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Latent profiles of physical and psychological outcomes of bereaved parents in China who lost their only child

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ABSTRACT

Background: Along with the implementation of the one-child policy in China, a special group of bereaved parents called 'shiduer' (失独者), meaning parents bereaved by the loss of their only child, emerged. Although previous research has examined the physical and psychological health of this population, individual differences in physical and psychological outcomes are still not well understood.

Objective: This study aimed to identify heterogenous subgroups of Chinese bereaved parents who lost their only child based on the physical and psychological health of this population as well as the predictive factors of each subgroup.

Method: Latent profile analysis was used to explore underlying patterns of physical and psychological indicators including subjective physical health, negative psychological outcomes (i.e. depression, post-traumatic stress disorder and prolonged grief disorder) and positive psychological outcomes (i.e. post-traumatic growth) among a sample of Chinese bereaved parents who lost their only child ($N = 536$). A three-step approach was used to examine the effects of covariates including quality of spousal relationship and recruitment channels on psychological and physical outcomes.

Results: A three-profile model identified severity-based groupings of a 'resilient' subgroup ($n = 153$), a 'coping' subgroup ($n = 338$) and a 'dysfunctional' subgroup ($n = 45$). Less satisfaction with spousal relationship and recruitment from institutions in the community and online self-help groups (vs. offline support groups) are associated with the membership of the 'coping' or 'dysfunctional' subgroup compared to the 'resilient' subgroup.

Conclusions: There is heterogeneity regarding the physical and psychological health of Chinese parents after losing their only child. The predictive effects of the quality of spousal relationship and the recruitment channels could provide directions for professional intervention.

Perfiles Latentes de Resultados Físicos y Psicológicos de Padres en Duelo que Perdieron a su Único Hijo en China

Resumen del Artículo:

Antecedentes: Junto a la implementación de la política de un solo hijo en China, surgió un grupo especial de padres afligidos llamado 'shiduer' (失独者), que significa padres despojados (en duelo) por la pérdida de su único hijo. Aunque investigaciones previas han examinado la salud física y psicológica de esta población, las diferencias individuales en los resultados físicos y psicológicos aún no son bien comprendidos.

Método: Se usó el análisis de perfil latente para explorar patrones subyacentes de indicadores físicos y psicológicos que incluían salud física subjetiva, resultados psicológicos negativos (es decir, depresión, trastorno de estrés postraumático y trastorno de duelo prolongado) y resultados psicológicos positivos (es decir, crecimiento postraumático) en una muestra de padres chinos en duelo que perdieron a su único hijo ($N = 536$). Se utilizó un enfoque de tres pasos para examinar los efectos de las covariables, incluida la calidad de la relación conyugal y las vías de reclutamiento, en los resultados psicológicos y físicos.

Resultados: Un modelo de tres perfiles identificó agrupaciones basadas en la gravedad mostrando un subgrupo 'resilente' ($n = 153$), un subgrupo 'de afrontamiento' ($n = 338$) y un subgrupo 'disfuncional' ($n = 45$). La menor satisfacción con la relación conyugal y el reclutamiento de instituciones en la comunidad y grupos de autoayuda en línea (en comparación con grupos de apoyo presenciales) se asociaron con la pertenencia al subgrupo 'afrontamiento' o 'disfuncional' en comparación con el subgrupo 'resilente'.

Conclusiones: Existe heterogeneidad con respecto a la salud física y psicológica de los padres chinos después de perder a su único hijo. Los efectos predictivos de la calidad de la relación conyugal y las vías de reclutamiento podrían proporcionar instrucciones para la intervención profesional.

HIGHLIGHTS
• Three subgroups which presented a severity-based gradient were identified, i.e. a 'resilient' subgroup, a 'coping' subgroup and a 'dysfunctional' subgroup.
• The 'coping' subgroup had the highest levels of post-traumatic growth.
• Less satisfaction with spousal relationship and recruitment from the online self-help groups and community institutions are associated with the membership of the 'coping' or 'dysfunctional' subgroup compared to the 'resilient' subgroup.

