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Research paper

The adolescent grief inventory: Development of a novel grief measurement

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ABSTRACT

Background: To develop an empirically derived, reliable and valid measure of grief in adolescents, aged 12–18 years old.

Methods: An online survey comprising 59 items derived from a qualitative study of 39 bereaved adolescents, the Hogan Inventory of Bereavement Children and Adolescents (HIB), the Depression, Anxiety and Stress Scales (DASS-21), the Multidimensional Scale of Perceived Social Support (MSPSS), and a series of death- and mental health-related questions, targeted adolescents bereaved when aged 12–18 years, with 176 adolescents (80.6% girls) completing the survey.

Results: Factor Analysis of the 59-items resulted in a final solution, the Adolescent Grief Inventory (AGI) comprised of 40 items and 6 factors: Sadness, Self-blame, Anxiety and Self-harm, Shock, Anger and Betrayal, and Sense of Peace, with indices of good fit (RMSEA = 0.057, CFI = 0.952, TLI = 0.948). There was strong evidence of convergent (HIB) and divergent (MSPSS) validity. Adolescents bereaved by suicide scored higher on Self-blame, Anger and Betrayal while those with a history of suicidal behaviour or having a mental health diagnosis scored higher overall than those who had not.

Limitations: Study limitations include the self-selected, mostly female, sample, a high proportion of participants with a mental health and self-harm history, and reliance on self-reported data.

Conclusions: The AGI is a novel, comprehensive and valid measure of grief in adolescents. It can be used broadly, including with bereaved adolescents at-risk of mental health ramifications.

1. Introduction

About half of adolescents experience the death of a significant other such as a family member or a friend over a year (Rheingold et al., 2004), and most adolescents lose a relative or friend before adulthood (Harrison and Harrington, 2001). Experiencing a death potentially affects the bereaved adolescent's short- and long-term quality of life (Balk, 2014; Stroebe et al., 2008). Due to biopsychosocial changes in the transition from childhood to adulthood, bereaved adolescents in particular have increased risks of problems related to physical, and mental health and social functioning (Feigelman et al., 2017). Typical adolescent acute grief reactions include shock, sadness, numbness, yearning, guilt, anger, and distress. They frequently report feeling ill, physical pain, and sleeping problems (Luecken, 2008). Bereaved adolescents often struggle with 'meaning-making', forgo the sense of personal invulnerability, and have increased risks of depression, anxiety, post-traumatic stress disorder, and suicidal ideation in the first months after the bereavement (Brent et al., 2009; Stikkelbroek et al., 2016). Bereaved adolescents may commence risky behaviors such as smoking, drinking or fighting, particularly during the first years after the loss (Feigelman et al., 2017; Hamdan et al., 2012). Adolescents losing a parent have higher long-term risks of psychiatric problems, attempted suicide, and violent behaviour (Berg et al., 2016; Jakobsen and Christiansen, 2011; Wilcox et al., 2010).

Conversely, bereaved adolescents may experience long-term positive reactions: increased appreciation of life, maturity, empathy and compassion for others (Andriessen et al., 2017, 2018a; Balk, 2014). Whereas a variety of grief reactions are possible, including positive reactions, the pathways of personal growth of bereaved adolescents are yet to be studied (Meyerson et al., 2011). Research with young adults indicates that a minimum level of distress is necessary for personal growth, but there is no linear relationship between the levels of distress and personal growth (Taku et al., 2015). Attachment styles (including the continuing bond with the deceased), coping styles (e.g., self-disclosure), relationships (e.g., social support), and psychological factors (e.g., resilience and meaning making) affect the pathways of personal growth after suicide (Genest et al., 2017). According to a contemporary grief model, the Dual-Process Model of coping with bereavement (Stroebe and Schut, 2010), grieving individuals oscillate between loss-oriented and restoration-oriented stressors, though research with

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bereaved adolescents is needed.

Several factors may affect the intensity or duration of the grief. However, specifically among adolescents the effect of these factors is inconclusive. The sex and age of the bereaved adolescent, the kinship and psychological closeness of the relationship, the number of deaths experienced, the expectedness of the death, and time since the loss, are inconclusive mainly because of a shortage of research (Balk, 2014). Social support facilitates grief outcomes; however, finding appropriate and sufficient social support is a challenge for bereaved adolescents (Andriessen et al., 2016). Family may be preoccupied with their own grief, friends may lack the necessary skills, and in general, adolescent grief may go unnoticed for others. High self-reliance is common among bereaved adolescents and they may not feel a need to share their grief even if social support (family or friends) is available (Andriessen et al., 2018a).

Bereavement research, including adolescent research, has been criticised for relying on psychiatric rather than grief scales (Neimeyer and Hogan, 2001). Though psychiatric scales may capture common grief feelings, such as depressed mood, they often overlook grief-specific characteristics such as yearning. Also, pathology-focused measurements dismiss grief as a natural reaction to major loss, and overlook positive grief feelings like relief, or outcomes like personal growth. Lastly, research into complicated or prolonged grief, distinct from other disorders, has stimulated development of designated measures such as the Inventory of Prolonged Grief (IPG) for Children and Adolescents (Spuij et al., 2012), derived from the adult version of the IPG. Though such diagnostic instruments provide insight into maladaptive or pathological reactions, arguably no claims regarding complicated grief are valid in the absence of reliable measurements of the variety of "normal" grief reactions (Neimeyer and Hogan, 2001). While the criticism was formulated over 15 years ago, it still holds true for adolescent bereavement research (Stroebe et al., 2013). Over the decades, most progress has been made in adult bereavement studies. Adolescent research is lagging behind, mainly due to a lack of validated measures, a focus on selected relationships (e.g., death of a parent), and reliance on clinical samples (Kaplow et al., 2012). The developmental context of bereaved children and adolescents would be more important than for adults. Hence, empirically derived adolescent grief instruments which have stronger internal validity than expert-based instruments, and mixed-methods approaches combining insights from qualitative research and quantitative data, have been recommended to further adolescent bereavement research (Kaplow et al., 2012; Neimeyer and Harris, 2011).

