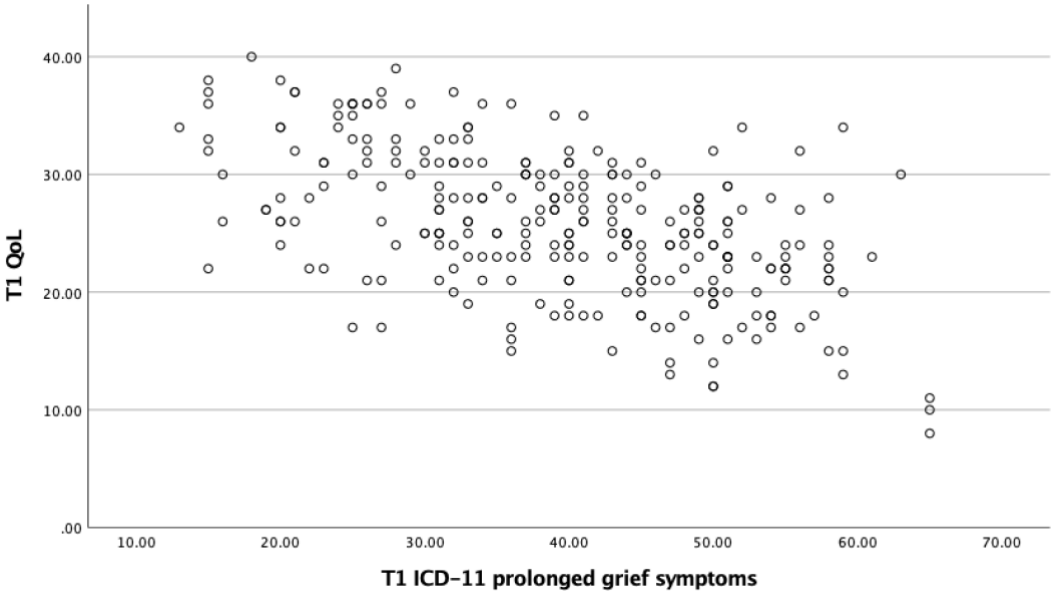


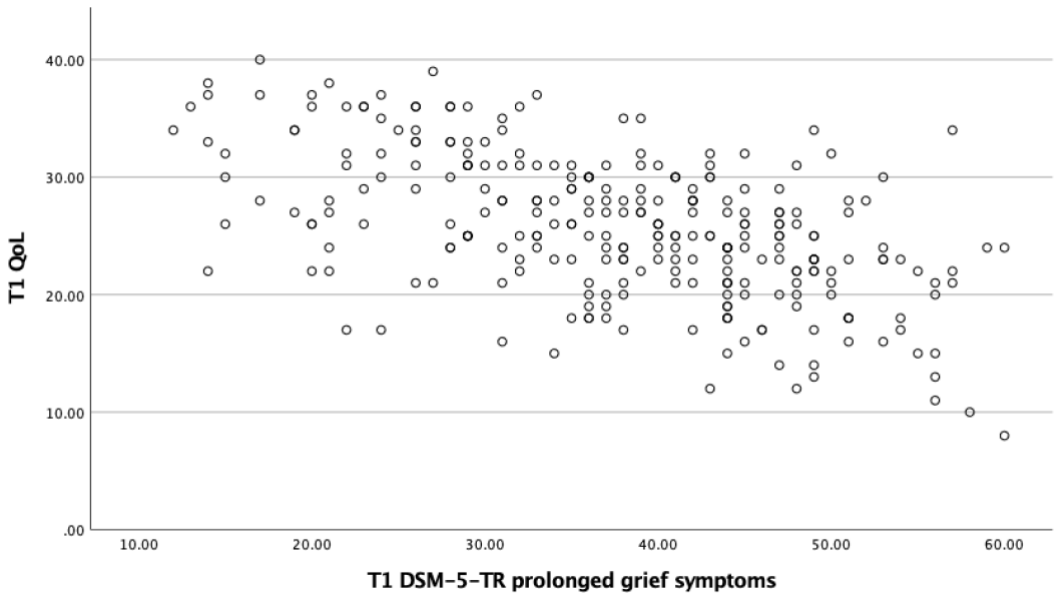




Supplemental Figure 3

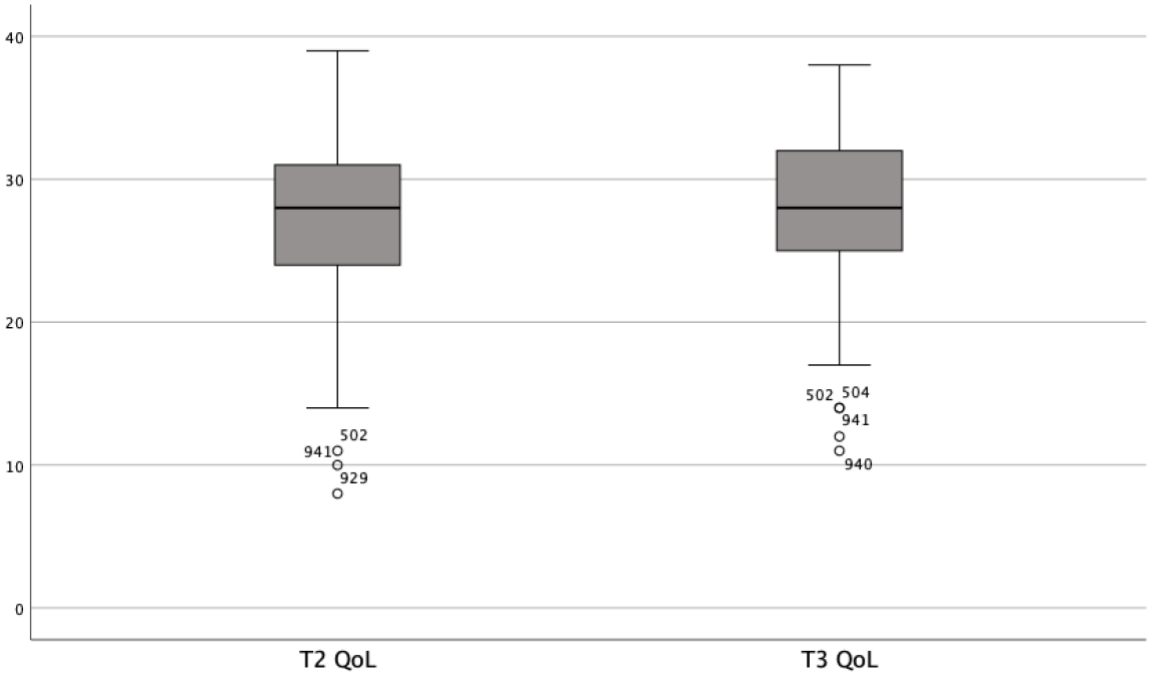
Scatterplots Showing the Relationship between T1 ICD-11 Prolonged Grief Symptoms and T1 QoL, and between T1 DSM-5-TR Prolonged Grief Symptoms and T1 QoL