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中国失独父母生理和心理健康状况的潜剖面分析

背景：在中国，由于独生子女政策，大部分家庭都只有一个孩子；其中，有一部分家庭失去了他们唯一的孩子，成了'失独者'。尽管以前的研究报告了这个群体的生理和心理健康状况，失独父母的个体差异很少被研究。

目标：本研究探索了失独父母中一系列生理和心理指标的潜在剖面，以及不同剖面的预测因素。

方法：536名失独者参与了调研。本研究对他们的生理健康、消极的心理结果（如抑郁、创伤后应激障碍和延长哀伤障碍）和积极的心理结果（比如创伤后成长）进行了潜剖面分析，并且使用三步骤分析方法探索了夫妻关系质量和招募渠道对不同模式的预测作用。

结果：本研究识别出按照严重程度分级的三剖面模型，包括弹性组（n=153），应对组（n=338），以及功能受损组（n=45）。并且，更差的夫妻关系以及从网上互助小组和社区招募相比于从线下的支持组织（比如公益机构）招募预测应对组和功能受损组。

结论：中国的失独父母在生理和心理健康上存在异质性，夫妻关系质量和招募渠道可以帮助区分不同组。

1. Introduction

The death of a child is a devastating event and is considered to be the most severe kind of loss (Kersting, Brahler, Glaesmer, & Wagner, 2011; Newson, Boelen, Hek, Hofman, & Tiemeier, 2011). Previous research has found that bereaved parents may experience mental health disorders such as depression, anxiety, insomnia, prolonged grief disorder (PGD), post-traumatic stress disorder (PTSD) and suicidal behaviours (Harper, O'Connor, & O'Carroll, 2014; Lannen, Wolfe, Prigerson, Onelov, & Kreicbergs, 2008; Rogers, Floyd, Seltzer, Greenberg, & Hong, 2008). The loss of a child is also associated with worse physical health problems in the long term (Lannen et al., 2008). In China, many families have only one child. If parents lose their only child in adulthood this may further impact the feeling of loss as bearing another child is not possible. Previous research has demonstrated that Chinese parents who lost their only child present with significant symptoms of anxiety, depression and PTSD as well as significant impairments in physical and social areas compared to non-bereaved counterparts (Cao, Yang, & Wang, 2018; Yin et al., 2018; Zheng, Lawson, & Anderson Head, 2017).

Losing a loved one may affect people differently, and post-loss outcomes vary. Different patterns of post-loss outcomes can be identified by using person-centred statistical techniques. Previous research has used latent class analysis (LCA) to identify groups of individuals based on the symptoms or symptom clusters of PGD, PTSD and/or depression, e.g. a resilient class, a predominately PGD or PTSD class and a combined PGD/PTSD or PGD/depression or PGD/PTSD/depression class (Boelen, Reijntjes, Aaam, & Smid, 2016; Boelen, Spuij, & Reijntjes, 2017; Djelantik, Smid, Kleber, & Boelen, 2017; Lenferink, De Keijser, Smid, Djelantik, & Boelen, 2017; Maccallum & Bryant, 2018; Nickerson et al., 2014). To our knowledge, only one research project has examined the latent groups among bereaved parents and reported that bereaved parents can be categorised into three different subgroups (i.e. a high growth group, a moderate growth group and a low growth group) based on positive psychological outcomes (i.e. post-traumatic growth). Additionally, very limited research examined whether subgroups can be distinguished in terms of both negative and positive psychological outcomes among bereaved people (Zhou, Yu, Tang, Wang, & Killikelly, 2018). Moreover, subjective physical health, which is often thought to reflect psychological adaption, has rarely been examined among bereaved people (Spahni, Morselli, Perrig-Chiello, & Bennett, 2015). The identification of heterogenous subgroups on the basis of physical, negative and positive psychological health outcomes are of scientific and clinical relevance. It could deepen our understanding about the heterogeneity of negative and positive post-loss outcomes among bereaved people, and identify target groups with different physical and psychological reactions. This could help develop tailored professional interventions for each group.

Furthermore, after identifying different subgroups of bereaved parents, the next task was to identify the possible predictive factors of each subgroup. This may indicate key directions for policy development and the provision of psychosocial interventions for this population. After the death of a child, support from a partner seems to play an important role in the recovery. Researchers proposed that subjective spousal support could provide a protective role and reduce psychological distress when encountering a traumatic event (Cox, Buhr, Owen, & Davidson, 2016; Stapleton et al., 2012). Some research also found that satisfaction with the marital relationship could encourage the healing process for bereaved parents (Lang, Gottlieb, & Amsel, 1996; Wijngaards-De Meij et al., 2007). In addition, community institutions, self-help groups and non-profit organizations provide a space for bereaved parents to share their loss experience and look for comfort, and thus help the bereaved parents recover (Cacciatore, 2010; Pan, Liu, Li, & Kwok, 2016). Online self-help groups provide a space for bereaved people to share their emotions

