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Relationship between Grandparental Care and Subjective Well-being of the Elderly: Testing the Effect of Inter-generational Care in China

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Received: August 05, 2024**Accepted:** August 29, 2024**Published:** September 06, 2024**Abstract****Objectives:** This study explores the association between the four types of grandparenting and the mental health of grandparents in China.**Methods:** This study analyses the data from the 2018 China Health and Retirement Longitudinal Study (CHARLS) with the application of the General Linear Model. It compares the situation of subjective well-being among the four groups of the Maternal Grandmother (MGMs), the Maternal Grandfathers (MGFs), the paternal grandmothers (PGMs) and the Paternal Grandfathers (PGFs).**Results:** MGMs' and the PGMs' grandparenting behaviour is significantly associated with depression. Nevertheless, this significant feature mainly appears in the families with two parental generations and more than three parental generations but not in the families with only one parental generation.**Conclusion:** Although grandmothers are more likely to report depression than grandfathers in the cases of grandchild care, grandparenting type is not significantly associated with the feeling of happiness, thus not support the kinship-selection hypothesis.**Keywords:** Grandparenthood; Child care; Intergenerational relations; Mental health; Subjective wellbeing**Introduction**

Grandparenting is a form of inter-generational care relationship that assigns grandparents as caregivers and grandchildren as care receivers. For the caregivers, the studies on grandparents engaged in care activities help enhance the ideals of 'active ageing' and 'productive ageing'. In contrast, the investigation into grandparenting is also reasonable for exploring the motivation, feelings and condition of the subjective well-being of the elders as caregivers. Thus, this study examines the care activities of older people to understand the behavioural and psychological features of their actions, testing their happiness and satisfaction through survey data. The focus of this study is not on finding a source of childcare but on the subjective well-being and happiness of the grandparents in the sense of 'successful ageing'. To conduct this research, there must be a solid theoretical grounding in sociological and gender studies. The study uses evolutionary psychology theory to uncover the grandparents'

attitudes, perceptions and subjective views. As a general assumption of evolutionary psychology, females play a biological role in the reproduction of new generations. Since they have no issue with paternity uncertainty [2], they are more motivated and inclined to care for their children and grandchildren. The kin selection theory heavily influenced this evolutionary psychological approach, underscored by fitness benefits and altruistic kinship behaviour [21]. Using survey data, the study investigates the willingness of older adults to take care of their grandparents. It also adopts gender perception to study the action of grandchild care along the parental lineage or maternal line. Thus, it is essential to examine the impact of grandparenting on the subjective well-being of older adults. The problem of paternity uncertainty prompts men to have more children to increase the probability of replicating their genes instead of investing in their children altruistically [24]. In this discussion,

the assumption is that women are more willing than men to spend time and energy caring for their offspring and are, therefore, more likely to have a closer relationship with their children and grandchildren. Meanwhile, assuming that grandparents' undertaking of the care is based on the power of generation reproduction, gene-motivated female grandparents shall voluntarily undertake more responsibility in grandchild care affairs. Using the samples of grandparental care, many European and American scholars have proved the validity of inclusive fitness, maternal grandmothers invest the most and paternal grandfathers the least in their grandchildren [9,11]. Empirical evidence has proved these inferences and found that the maternal grandmothers were more willing to look after their grandchildren compared to the paternal grandfathers, maternal grandfathers and paternal grandmothers [7]. his study aims to the subjective well-being of the elderly as caregivers of grandchildren. We test the levels of self-reported happiness and depression among different categories of caregivers, the grandfathers or grandmothers in the paternal or maternal lineages.

This study advances the discussion by considering influential factors on the subjective well-being of the grandparents motivated by human biological instinct as well as social, cultural and institutional factors. When we study the psychological effect of grandparental care, we should look at the power of lineage, kinship and kin selection, and on a practical basis, the difference in behaviour between grandparents on the paternal and maternal sides of the lineage. The uncertainty of the kinship ensures that the obligation of childcare relies on mothers and maternal grandparents with certain psychological impacts on childcare [28]. However, This approach are not as popular in Asia as in Europe and the US, and its application to the study of grandchild care is also rarely seen in China.