A review (Neimeyer et al., 2008) of grief instruments identified only one adolescent scale, the Hogan Sibling Inventory of Bereavement (HSIB) (Hogan, 1987; Hogan and DeSantis, 1996; Hogan and Greenfield, 1991), and we could not find any other measure of normal or uncomplicated grief in adolescents. The 46-item Hogan Inventory of Bereavement - Children and Adolescents (HIB) was derived partly empirical, partly expert-based from the 109-item HSIB to apply it to all adolescents, aged 12–18 years. However, apart from Blankemeyer (1993) we could not find a study that used the HIB. Also, though the two HIB factors appear to be valid for bereaved adolescents (Blankemeyer, 1993), it is conceivable that adolescent grief entails more characteristics than the two Grief, and Personal Growth factors. For example, an empirically developed grief instrument for adults consists of six factors (Hogan and Schmidt, 2002). Clearly, adolescent grief requires an empirically developed, contemporary, reliable and comprehensive instrument.

Our aim was to develop empirically a valid grief measurement for adolescents, aged 12–18 years; hereafter "Adolescent Grief Inventory (AGI)". We hypothesised: i) that the development of the AGI would identify novel items and important characteristics of adolescent grief not captured by the HIB; ii) the AGI scores would correlate strongly with the HIB Grief, a convergent measure; iii) the AGI would not correlate with HIB Personal Growth, a divergent measure; iv) the AGI would correlate positively with distress as measured by the Depression, Anxiety, and Stress Scales (DASS-21) (Lovibond and Lovibond, 1995), and with self-rated severity of impact of the other person's death; v) and no correlation with a divergent measure of social support, the Multidimensional Scale of Perceived Social Support (MSPSS) (Zimet et al., 1988), nor with age and sex of bereaved adolescents, number of deaths experienced, time since death of the significant other, self-rated closeness or expectedness of the other's death. Further, we wanted to investigate if the AGI discriminates between groups based on cause of death of the significant other, kinship with the deceased, and mental health status of participants.

2. Methods

2.1. Study design and sampling

First, we undertook a qualitative study to investigate the grief, mental health and help-seeking experiences of adolescents. Participants were eligible i) if a family member or friend died through any cause when participants were 12–18 years old, and ii) participants experienced the death between 6 months and ten years before participation. We conducted semi-structured telephone interviews with 39 participants who were 13–27 years old at the time of the interview. The methodology and results of that study are reported elsewhere (Andriessen et al., 2018a, 2018b). The AGI items were developed through an iterative process from NVivo-generated Node reports of acute and long-term grief experiences reported during the interviews (QSR, 2014). Attention was given to negative and positive grief reactions, and grief reactions after any cause of death. The process resulted in 59 statements reflecting the variety of adolescents' grief feelings, thoughts, sensations and behaviours. Wording was kept close to their statements.

Next, an online questionnaire was created using KeySurvey, which was accessible from April to June 2017. We applied the same eligibility criteria as above. Participants were recruited through grief and youth organizations, announcements on posters, flyers, websites, Facebook (Griefofadolescents.study), paid Facebook and Instagram advertisements, and they could enrol in a draw to win a $50.00 gift voucher. All participants provided online consent, and parental/guardian consent was obtained for those below age 18. The Human Research Ethics Committee of the University of New South Wales (HC15088) approved the study.

2.2. Measures

Adolescent Grief Inventory (AGI): Participants used a 5-point Likert scale, ranging from "1. Not at all" to "5. Extremely", to rate how much the 59 items of the draft AGI applied to them in the first month after the death (T1), as well as in their current situation (past month, T2). Sample items included: "2. I felt sad", and "39. I felt a sense of peace". Cronbach's alpha was 0.94 both for T1 and T2.

Hogan Inventory of Bereavement - Children and Adolescents (HIB): the 46-item scale measures Grief (for example, "6. I have no control over my sadness") and Personal growth (for example, "2. I believe I am a better person"). Items are rated on a 5-point Likert scale, ranging from "1. Does not describe me at all" to "5. Describes me very well". Scores are summed on each subscale. Higher scores indicate stronger grief symptoms (range 24–120), or more personal growth (range 22–110). Cronbach's alpha was established at 0.90–0.95 for the Grief factor, and 0.88–0.90 for the Personal Growth factor (Neimeyer et al., 2008). The values in our sample were 0.94 and 0.91, respectively.

Depression, Anxiety, and Stress Scales (DASS-21): Participants rate the 21 items on a 4-point scale on how much it applied to them during the past week, ranging from "0. Never" to "3. Almost always". Higher scores on each subscale (range 0–21) and the total scale (range 0–63) indicate more severe symptoms. Cronbach's alpha in a normative

sample of Australian adolescents was established at 0.88 (depression), 0.79 (anxiety), 0.82 (stress), and 0.93 (total) (Tully et al., 2009). The values in our sample were 0.93, 0.90, 0.89, and 0.96, respectively.