with people who have also lost their loved ones, and to acquire some knowledge on how to cope with grief (Chapple & Ziebland, 2011; Liu, 2014; Swartwood, Veach, Kuhne, Lee, & Ji, 2011). In China, offline support groups organize activities for bereaved parents and provide support when needed (Fang, 2013), and community institutions provide material and emotional support to this population, such as organizing get-togethers on holidays, visiting bereaved parents or providing practical help when needed. These different institutions or groups provide various kinds of support for this population, while it remains unknown whether there are differences among the effect of support provided by the different types of institutions or groups. As a preliminary exploration, the present study examined the associations between recruitment channels (community institutions, online self-help groups and offline non-profit organizations) and each subgroup of bereaved parents.

Overall, the present study aimed to (a) identify different subgroups of Chinese bereaved parents who lost their only child based on physical as well as negative and positive psychological outcomes (i.e. physical health, depression, PGD, PTSD and post-traumatic growth) and (b) investigate the discriminating variables among these subgroups in terms of quality of spousal relationship and recruitment channels.

2. Method

2.1. Participants and procedures

The data presented here is part of the project 'Constructing a Psychological Aiding System for Chinese Bereaved Parents Who Lost Their Only Child Based on a Popular-Based Survey' conducted in 2017. The project was approved by the Ethics Committee of Beijing Normal University. Bereaved parents who lost their only child when they were over 49 years old (according to Chinese government's official definition) were recruited via community institutions (e.g. some neighbourhood committees) (N = 207), offline support groups (e.g. non-profit organizations) (N = 160) and online self-help groups (N = 169). Inclusion criteria included that the bereaved parents had only one biological child and had no living child at present. Individuals with serious mental disorders or physical illness or who failed to complete the questionnaires were excluded. Data was collected between April 2017 and January 2018. Trained research assistants conducted the survey via interview online or in person and provided necessary support when asking about sensitive items. Written informed consent was obtained prior to data collection. Total sample size was 536. Descriptive data of the total sample is presented in Table 1.

Table 1. Socio-demographic, loss-related characteristics, quality of spousal relationship and recruitment channels.

	Total sample (N = 536)
Socio-demographic information	
Age of parents; mean (SD)	60.46 (6.89)
Gender; female	336 (62.7%)
Place of residence	
Village	156 (29.1%)
Town	55 (10.3%)
City	274 (51.1%)
Marriage status	
Divorced or separated	77 (14.4%)
Widowed	75 (14.0%)
Marriage or remarriage	376 (70.1%)
Educational background	
Primary school	144 (26.8%)
Middle or high school	336 (62.7%)
Above college	36 (6.7%)
Monthly income; mean (SD)	1845.67 (1297.24)
Religious faith	51 (9.5%)
Loss-related variables	
Age of the child; mean (SD)	25.21 (7.92)
Gender; female	159 (29.7%)
Cause of death; accident	392 (73.1%)
Time since loss; mean (SD)	9.50 (7.12)
Having a grandchild	148 (27.6%)
Quality of spousal relationship; mean (SD)	3.25 (0.88)
Recruiting channels	
Community institutions	207
Offline support groups	160
Online self-help groups	169

SD = Standard Deviation.

2.2. Measures

2.2.1. Indicators

Physical health was assessed by the six items of physical component summary of the short form 12 (SF-12 PCS; Ware, Kosinski, & Keller, 1996). The score of each item was transferred into standardized value according to the standard scoring system (Ware, Keller, & Kosinski, 1995). Total scores of the six items was calculated by summing the standardized values of the six items and then adding 56.57706, with higher values representing better physical health. In order to be consistent with the other three negative psychological indicators (i.e. higher values representing worse mental or physical health), the average scores of the standardized values of the six items were calculated and converted into positive values, with higher values representing worse physical health. The SF-12 had good validity and reliability among Chinese elders (Xiao & Kuang, 2014). Cronbach's α of the six items was 0.893 in the current study.