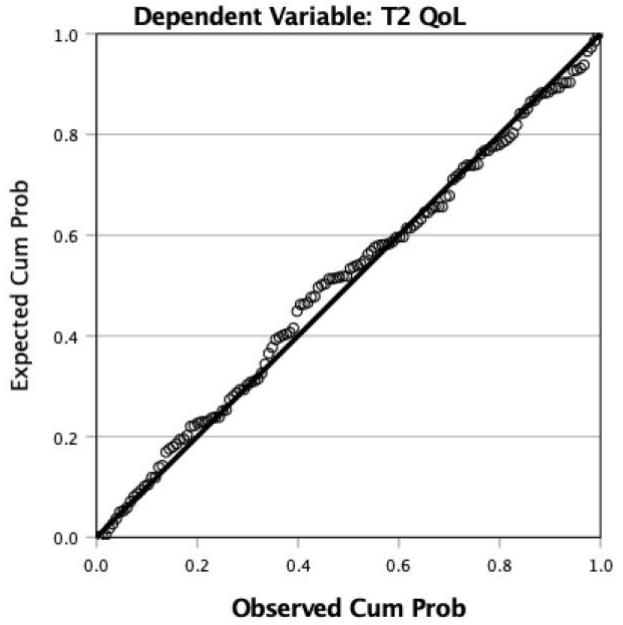
Supplemental Figure 4

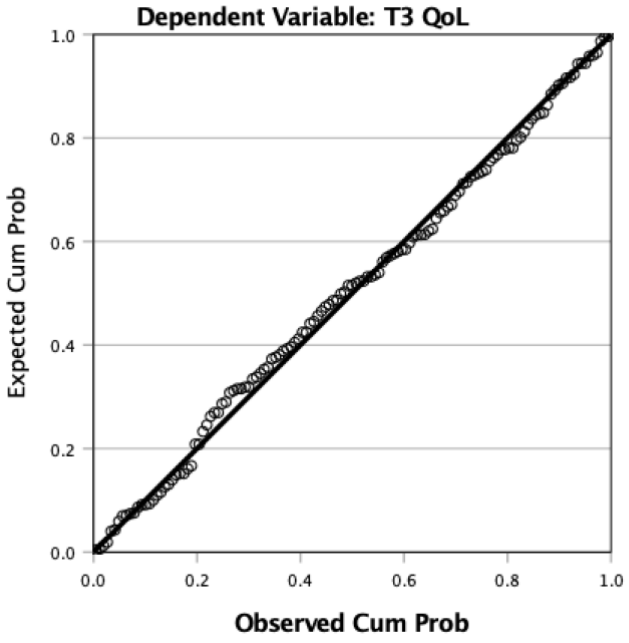
Boxplots for T2 QoL and T3 QoL



Supplemental Figure 5

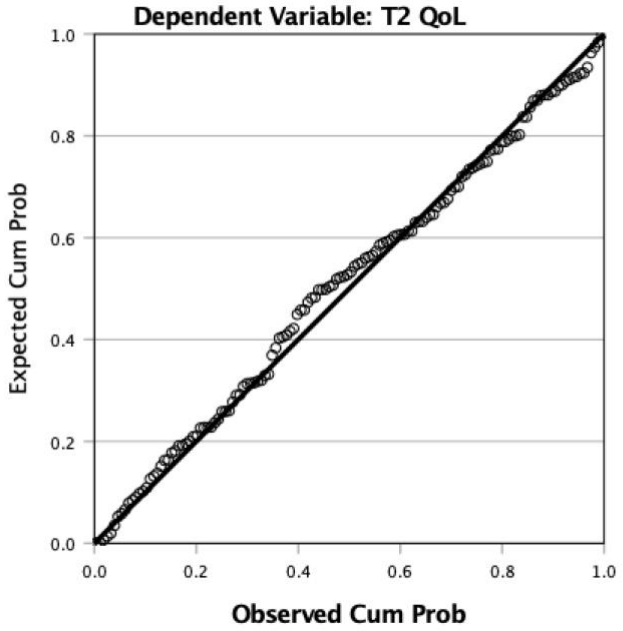
Normal PP-plots for T2 QoL and T3 QoL with T1 ICD-11 Prolonged Grief Symptoms