Multidimensional Scale of Perceived Social Support (MSPSS): This 12-item scale assesses perceived social support from family, friends, and any significant other (Zimet et al., 1988). Participants rate each item on a 7-point scale on how much it applied to them during the past weeks ("1. Disagree very strongly" to "7. Agree very strongly"). Higher scores indicate more perceived social support. Cronbach's alpha for the three subscales and total scale were established at 0.87, 0.85, 0.91, and 0.88 (Zimet et al., 1988), and in our sample: 0.93, 0.95, 0.96, and.92.

Psychological closeness, expectedness of the death, and perceived impact of the death, were each assessed through one question developed for the current study ("How close did you feel to the person who died?", "Did you expect the person to die at that time?", "Thinking about the effect of the person's death on your life until now, how strong is the effect?"). Participants rated each question on a 5-point Likert scale from 1 ("Not close at all", "Not at all", "No effect") to 5 ("Extremely close", "Extremely expected", "Extremely strong effect").

2.3. Analyses

We used SPSS version 22, Mplus version 8 (Muthén and Muthén,1998–2017), and R (R Core Team, 2017). Items were treated as categorical using the default Mplus estimator (WLSMV). We ran a series of exploratory factor analyses (EFA) with T1 and T2 data of the 59-items AGI to reduce the number of items and determine the factor structure. We used the GEOMIN rotation with oblique factors or the bi-factor rotation. We examined the effects of including one or two method factors related to positively-worded and negatively-worded items, and for the utility of rotation to a bi-factor-solution. Lastly, on the final reduced set of items we fitted a confirmatory-like factor analysis (CFA). Convergent and divergent validity was assessed through bivariate correlations with the HIB, DASS-21, MSPSS, closeness of the relationship, and expectedness and perceived impact of the death. Number of deaths experienced and months since the death were also assessed with bivariate correlations. One-way ANOVA was used to assess differences by participant sex, cause of death of the significant other, kinship, living together with the deceased, and participants' having received a mental health diagnosis, having experienced suicidal ideation, or having engaged in deliberate self-harm or attempted suicide. To adjust for the problem of type I error inflation under multiple testing, we used the function *p.adjust* in R (R Core Team, 2017) to control the false discovery rate using the method of Benjamini and Hochberg.

3. Results

3.1. Sample

In total, 165 individuals completed all components of the questionnaire. It was predetermined that completing the grief (AGI, HIB), mental health (DASS-21), and social support (MSPSS) measures was essential for study inclusion. Hence, a further 11 individuals who had missed the final questions on mental health diagnosis and suicidal behaviour were also included, resulting in a total sample N = 176. Table 1 summarizes the sociodemographic characteristics. Approximately half of the participants reported having received a mental health diagnosis (51%), or having engaged in self-harming behaviour (51%). The lifetime prevalence of deliberate self-harm in Australian adolescents has been estimated at 11%, past-year prevalence among adolescents with major depression at 46%, and past-year prevalence of mental disorders at 14% (Lawrence et al., 2015). Hence, our sample is skewed towards a clinical population.

3.2. Exploratory factor analysis

For the initial 59 items the number of eigenvalues > 1 indicated a 13-factor solution at T1 (12-factor at T2), while parallel analysis indicated 6 factors at T1 and T2. Items were deleted through a process of constant comparison across different solutions. Criteria for deletion included: i) if items were repetitive, i.e., if an item with similar meaning loaded on the same factor (nine items); or ii) if items had a low loading (below 0.350) on one or two factors (ten items). Three items (24, 33, 46) which loaded low on one factor but higher on another factor were restricted to the latter. The final solution, presented in Tables 2 and A1, consisted of 40 items and 6 factors, accounting for 58.01% and 60.75% of the variance in T1 Total and T2 Total, respectively. We labelled the factors: 1. Sadness (11 items), 2. Self-blame (5 items), 3. Anxiety and self-harm (8 items), 4. Shock (4 items), 5. Anger and betrayal (5 items), and 6. Sense of peace (7 items). Cronbach's alpha for the total AGI was 0.93 at T1 and T2. The values for the six factors were 0.91, 0.85, 0.87, 0.75, 0.84, and 0.76, at T1; and 0.93, 0.85, 0.87, 0.69, 0.82, and 0.76, at T2. As such, the total scale and subscales show high internal consistency, bearing in mind the low number of items in factor 4.

3.3. Confirmatory-like factor analysis

The final 40 items were re-analysed, but with each item set to load only on its assigned factor. The model fit indices (Root Mean Square Error of Approximation, Comparative Fit Index, and Tucker-Lewis Index) detailed in Tables 2 and A1 all indicate good fit. Table A2 presents the correlations between the AGI factors.