Depression symptoms were assessed by the 13-item depression subscale of the Symptom Checklist 90 (SCL-90; Derogatis, Lipman, & Covi, 1977). SCL-90 is a five-point Likert-type scale ranging from 1 (not at all) to 5 (extremely). Previous research indicated that this subscale was acceptable for screening depression (Aben, Verhey, Lousberg, Lodder, & Honig, 2002). Average values of the 13 items were calculated. SCL-90 was shown to have good reliability and validity among Chinese older people, and people with scores above 39 are considered to have severe

depression (Chen & Li, 2003). Cronbach's α of the depression subscale in the current study was 0.897.

Prolonged grief symptoms were measured by the 11 items representing criteria for PGD (Prigerson et al., 2009). One item assesses separation distress, nine items are related to cognitive, emotional and behavioural reactions (e.g. difficulties accepting the loss, avoidance, and anger), and one item measures the functional impairment. A 5-point scoring system is used (1 = never, 5 = always). Average values of the 10 items excluding the functional impairment item were calculated. The diagnostic criteria for PGD include: (1) the 'longing' item should be rated above 3; (2) at least five of the nine cognitive emotional behavioural items should be rated above 3; (3) grief symptoms should last for over six months; (4) significant functional impairments in social, occupational or other important areas are reported (Prigerson et al., 2009). The prolonged grief disorder scale was proved to have good validity and reliability among bereaved Chinese (Yi, Gao, Wu, Tang, & Li, 2016). Cronbach's α of the 10 items in the current study was 0.896.

Post-traumatic stress symptoms were assessed by the 17-item post-traumatic stress disorder checklist-civilian version (PCL-C), and a 5-point scoring system was employed ranging from 1 (not at all) to 5 (extremely) (Weathers, Litz, Herman, Huska, & Keane, 1994). Average values of the 17 items were calculated. The scale was shown to have good reliability and validity among Chinese (Wu, Chan, & Yiu, 2008; Yang, Yang, Liu, & Yang, 2007). The cut-off of 50 provides good diagnostic sensitivity and specificity (Liu et al., 2010). Cronbach's α of the scale in the current study was 0.934.

Post-traumatic growth was assessed by the 21-item self-report post-traumatic growth inventory (PTGI). This scale is designed to measure positive psychological change after trauma (Tedeschi & Calhoun, 1996). Items were rated on a 6-point scale ranging from 0 ('not at all') to 5 ('very strongly'). Previous Chinese researchers deleted item 18 ('I have a stronger religious faith'), as it is not applicable in Chinese sample (Wang, Chen, Wang, & Liu, 2011; Zhang et al., 2016). Average scores of the remaining 20 items were calculated. Cronbach's α of the 20 items in the present data was 0.914.

2.2.2. Predictors

Quality of spousal relationship (1 = very poor, 2 = poor, 3 = good, 4 = very good) and recruitment channels (0 = offline support groups, 1 = community institutions, 2 = online self-help groups) were included as predictors in the analyses. The socio-demographic characteristics (i.e. age, gender, place of residence, marital status, educational background, family monthly income per capita [in RMB] and religious faith), and loss-related variables (i.e. age of the deceased, gender of the deceased, cause of death [0 = chronic disease, 1 = accident including traffic accident, natural disaster, sudden disease, murder, suicide and others], time since loss [in years] and grandchild) were included as control variables.

2.3. Analysis

A series of Latent Profile analyses (LPAs) were conducted to examine the patterns amongst physical and psychological outcomes by using Mplus version 7.11 (Muthén & Muthén, 2013). In order to identify the optimal number of profiles, a series of indices were used, including Akaike's Information Criterion (AIC), Bayesian Information Criterion (BIC), Sample-Size Adjusted Bayesian Information Criterion (SS-BIC) and Vuong-Lo-Mendell-Rubin likelihood ratio test (LMR-LRT). Lower values on the AIC, BIC and SS-BIC reflect a better-fitting model. Higher entropy values reflect a clearer delineation between profiles. The LMR-LRT was used to compare two successive profile models, and a significant LMR-LRT indicates the k-profile solution was the more parsimonious solution compared to the k-1-profile solution (Nylund, Asparouhov, & Muthén, 2007).

The second step aimed to examine whether total scores of the five indicators and prevalence of depression, PTSD and PGD differed significantly between the subgroups. The auxiliary facility of the Mplus was used by adding each variable separately into the model as distal outcomes (Lanza, Tan, & Bray, 2013). This method estimates simultaneously the profiles as a latent variable and the differences of distal variables between the estimated profiles. Differences of each distal variable among the latent profiles are tested using an over Wald test and pairwise comparisons.