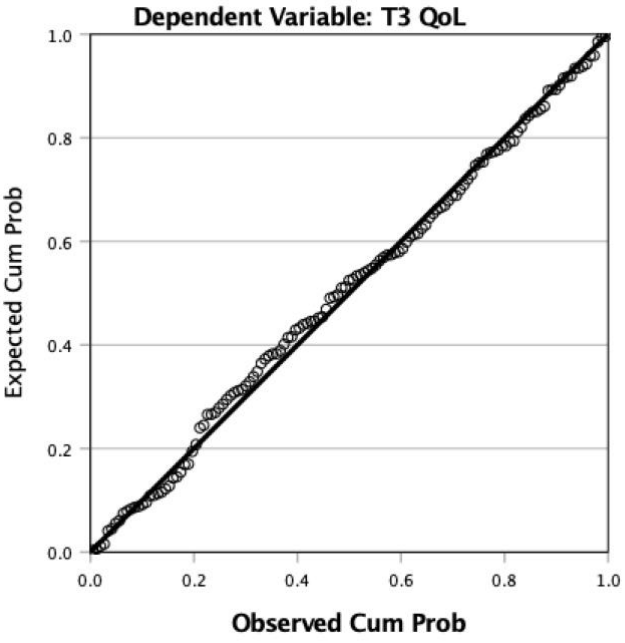




Supplemental Figure 6

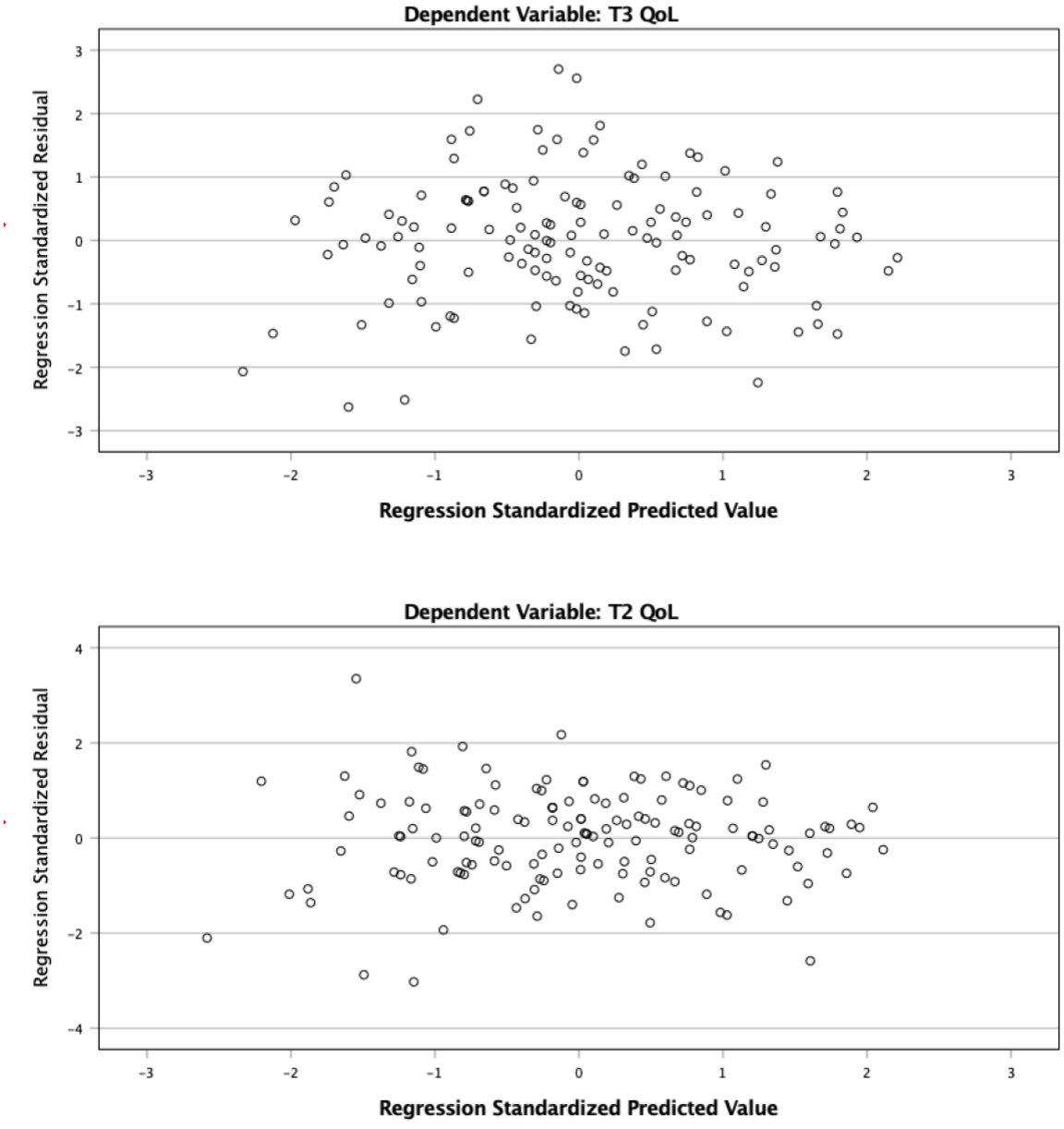
Normal PP-plots for T2 QoL and T3 QoL with T1 DSM-5-TR Prolonged Grief Symptoms





Supplemental Figure 7

Scatterplots of the Standardized Residuals for T2 QoL and T3 QoL with T1 ICD-11 Prolonged Grief Symptoms



Supplemental Figure 8

Scatterplots of the Standardized Residuals for T2 QoL and T3 QoL with T1 DSM-5-TR Prolonged Grief Symptoms