3.4. Convergent and divergent validity

Table 3 details the correlations of the AGI T1 and T2 total and factor scores with the other measures. As hypothesised, the AGI total and factor scores correlated positively with the HIB Grief, except for Factor 6 (Sense of Peace) which correlated negatively, and correlated weakly with the HIB Personal Growth. Also, the AGI scores correlated positively with the DASS-21 total and subscales, except for the negatively correlated Factor 6, and the AGI total and factor scores correlated positively with self-rated severity of impact of the death, again except for Factor 6. Contrary to our hypothesis, a weak negative correlation existed between AGI scores and the MSPSS total and subscales, especially Factors 1 (Sadness), 3 (Anxiety and self-harm) and 5 (Anger and betrayal), and a positive correlation with Factor 6 (Sense of peace). Lastly, as hypothesised, no correlation of the AGI and factor scores existed with self-rated closeness except for a weak positive correlation at T1, and no correlation with Expectedness except for Factor 4 (Shock, negatively correlated), and Factor 6 (Sense of Peace, positively correlated).

Comparing AGI and HIB scores in detail reveals unique AGI features. Whereas the two HIB scales distinctly correlate either positively (e.g. HIB Grief - DASS-21), negatively (e.g., HIB Grief – MSPSS), or not (e.g., HIB Personal Growth–DASS-21), the AGI 6 Factor model provided more descriptors germane to the grief experience. For example, AGI Factors 3 (Anxiety and self-harm), 1 (Sadness), 5 (Anger and betrayal), and 2 (Self-blame) correlated with the DASS-21 total scores; and the AGI Factors 5 (Anger and betrayal) and 3 (Anxiety and self-harm) correlated negatively with social support, whereas Factor 6 (Sense of peace) was strongly positively correlated.

3.5. Distinctions and commonalities between the AGI and HIB

Both instruments include items regarding sadness, yearning, anxiety and guilt. However, the AGI discloses topics not covered by the HIB: feelings of shock, anger, betrayal, self-blame, self-harm, and feelings of injustice and helplessness. In addition, Factor 6 entails unique positive feelings such as gratitude and relief, which explains the divergent scores of this factor. Conversely, the HIB Personal Growth factor

Table 1
Sociodemographic variables (N = 176).

Sociodemographic variables		*N*	% or *M, SD*
Age	Range 12–28 Median = 20	*N* = 176	*M* = 19.87 *SD* = 3.89
Sex	Female/Male	*n* = 137/33	80.6%/19.4%
Location	NSW/Other state	*n* = 86/90	48.9%/51.1%
Remoteness	City/Other (N = 169)	*n* = 142/27	84%/16%
Ethnicity	Caucasian/Other	*n* = 127/49	72.2%/27.8%
Having a religion	Yes/No	*n* = 60/116	34.1%65.9%
Relationship status	Single, never married/Other	*n* = 160/16	90.9%/9.1%
Living condition	With parents and siblings (if any)	*n* = 117	66.5%
	With friends, flatmates, …	*n* = 22	12.5%
	With partner, spouse, and children (if any)	*n* = 19	10.8%
	Other family, mixed relationships, or single	*n* = 18	10.2%
Occupation	Student/Working, unemployed, other	*n* = 128/48	72.7%/27.3%
No of deaths when 12–18	Range 1–8 Median = 2	*N* = 176	*M* = 2.49 *SD* = 1.49
Months since death	Range 6–125 Median = 46.50	*N* = 176	*M* = 55.45 *SD* = 39.03

Table 2
AGI 6 factor solution, confirmatory factor analysis with T1 data*.

Item	Label	F1 Sadness	F2 Self-blame	F3 Anxiety Self-harm	F4 Shock	F5 Anger betrayal	F6 Sense of peace
2	I felt sad	0.744					
5	I cried more than usual	0.798					
6	I felt numb	0.653					
17	I was overwhelmed	0.839					
32	I felt miserable	0.895					
38	I felt lonely	0.801					
49	I felt empty	0.842					
50	I put on a brave face	0.434					
55	I felt so unjust/unfair that he/she had to die	0.660					
56	I could not get it out of my mind	0.860					
57	I felt helpless there was nothing I could do	0.804					
1	I felt guilty		0.774				
26	I was angry at myself		0.919				
33	I felt regrets		0.877				
36	I felt ashamed		0.686				
41	I felt responsible		0.826				
8	I was anxious			0.783			
9	I worried that other people would die as well			0.565			
10	I had nightmares			0.720			
42	I had a panic attack			0.826			
46	I had difficulties sleeping			0.884			
47	I was experiencing difficulties with eating			0.825			
52	I had thoughts about killing myself			0.851			
53	I deliberately caused harm to myself			0.774			
3	I was shocked				0.778		
23	I felt confused				0.910		
25	I thought that the death could have been prevented				0.640		
34	I was surprised				0.680		
27	I was angry at him/her					0.635	
28	I was angry at others					0.797	
30	I felt betrayed					0.821	
31	I felt rejected					0.848	
40	I felt abandoned					0.902	
7	I was calm and focused on the things I had to do						0.650
14	I felt prepared to deal with the loss						0.755
24	I was grateful that he/she was no longer suffering						0.404
35	I felt relieved						0.428
37	I felt happy						0.646
39	I felt a sense of peace						0.700
58	I felt at ease with his/her death it was all right						0.862
Variance accounted (%)		16.30	8.06	12.39	5.64	8.01	7.61
Indices of fit							
RMSEA	Root Mean Square Error of Approximation	0.062					
CFI	Comparative Fit Index	0.935					
TLI	Tucker-Lewis Index	0.930					

* A similar final solution with T2 data is included in the supplement (Table A1).

includes items related to valuing self, others or life, not covered by the AGI. Regarding the style of wording, the AGI comprises mainly short, direct statements (for example: "1. I felt guilty"), whereas the HIB includes several compound statements (for example: "12. I get a sick feeling when I am feeling happy").