In order to identify the predictive effects of quality of spousal relationship and recruitment channels in best distinguishing different profiles, a three-step approach (multinomial regression analysis) was conducted by using group membership as the dependent variable (Asparouhov & Muthén, 2014). Quality of spousal relationship and recruitment channels were included as covariates while forming subgroups, at the same time controlling socio-demographic and loss-related variables.

3. Results

3.1. Latent profile analysis

Six models with 1–6 profiles were estimated. The goodness-of-fit indexes are presented in Table 2. Models with two to six profiles promoted a distinct

Table 2. Goodness-of-fit statistics for 1 to 6 class solutions.

No. of groups	Loglikelihood	Free parameter	AIC	BIC	SS-BIC	Entropy	LMR-LRT	p
1	−3801.30	10	7622.60	7665.44	7633.70			
2	−3301.89	16	6635.78	6704.32	6653.53	0.94	998.82	0.001
3	−3046.04	22	6136.08	6230.33	6160.49	0.95	511.70	0.001
4	−3005.21	28	6066.41	6186.37	6097.48	0.88	81.67	0.34
5	−2932.08	34	5932.17	6077.83	5969.90	0.91	146.24	0.001
6	−2904.83	40	5889.67	6061.03	5934.06	0.91	54.50	0.16

AIC = Akaike Information Criterion; BIC = Bayesian Information Criterion; SS-BIC = Sample Size Adjusted BIC; LMR-LRT = Vuong-Lo-Mendell-Rubin Likelihood Ratio Test.

decrease of the AIC, BIC and SS-BIC, with the lowest value for the six-profile model, implying six or more latent profiles. The LMR-LRT was significant for the three-profile model, which meant that the three-profile model was better than the two-profile model. The non-significant LMR-LRT value of the four-profile model indicated that the four-profile model did not have a better fit compared to the three-profile model. Therefore, we chose the three-profile model.

As shown in Figure 1, the three-profile model presents a severity-based gradient of physical and psychological health. A small subgroup (28.5%) named as the 'resilient' subgroup was characterized by low levels of physical impairment and negative and positive psychological outcomes (i.e. depression, PGD, PTSD, post-traumatic growth). The next subgroup (63.1%) was described as the 'coping' subgroup, which presented moderate levels of physical impairment, negative psychological outcomes as well as the highest levels of post-traumatic growth. The third subgroup (8.4%) which was termed as the 'dysfunctional' group was characterized by high levels of physical impairment and negative psychological outcomes as well as lower levels of post-traumatic growth, accounting for the remaining 8.8% of the sample.

3.2. Differences in levels of each indicator and diagnostic information of depression, PGD and PTSD between the subgroups

Table 3 presents average total scores of each indicator and diagnostic information of depression, PGD and PTSD of each subgroup and the overall sample. Levels of physical functional impairments, depression, PGD and PTSD were highest for the 'dysfunctional' subgroup and lowest for the 'resilient' subgroup. Levels of post-traumatic growth were significantly higher in the 'coping' subgroup than in the 'resilient' and 'dysfunctional' subgroups.

In terms of the diagnostic information of depression, PGD and PTSD, the 'dysfunctional' subgroup had the highest proportion of individuals who reached the diagnostic criteria of each disorder as well as the comorbid three disorders, while the 'resilient' subgroup had the lowest proportion.