This study used data from 2018's CHARLS, adopting empirical data into the analysis, taking happiness and depression as indicators and applying the comparative method. It is worth noting that the approach of this study is not derived from individual psychology but from service relations, though the study of happiness must reflect the state of individual psychology across genders and generations. It develops along the respects of social and care relations rather than on human instincts and the behavioural models of care activities. For testing the impacts of kinship on childcare issues, we classify care relations into four groups of grandparenting types: Paternal Grandfathers (PGF), Maternal Grandfathers (MGF), Paternal Grandmothers (PGM) and Maternal Grandmothers (MGM). We adopt the following assumption on the levels of paternity uncertainty in the grandparent–grandchild kinship relationship: PGF<MGF<PGM<MGM [27]. This assumption sets out the effects of both gender and lineage factors and tests the levels of subjective well-being for these four groups. Using this classification, we explore the nexus between grandchild care participation and the subjective well-being of the grandparents in the four groups. In the context of this assumption, the levels of subjective well-being in grandparents engaged in grandchild care in these four groups could be: PGF<MGF<PGM<MGM.

Methods

Data

This study used the data from CHARLS and utilised a general linear model for further analyses. The sample, collected from 28 provinces in China, 150 municipalities and 450 communities, included 19,816 participants. CHARLS used a probability

proportionate to the size sampling method of data collection to produce a weighted sample from this dataset. Cases are only selected if the informant takes care of at least one grandchild. We imposed another rule to simplify the kinship relations being tested and ensure only one kind of intergenerational kinship relation is targeted by the investigation. This is to avoid the complication of intergenerational relations since a grandmother who looks after several children simultaneously can play the roles of the grandmother in both the paternal and maternal lines and thus engage with different kinship relations. Therefore, this case selection method can help to make the relationships clearer. Using this rule, we obtained 3,454 survey participants from the CHARLS, 2018 data, although not all these samples provide answers to all the questions (the selected independent variables). Through the process of data cleaning, we got the actual number of samples in each model, as shown in Tables 2–5.

Measures

Drawing on previous studies [5,8,33], the dependent variables included are household type, marital status, age, education level, work status, health status, duration of care, frequency of contact, number of social activities, personal income and the number of grandchildren. In order to examine the kinship effect, the different types of family relations need to be identified. Accordingly, we classified the grandparental relations of the targeted families into three groups. Group 1 refers to families with one adult child, a result of the one-child policy that has been implemented for three decades. This model was more prominent in urban areas as the one-child policy was not rigorously enforced in rural areas. Group 2 refers to families with two adult children, and Group 3 refers to those families with three or more adult children.

Happiness and depression were adopted as measures of the positive and negative subjective well-being of grandparents in this analysis, allowing an adaptive two-factor approach to be utilised [5,15,33]. CHARLS used the 10-item Center for Epidemiologic Studies Depression (CES-D) scale to assess the happiness and depressive symptoms of the elderly. Participants were asked questions about their feelings during the previous week to assess depressive symptoms (e.g. 'I was bothered by things that don't usually bother me'). For each question, they were asked to select an answer from four options: '1 = rarely or none of the time' (<1 day); '2 = some or a little of the time' (1–2 days); '3 = occasionally or a moderate amount of the time' (3–4 days); '4 = most or all of the time' (5–7 days).

For comparison purposes, we separate the happiness indicator from the CES-D scale and regard it as an independent variable. Meanwhile, the sum of the remaining variables of the CES-D scale was calculated and regarded as the variable for measuring the level of depression. Hence, the scale of depressive symptoms ranged from 9–36 – a higher score indicates negative outcomes. We can make comparisons between the four groups – PGF, MGF, PGM and MGM – on grandparents' feelings and attitudes regarding grandchild care, revealing their kin relations and illustrating the explanatory power of evolutionary psychological theory on intergenerational relations and grandparental care.

In the following section, we will present the results. Four grandparenting groups and the family structure are added to Model 1 as influencing factors on subjective well-being using the indicators of happiness and depression for the grandpar-

ents. Household type and marital status are added to Model 2, and finally, the remaining variables are incorporated into Model 3 to reveal the significant influential factors: the number of social activities, personal income, care duration, frequency of contact, the number of grandchildren and the age of the grandparent. This should provide a more comprehensive overview of the general situation of factors, although some of these factors are not significant in the testing.

Results

Table 1 shows the descriptive statistics of the sample. The PGMs have the highest ratio of grandchild care responsibility, especially in families located in rural areas with only one grandchild; meanwhile, the MGFs have the lowest rate of participation in grandchild care. However, the caring time of the PGFs is the longest. Also, most of the grandparents selected in the sample have spouses. Furthermore, the overall education level of these grandparents is below secondary, with a very low proportion having a tertiary level of education. The working status is obviously gender oriented as the working rate of grandmothers is lower than that of the grandfathers. As for the health status, the PGMs report better levels despite the overall level of happiness of grandmothers being lower than that of the grandfathers and the grandmothers experiencing a higher level of depression than the grandfathers.