3.6. Discriminate validity: Sociodemographic and mental health variables

3.6.1. Cause of death of the significant other

Cause of death – categorised as: natural, suicide, and other (i.e., accident, homicide, unknown) – had a significant effect on T1, and T2

Table 3
Correlations between AGI T1 and T2 Factors and Totals, and other measures.

	HIB Grief	HIB Pers. Growth	DASS Depr.	DASS Anx.	DASS Stress	DASS Total	MSPSS Family	MSPSS Friends	MSPSS Sign. Other	MSPSS Total	Close-ness	Expec-ted	Perc. impact
AGI Factors at T1													
T1 F1 Sadness	**.548**	**.284**	**.452**	**.482**	**.450**	**.502**	−0.152	−0.060	−0.040	−0.106	**.429**	−0.131	**.630**
T1 F2 Self-blame	**.495**	.183	**.448**	**.388**	**.434**	**.461**	−0.104	−0.134	−0.012	−0.104	**.279**	−0.158	**.398**
T1 F3 Anxiety-Self-harm	**.647**	.173	**.508**	**.675**	**.614**	**.649**	**−0.321**	−0.131	−0.075	**−0.221**	**.230**	−0.163	**.490**
T1 F4 Shock	**.271**	**.258**	.201	**.335**	**.281**	**.295**	.014	−0.069	.022	−0.013	.076	**−0.575**	**.340**
T1 F5 Anger-Betrayal	**.459**	.205	**.372**	**.385**	**.414**	**.424**	−0.203	−0.064	−0.014	−0.118	**.273**	−0.158	**.444**
T1 F6 Sense of peace	−0.110	.087	−0.131	−0.132	−0.095	−0.131	**.221**	.138	**.210**	**.240**	−0.057	**.522**	−0.057
T1 Total	**.635**	**.297**	**.512**	**.589**	**.570**	**.605**	−0.187	−0.093	−0.004	−0.118	**.351**	−0.162	**.611**
AGI Factors at T2													
T2 F1 Sadness	**.807**	.151	**.689**	**.647**	**.671**	**.728**	**−0.223**	**−0.214**	−0.109	**−0.229**	**.256**	−0.058	**.565**
T2 F2 Self-blame	**.575**	.151	**.524**	**.463**	**.488**	**.536**	−0.166	**−0.212**	−0.018	−0.165	.081	−0.146	**.372**
T2 F3 Anxiety-Self-harm	**.767**	.097	**.670**	**.739**	**.723**	**.772**	**−0.323**	−0.178	−0.064	**−0.237**	.108	−0.047	**.423**
T2 F4 Shock	**.470**	**.235**	**.401**	**.484**	**.453**	**.484**	−0.041	−0.174	.067	−0.061	.002	**−0.353**	**.334**
T2 F5 Anger-Betrayal	**.594**	.102	**.537**	**.475**	**.484**	**.544**	**−0.293**	**−0.226**	−0.079	**−0.250**	.139	−0.102	**.432**
T2 F6 Sense of peace	**−0.294**	**.297**	**−0.314**	**−0.249**	**−0.282**	**−0.307**	**.224**	**.402**	**.340**	**.406**	−0.086	.180	−0.126
T2 Total	**.773**	**.233**	**.663**	**.669**	**.669**	**.726**	**−0.229**	−0.158	.000	−0.162	.162	−0.091	**.524**
HIB Factors													
HIB Grief	–	.137	**.740**	**.726**	**.759**	**.807**	**−0.259**	**−0.311**	−0.154	**−0.303**	**.210**	−0.002	**.492**
HIB Personal Growth	.137	–	−0.049	.059	.046	.018	**.358**	**.295**	**.284**	**.394**	.148	−0.113	**.271**

AGI: Adolescent Grief Inventory; HIB: Hogan Inventory of Bereavement Children and Adolescents; DASS21: Depression, Anxiety and Stress Scale; MSPSS: Multidimensional Scale of Perceived Social Support. Closeness, Expectedness, Perceived impact: one-question measures developed for the study.
Pearson correlations in bold are significant at the 0.01 level (two-tailed), p values adjusted via control of false discovery rate.

total scores (Table 4). Tukey HSD post-hoc tests show that the suicide bereaved group scored higher than the natural causes group at T1 (p = .014) and T2 (p = .005). Significant differences also existed for T1 Factors 3, 4, 5 and 6, and T2 Factors 2, 4 and 5. Tukey HSD post-hoc tests show that T1 'Anxiety-Self-harm' was lower after natural deaths compared to suicide, T1 'Shock' was lower after natural deaths compared to both other groups, and T1 'Sense of Peace' was lower after other deaths compared to both other groups. T1 and T2 'Anger-Betrayal' were higher among the bereaved by suicide group, as well as T2 'Self-blame', compared to the other groups. The findings indicate that the AGI discriminates grief aspects resulting from different modes of death.