3.3. Three-step approach

Quality of spousal relationship was significantly associated with group membership, with the 'dysfunctional' and 'coping' groups having less satisfaction with the spousal relationship than the 'resilient'
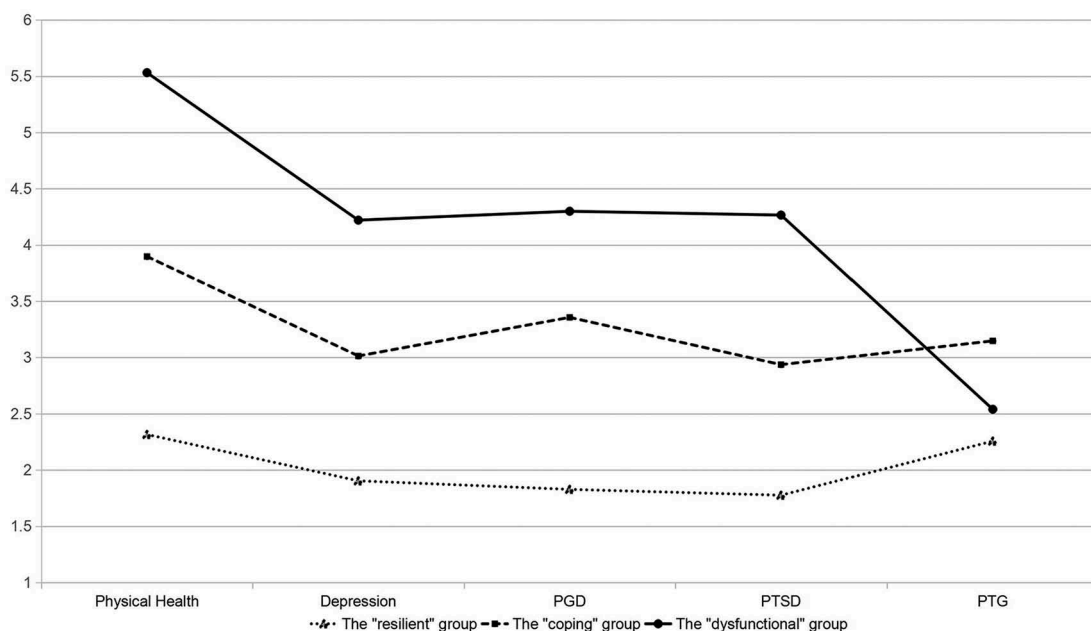
Figure 1. Uncentered means of the three latent profile model of Chinese bereaved parents who lost their only child.
PGD = Prolonged Grief Disorder; PTSD = Post-Traumatic Stress Disorder; PTG = Post-Traumatic Growth.

Table 3. Means, standard deviations and diagnostic information for each latent group per the three-profile solution.

	Total sample (N = 536)	Resilient (n = 153)	Coping (n = 338)	Dysfunctional (n = 45)	Wald's test approx. χ^2
Physical health					
Mean score (SE)	34.98 (0.54)	42.85 (1.04)	33.09 (0.61)	22.83 (1.28)	151.09***
Depression					
Mean score (SE)	36.43 (0.44)	24.66 (0.45)	39.24 (0.32)	54.83 (1.07)	1044.07***
Probable diagnosis (39 cut-off score)	236 (44.0%)	4 (2.6%)	189 (55.9%)	43 (95.6%)	10273.16***
PGD					
Mean score (SE)	31.17 (0.38)	19.40 (0.32)	34.73 (0.27)	44.23 (0.80)	1739.79***
Probable diagnosis (algorithm)	87 (16.2%)	0 (0.0%)	52 (15.4%)	35 (77.8%)	174.33***
PTSD					
Mean score (SE)	46.20 (0.59)	29.84 (0.57)	49.91 (0.37)	73.24 (1.27)	1394.85***
Probable diagnosis (50 cut-off score)	200 (37.3%)	3 (2.0%)	152 (45.0%)	45 (100.0%)	3796.73***
PTG					
Mean score (SE)	56.80 (0.71)	44.85 (1.07)	63.21 (0.76)	50.15 (3.43)	193.93***
THREE DIAGNOSIS (depression, PTSD, PGD)	67 (12.5%)	0 (0.0%)	33 (9.8%)	34 (75.6%)	254.26***

**p < .01; ***p < .001; SE = Standard Error; PGD = Prolonged Grief Disorder; PTSD = Post-Traumatic Stress Disorder; PTG = Post-traumatic growth.

Table 4. Three-step approach predicting group membership and summary of the beta coefficients of the different predictor per group after controlling socio-demographic and loss-related variables.

	Coping vs. resilient				Dysfunctional vs. resilient			
	B	SE (B)	95% CI	p	B	SE (B)	95% CI	p
Spousal relationship	−0.63	0.22	(−1.06, −0.20)	0.005	−1.04	0.29	(−1.61, −0.47)	< 0.001
Recruiting channels								
Community institutions	2.55	0.37	(1.82, 3.28)	< 0.001	4.83	0.97	(2.92, 6.74)	< 0.001
Online self-help groups	3.48	0.42	(2.65, 4.31)	< 0.001	3.30	1.12	(1.10, 5.50)	0.003

95% CI = 95% confidence interval.

group (Table 4). Recruitment from the community institutions and online self-help groups (vs. offline support groups) were associated with the membership of the 'dysfunctional' and 'coping' subgroups (Table 4).

4. Discussion

In the current study, we employed LPA in a sample of Chinese bereaved parents who lost their only child and found distinct profiles of physical and psychological outcomes in terms of physical health, depression, PGD, PTSD and post-traumatic growth. Three latent subgroups were identified, i.e. the 'resilient' subgroup was characterized by low levels of all physical and psychological outcomes (even post-traumatic growth), the 'coping' subgroup characterized by moderate levels of physical impairments, negative psychological outcomes and high levels of post-traumatic growth, and the 'dysfunctional' subgroup characterized by high levels of physical impairments, negative psychological outcomes and low levels of post-traumatic growth. Quality of spousal relationship and recruitment channels predicted group membership.

The 'resilient' subgroup, which accounted for 29% of the sample, reported low levels of all physical and psychological outcomes including post-traumatic growth. People in this subgroup seem to be able to manage their distress and return to their previous level of functioning (O'Leary & Ickovics, 1994). Evidently, few individuals in this group reached the diagnostic criteria for depression, PTSD and PGD,

3%, 2% and 0%, respectively. This finding is consistent with previous research that demonstrates that some bereaved parents could still maintain general physical and psychological health and exhibit resilience in their recovery even after undergoing an extremely traumatic event (Djelantik et al., 2017; Lenferink et al., 2017; Spahni et al., 2015; Zhou et al., 2018).

The 'coping' subgroup, which comprised the majority of the sample (63%), reported moderate levels of physical functional impairments and negative psychological outcomes as well as high levels of post-traumatic growth. People who reached the diagnostic criteria of depression, PTSD and PGD were 56%, 45% and 15%, respectively, which is higher than for those who have experienced other kinds of loss (e.g. disease loss, traumatic loss, violent loss, partner loss; He et al., 2014; Lundorff, Holmgren, Zachariae, Farver-Vestergaard, & O'Connor, 2017; Melham et al., 2001; Nakajima, Masaya, Akemi, & Takako, 2012; Schaal, Elbert, & Neuner, 2009). This implies that the 'coping' subgroup of this sample may present with more severe psychological symptoms compared to bereaved people who experience other kinds of loss. At the same time, levels of post-traumatic growth in the 'coping' subgroup were the highest among the three subgroups. This result is also consistent with previous research which showed an inverted U-shaped curvilinear relationship between post-traumatic growth and PTSD or stress responses (Mccaslin et al., 2009; Shakespeare-Finch & Lurie-Beck, 2014; Taku, Tedeschi, & Cann, 2015), indicating that there might be an optimal level of emotional distress which can facilitate the development of post-traumatic

growth. Less emotional distress may be insufficient to stimulate growth, and excessive emotional distress may impede the development of growth. Overall, people in this subgroup not only experience strong emotional distress but also try to reconstruct meaning, find new directions for their life and readapt to the future life without a child. This reminds us that, when providing psychological interventions for people in this subgroup, their potential for growth should be considered and incorporated into the intervention.

The 'dysfunctional' subgroup, which constituted 9% of the sample, reported high levels of physical functional impairments and negative psychological outcomes as well as low levels of post-traumatic growth: 96% reached the diagnostic criteria for depression, all of them reached the diagnostic criteria for PTSD, 78% reached the diagnostic criterion for PGD and 76% reached the diagnostic criteria for all three disorders. Additionally, people in this subgroup had lower levels of post-traumatic growth compared to the 'coping' subgroup, and it's possible that the intense emotional distress impedes their ability to reconstruct the meaning in their life and gain growth from the loss. This is the group with the highest distress and lowest growth, and people in this group should be given special management. Services such as medical assistance, daily life support and psychological aids should be provided to this group.

Overall, the present study showed divergent findings from previous research by revealing a severity-based gradient for the three subgroups. Previous research reported that subgroups of bereaved people were distinguished by the dominance of particular symptom profiles (e.g. predominantly PGD and comorbid symptom clusters such as PGD/PTSD or PGD/PTSD/depression; Djelantik et al., 2017; Lenferink et al., 2017). The inclusion of post-traumatic growth instead of only negative symptoms could contribute to the profile of classification. However, results from repeated LPA analyses by only including three negative psychological symptoms in the same data also showed a severity-based gradient. Other reasons may explain the divergence of the current findings, for example, differences in methodology and the nature of the sample. Previous research which analysed the latent class of bereaved people based on the symptoms or symptom clusters of PGD, PTSD or depression in refugees, disaster-bereaved individuals and other general bereaved people (Boelen et al., 2016; Djelantik et al., 2017; Lenferink et al., 2017; Maccallum & Bryant, 2018; Nickerson et al., 2014), while the present study analysed all individuals average scores of each indicator among a sample of parents, average age of 60 years, bereaved by losing their only child. Thus, the current study's method and sample is important to note when comparing study findings.