3.6.2. Kinship, and living together with deceased

In addition to the self-rated psychological closeness, we compared the effect of two other indicators of closeness (Table A3). Kinship (blood-related closeness) was categorised as '1st Degree Family', 'Other Family', and 'Non-Family'. Living together with the deceased at time of death (physical closeness) was dichotomised as Yes or No. Regarding kinship, significant differences existed for all AGI scores, except for T2 'Self-blame', 'Anxiety-Self-harm', and 'Sense of Peace'. Tukey HSD post-hoc tests show that among 1st degree Family, T1 and T2 'Anger-Betrayal' exceeded other groups, and T1 and T2 'Sadness' were higher compared to 'Other Family'. T1 'Anxiety-Self-harm', and T1 and T2 'Shock' were higher among 'Non-Family' compared to 'Other Family', and T1 'Sense of Peace' was lower among 'Non-Family' compared to 1st Degree and Other Family. Overall, Other Family had lower Total T1 scores than the other groups, and lower Total T2 scores than 1st Degree Family. Living together with the deceased at time of death had no effect on AGI scores.

All AGI scores correlated non-significant negatively with Months since Death (Table 4), indicating that grief intensity decreases over time, reflected in lower T2 compared to T1 scores. Further, as expected, no differences existed in AGI scores regarding participant sex or age, or total number of deaths experienced (Table A4). Overall, the AGI differentiated grief experiences of kinship groups.

3.6.3. Mental health, and suicidal behaviour

First, we compared the AGI scores of participants who ever had received a mental health diagnosis with those who had not or did not know (Table 5). Next, we distinguished between having received a mental health diagnosis before or after the index death, and compared the AGI scores with the no-diagnoses group. Overall, those who were diagnosed after the index death had the highest scores. Post-hoc Tukey HSD tests show that they scored higher than both other groups on T1 'Anxiety-Self-harm', and higher than the no-diagnoses group on T1 and T2 'Self-blame', T1 'Anger-Betrayal', T2 'Sadness', T2 'Anxiety-Self-harm', T2 'Shock', T1 Total, and T2 Total.

Further, comparing the effect of ever having received mental health treatment we found significant differences in T1, and T2 Total scores, and in the same T1 and T2 AGI Factors as with mental health diagnosis. Scores were higher among those who received treatment compared to those who did not (Table 5).

Finally, we tested the effect of participants ever having engaged in deliberate self-harm, having experienced suicidal ideation, or having attempted suicide (Table A5). All AGI Factors were significantly higher among those with deliberate self-harm, suicidal ideation (except Factor 6), and behaviour (except Factor 4). A one-way ANOVA comparison of having received a mental health diagnosis, mental health treatment, having experienced suicidal ideation, or having engaged in deliberate self-harm or attempted suicide found significant effects ($p < .001$) on DASS-21 Total and subscale scores (data not shown). The findings demonstrate that the AGI discriminates between different groups based on mental health status, and suicidal behaviour.

Table 4
Means and Standard Deviations (SD) of AGI and HIB related to Cause of Death, and correlation with Months since Death.

	Total (N = 176)	Cause of death[a]				Months since death
	Mean (SD)	Natural (n = 109) Mean (SD)	Suicide (n = 37) Mean (SD)	Other (n = 30) Mean (SD)	*Adj. p*	r[c]
AGI Factors at T1						
T1 F1 Sadness	42.43 (10.17)	41.30 (10.66)	43.54 (10.50)	45.13 (7.16)	.170	−0.097
T1 F2 Self-blame	13.55 (5.54)	13.07 (5.36)	15.19 (6.20)	13.27 (5.10)	.170	−0.067
T1 F3 Anxiety-Self-harm	22.36 (8.95)	20.82[b] (8.87)	24.38 (9.19)	25.50[b] (7.83)	.020	−0.135
T1 F4 Shock	14.18 (4.13)	12.50[b] (3.90)	16.92 (2.88)	16.90 (2.88)	.000	−0.008
T1 F5 Anger-Betrayal	11.09 (5.69)	10.10 (5.44)	14.14[b] (6.63)	10.93 (3.90)	.003	.041
T1 F6 Sense of peace	13.68 (4.83)	14.92 (4.70)	13.03 (4.84)	9.97[b] (2.93)	.000	−0.134
T1 Total	117.29 (27.25)	112.72[b] (27.98)	127.19[b] (28.38)	121.70 (18.50)	.020	−0.111
AGI Factors at T2						
T2 F1 Sadness	29.01 (12.44)	28.37 (12.23)	31.41 (14.03)	28.37 (11.08)	.455	−0.176
T2 F2 Self-blame	10.14 (5.03)	9.70 (4.69)	12.51[b] (6.35)	8.83 (3.34)	.010	−0.142
T2 F3 Anxiety-Self-harm	18.38 (8.34)	17.40 (7.91)	20.51 (9.56)	19.27 (7.95)	.170	−0.126
T2 F4 Shock	8.81 (3.94)	7.50[b] (3.33)	11.84 (3.96)	9.83 (3.71)	.000	−0.055
T2 F5 Anger-Betrayal	8.80 (4.67)	8.20[b] (4.19)	10.95[b] (5.90)	8.33 (3.91)	.015	−0.018
T2 F6 Sense of peace	18.23 (6.11)	18.43 (6.25)	19.16 (6.30)	16.33 (5.07)	.170	.045
T2 Total	93.36 (28.62)	89.60[b] (27.06)	106.38[b] (33.81)	90.97 (22.81)	.015	−0.139
HIB Factors						
HIB Grief	58.06 (20.37)	57.03 (20.38)	60.97 (22.75)	58.23 (17.31)	.604	−0.212
HIB Personal Growth	67.93 (16.07)	64.80[b] (16.52)	76.16[b] (13.87)	69.17 (13.37)	.003	.181

AGI: Adolescent Grief Inventory; HIB: Hogan Inventory of Bereavement Children and Adolescents.
p values adjusted via control of false discovery rate.
[a] One-way ANOVA.
[b] Tukey HSD post-hoc tests: Mean difference is significant at the 0.05 level.
[c] Pearson correlations in bold are significant at the 0.05 level (two-tailed).

4. Discussion

Redressing a gap in the grief research literature, we developed a novel measure of grief in adolescents, the Adolescent Grief Inventory (AGI). Empirical development, using both qualitative and quantitative components, underpinned the internal validity of the AGI. Several items (e.g., related to anger, self-harm, and helplessness) are unique to this grief measure, as shown through comparison with the HIB (Hogan and DeSantis, 1996). Further, the six AGI factors comprehensively cover the variety of adolescent grief reactions.

In addition to feeling sad, overwhelmed or lonely, *Factor 1 (Sadness)* includes feelings of injustice and helplessness, and reactions such as putting on a brave face. Feelings of injustice, and reluctance to share their grief experiences may be typical in adolescent grief (Andriessen et al., 2018a). *Factor 2 (Guilt)* includes anger at self, feeling responsible, regrets, and shame. It taps into the egocentric adolescent worldview whereby adolescents may relate external events to themselves, which in cases of a death of a significant other may induce strong feelings of guilt (Balk, 2014). *Factor 3 (Anxiety and Self-harm)* includes worrying, nightmares, having sleeping or eating problems, suicidal ideas or self-harm. Anxiety and worrying in adolescents are related to eating problems and deliberate self-harm, features that may emerge before or after the bereavement (Andriessen et al., 2016). *Factor 4 (Shock)* relates to feeling surprised and confused by the death, and thinking it could have been prevented. Adolescence is the life stage when many consciously experience the death of a close person for the first time. Learning about death can compound the shock of the loss (Andriessen et al., 2018a; Balk, 2014). *Factor 5 (Anger and Betrayal)* includes feeling abandoned, betrayed, rejected, and angry at the deceased or others. Feeling angry is common among adolescents struggling to find their own place in the world, and many adolescents have not yet developed other skills to deal with life-threatening situations (Balk, 2014). Finally, *Factor 6 (Sense of Peace)* taps into feeling calm and prepared to deal with the loss, feeling relieved or grateful, and accepting the situation with equanimity. Despite the sadness, many adolescents experience positive reactions such as gratitude for having known the deceased who may have been a confidant or an example to them, and these experiences may provide them with solace (Andriessen et al., 2018a).

We found evidence of convergent validity with HIB Grief, the DASS-21 and self-rated impact of the other's death. Divergent validity was demonstrated through weak negative correlations with the MSPSS, Expectedness, and a weak positive correlation with self-rated Closeness. Importantly, the study found a weak positive correlation between the AGI and HIB Personal growth. The finding indicates that negative or grief-related aspects and positive or growth-related aspects are not opposites, and is in line with the grief dynamic described by the Dual-Process Model of coping with bereavement (Stroebe and Schut, 2010). According to this model, bereaved individuals will experience or engage both in loss-oriented and restoration-oriented processes in varying levels. In particular the process of meaning making has been associated with personal growth.

In addition to the importance of adaptive cognitive strategies, research with bereaved adults has pointed to positive associations between self-disclosure and personal growth (Levi-Belz, 2016). Self-disclosure may facilitate both positive mental re-appraisal of the bereaved's situation and help-seeking, though the causality of the association has not been determined. As selective sharing is common among bereaved adolescents (Andriessen et al., 2018a) further research is needed to clarify the pathways of social support and personal growth among adolescents.

Significantly, the AGI distinguished different groups - based on cause of death of the significant other, kinship, and mental health status. For example, Anger-Betrayal and Self-blame characterised those bereaved by suicide, a finding the literature supports (Grad and Andriessen, 2016). Those experiencing the death of a first-degree family member scored higher than those experiencing deaths of 'other family', with 'Non-family' (e.g., friends) scoring in between. Also, AGI scores were consistently higher among those who received a mental health diagnosis (especially after the index death), mental health

Table 5
Means and Standard Deviations of AGI and HIB related to participants having received a mental health diagnosis, or treatment (N = 165).