Quality of the spousal relationship could predict group membership, as the 'resilient' group had the most satisfied spousal relationship and the 'dysfunctional' group had the least satisfied spousal relationship ratings. This finding supports previous research that more marital satisfaction or marital closeness mitigated the negative effects of bereaved parents (Song, Floyd, Seltzer, Greenberg, & Hong, 2010; Wijngaards-De Meij et al., 2007). A satisfied spousal relationship may imply that the bereaved parents can share their emotions, be understood more easily and obtain the greatest support and strength (Fu et al., 2018). Despite this, the mechanism of marital quality on coping with the loss and the intervention methods to improve marital quality for bereaved parents need to be explored further.

Recruitment channels were related to group membership. People who were recruited from the community institutions and online self-help groups tended to be classified into the 'dysfunctional' and 'coping' subgroups compared to those from the offline support groups. This demonstrated that bereaved parents in the offline support groups had better physical and psychological health than those in the community institutions and online self-help groups. Although all of the three kinds of groups provide support for bereaved parents in different forms, the effect varies. There might be several possible reasons. Previous research found that whether the bereaved participate in the group actively could have an influence on the results (Lieberman & Videka-Sherman, 1986; Maton, 1988). For example, as we know from our practical work, although many bereaved parents join the online self-help groups, only few interact with others actively. Besides, the nature of the service provided by different support groups may have an influence on the results, and it might be possible that non-profit organizations (i.e. offline-support groups) which are targeted at bereaved parents have more professional workers and can provide more professional service than online self-help groups and community institutions. Future research need to assess the nature of the service provided by these support groups as well as how often bereaved parents take part in the activities in order to clarify the characteristics of bereaved people recruited from different support groups (Swartwood et al., 2011).

A limitation of the present study is the cross-sectional data, as this provides no information about the stability of the identified patterns over time. Future studies could validate the outcomes and determinants of physical and psychological consequences by using a longitudinal design. Second, more risk and protective factors (e.g. coping strategies, intrapersonal resources, social support and cognitions about losing an only child) could be examined in order to provide suggestions for interventions. Third, the diagnostic criteria for the depression, PTSD and PGD employed in the current study seem outdated. New criteria, such as the new ICD-11 PGD symptom criterion,

should be used in the future (Maciejewski, Maercker, Boelen, & Prigerson, 2016). Finally, further research which explores the differences between only child loss and bereavement in multiple child families in China could provide additional information about the differences of physical and psychological outcomes between these types of loss.

Notwithstanding these considerations, this study has important clinical implications. The finding that there are distinctive subgroups among bereaved parents underscores the need to assess and manage post-loss reactions of bereaved parents differently. For example, it may be helpful to develop a screening instrument which assesses some main post-loss reactions and helps identify the specific types of post-loss outcomes. In addition, interventions tailored to the specific needs for people in different subgroups may be more effective than indiscriminate treatments. Knowledge about the discriminating variables among these patterns is essential for prevention and intervention in psychosocial services. For example, findings related to the predictive factors implies that more psychosocial support should be provided for bereaved parents in the community institutions and online self-help groups. Findings from this study may also inform the understanding of and development of interventions for other bereaved groups or parents bereaved by losing their only child in other cultures. For example, improving spousal relationship and joining offline support groups might be helpful for the physical and psychological health of bereaved people.

5. Conclusions

The current findings show that Chinese bereaved parents who lose their only child can be differentiated into a 'resilient' group, a 'coping' group and a 'dysfunctional' group. Poor spousal relationship and being recruited from community institutions and online self-help groups were associated with the membership of the 'coping' or 'dysfunctional' subgroup compared to the 'resilient' subgroup. Timely attention should be paid to the physical and psychological health of individuals in the 'coping' and 'dysfunctional' subgroups, and targeted social and clinical services should be provided based on characteristics of these two subgroups.

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