	Received a mental health diagnosis[a] (N = 165)			Received a mental health diagnosis[a] (N = 165)				Received mental health treatment[c] (N = 165)		
	Yes (n = 84) Mean (SD)	No / Don't know (n = 81) Mean (SD)	*Adj. p*	Before index death (n = 30) Mean (SD)	After index death (n = 54) Mean (SD)	No / Don't know (n = 81) Mean (SD)	*Adj. p*	Yes (n = 71) Mean (SD)	No / Don't know (n = 94) Mean (SD)	*Adj. p*
AGI Factors at T1										
T1 F1 Sadness	44.44 (9.42)	41.28 (10.12)	.054	42.77 (11.08)	45.37 (8.33)	41.28 (10.12)	.085	44.07 (9.89)	42.00 (9.81)	.212
T1 F2 Self-blame	15.33 (5.52)	11.77 (4.99)	.000	13.63 (5.16)	16.28[b] (5.53)	11.77[b] (4.99)	.000	15.58 (5.68)	12.07 (4.96)	.001
T1 F3 Anxiety-Selfh.	24.62 (9.00)	20.78 (8.54)	.012	25.43[b] (8.61)	24.17 (9.26)	20.78[b] (8.54)	.034	24.76 (9.05)	21.20 (8.62)	.021
T1 F4 Shock	14.61 (4.00)	13.94 (4.05)	.309	13.80 (4.25)	15.06 (3.82)	13.94 (4.05)	.242	14.80 (4.19)	13.88 (3.87)	.199
T1 F5 Anger-Betray	12.36 (5.67)	10.11 (5.66)	.020	10.60 (5.16)	13.33[b] (5.76)	10.11[b] (5.66)	.011	12.70 (6.15)	10.16 (5.21)	.010
T1 F6 Sense of peace	13.31 (5.43)	14.15 (4.26)	.309	14.40 (5.92)	12.70 (5.09)	14.15 (4.26)	.201	13.34 (5.55)	14.01 (4.34)	.388
T1 Total	124.67 (25.76)	112.02 (26.27)	.005	120.63 (27.07)	126.91[b] (24.98)	112.02[b] (26.27)	.011	125.25 (26.88)	113.33 (25.51)	.010
AGI Factors at T2										
T2 F1 Sadness	31.85 (12.64)	26.74 (11.77)	.015	30.33 (12.73)	32.69[b] (12.62)	26.74[b] (11.77)	.036	32.04 (12.96)	27.30 (11.70)	.025
T2 F2 Self-blame	11.65 (5.26)	8.57 (4.32)	.001	10.30 (4.82)	12.41[b] (5.38)	8.57[b] (4.32)	.001	11.66 (5.36)	8.99 (4.49)	.006
T2 F3 Anxiety-Selfh.	20.82 (8.82)	16.04 (7.41)	.001	19.90 (8.16)	21.33[b] (9.21)	16.04[b] (7.41)	.003	20.83 (8.92)	16.69 (7.72)	.007
T2 F4 Shock	9.50 (4.22)	8.21 (3.53)	.053	8.70 (4.31)	9.94 (4.15)	8.21 (3.53)	.064	9.61 (4.08)	8.31 (3.76)	.053
T2 F5 Anger-Betray	10.11 (4.85)	7.64 (4.23)	.002	8.37 (4.01)	11.07[b] (5.03)	7.64 (4.23)	.001	10.08 (5.20)	8.00 (4.11)	.010
T2 F6 Sense of peace	17.46 (5.84)	19.32 (6.44)	.068	17.33 (6.13)	17.54 (5.74)	19.32 (6.44)	.199	17.63 (5.86)	18.94 (6.41)	.212
T2 Total	101.39 (29.91)	86.52 (24.76)	.002	94.93 (28.78)	104.98[b] (30.18)	86.52[b] (24.76)	.003	101.86 (30.65)	88.22 (25.21)	.007
HIB Factors										
HIB Grief	64.40 (20.42)	52.73 (18.98)	.001	61.73 (19.52)	65.89[b] (20.94)	52.73[b] (18.98)	.003	64.51 (20.07)	54.27 (19.84)	.007
HIB Personal Gr.	68.94 (15.46)	67.78 (16.42)	.643	66.53 (15.92)	70.28 (15.19)	67.78 (16.42)	.533	69.99 (14.51)	67.15 (16.85)	.277

AGI: Adolescent Grief Inventory; HIB: Hogan Inventory of Bereavement Children and Adolescents.
P values adjusted via control of false discovery rate in bold are significant at the 0.05 level.
The Adolescent Grief Inventory: Supplementary Tables A1–A5

[a] One-way ANOVA. The original categories were: 'Yes' (n = 84), 'No' (n = 62), and 'Don't know' (n = 19). We summed the categories 'No' and 'Don't know'. We divided the 'Yes' category into receiving a diagnosis before or after the index death. Those who provided the same month/year for index death and diagnosis (n = 2) were included in the 'after index death' group.

[b] Tukey HSD post-hoc tests: Mean difference is significant at the 0.05 level.

[c] One-way ANOVA. The original categories were: 'Yes' (n = 71), 'No' (n = 81), and 'Don't know' (n = 13). We summed the categories 'No' and 'Don't know'.

treatment, experienced suicidal ideas, or engaged in deliberate self-harm or attempted suicide. The findings demonstrate that the AGI can be used broadly in bereaved adolescents, including among those at mental health risk. The AGI's major strength is the strong validity of its empirically developed novel items and factors.

4.1. Limitations and conclusion

Study limitations include the self-selected, mostly female, sample, a high proportion of participants with a mental health and self-harm history, and reliance on self-reported data. This may entail recollection bias especially in relation to T1 data if the death occurred several years ago. No measure of complicated grief was included, which may have informed convergent or divergent validity. Future research may include measures of attitudes to life and death, especially to better understand the construct validity of positive grief captured in Factor 6. Finally, while differences existed between T1 and T2 scores, prospective studies may illuminate the hitherto uncovered course of adolescent grief.

In conclusion, the Adolescent Grief Inventory (AGI) is a novel measure of grief in adolescents and includes unique items and factors making it a comprehensive and valid measure. The instrument is freely available from the authors. It can be used broadly, in community samples and with bereaved adolescents at-risk of mental health ramifications.

Declaration of interest

None.

Contributors

All authors contributed to the design of the study. KA conducted the analyses and drafted the manuscript. All authors contributed to the revision of the manuscript, and agreed with the final version.

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Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.jad.2018.07.012.

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