Table 1: Descriptive statistics of the sample.

	MGM		MGF		PGM		PGF	
	n	%	n	%	n	%	n	%
Family structure								
1 parental generation	26	23.9	16	14.5	40	37.5	26	24.1
2 parental generations	53	19.6	55	20.2	83	30.4	81	29.9
More than 3 parental generations	105	20.5	94	18.3	169	33.1	144	28.2
Area type								
Urban	49	22.4	46	21.2	67	30.6	56	25.8
Rural	133	20.0	117	17.5	224	33.5	193	28.9
Marital status								
With a spouse	125	18.8	141	21.3	185	27.9	212	32.0
Without a spouse	59	25.8	23	10.1	107	47.1	39	17.1
Education level								
Compulsory and below	165	21.1	135	17.3	272	34.7	211	27.0
Secondary	16	17.8	26	27.9	18	19.3	32	35.0
Tertiary and above	2	13.6	3	22.1	2	14.6	8	49.7
Work status								
Working	104	20.2	106	20.6	149	28.9	156	30.3
Not working	77	20.8	57	15.4	143	38.4	95	25.4
Health status								
Good	46	21.0	33	14.9	80	36.5	60	27.5
Medium	87	21.5	78	19.3	130	32.4	108	26.8
Poor	39	18.9	43	20.7	62	29.7	64	30.6
	Mean	Std.Dev	Mean	Std.Dev	Mean	Std.Dev	Mean	Std.Dev
Care time (thousand hours of the last year)	2.092	1.875	2.024	1.851	2.159	1.827	2.274	1.972
Frequency of contacting children (score of times)	2.004	2.699	1.984	2.528	2.022	2.688	1.947	2.647
Number of kinds of social activities	1.395	0.945	1.461	0.877	1.325	0.760	1.355	0.818
Personal income (thousand yuan of the last year)	8.401	14.905	15.202	24.168	6.489	13.734	15.402	32.396
Number of grandchildren	3.747	3.322	3.756	3.344	4.349	3.724	4.146	3.738
Age of grandparent	62.797	10.527	63.464	10.341	63.829	10.993	64.676	10.161
Happiness score (1 to 4)	2.802	1.231	3.008	1.194	2.950	1.200	2.956	1.207
Depression score (9 to 36)	17.390	6.426	15.244	5.717	17.052	6.138	15.434	5.356
CES-D score (10 to 40)	19.555	7.184	17.216	6.292	19.060	6.768	17.452	5.860

Note: MGM: Maternal grandmothers; MGF: Maternal grandfathers; PGM: Paternal grandmothers; PGF: Paternal grandfathers

As shown in Table 2, we found that grandparenting type is significantly associated with depression symptoms. Among the four groups, the MGM and PGM groups experience more depression than the PGFs. However, there was no significant difference in depression levels between the MGF and the PGF groups. There was also no significant difference in the happiness of the four grandparenting groups. These findings differ from reports that indicated that the sequence of happiness levels among grandparents is MGM>PGM>PGF>PGF [9]. Nevertheless, both scores of happiness and depression in the MGFs remain insignificant compared to the PGFs. Regarding family structure, the score is significant across all the models apart from happiness in Model 3. Table 2 shows that grandparents with one grandchild seem to be happier but experience less depression. In other words, grandparents can benefit more from one-generation families.

In Table 2, we obtain an overview of the data between the family relations with the subjective indicators of happiness and depression state the general situation, which implies their correlations substantially exist. However, the purpose of this study is to reveal the impact of kin relations on grandparents' happiness or depression, therefore, we need to look, in detail, at the exploration of the relations to different parenting groups. In addition, some of the models in Tables 2–5 suggest that area type, marital status, the number of social activities, personal income,

Table 2: General linear models of the whole sample.

	Model 1			Model 2			Model 3		
	Happiness	Depression	CES-D	Happiness	Depression	CES-D	Happiness	Depression	CES-D
(Intercept)	2.864***	18.438***	18.022***	2.612***	20.555***	19.653***	2.080***	24.978***	24.032***
Grandparenting type									
MGM	-0.171	2.292***	2.197***	-0.137	1.986***	1.938***	-0.130	1.714**	1.697**
MGF	0.056	-0.163	-0.253	0.039	-0.053	-0.143	0.086	-0.119	-0.287
PGM	-0.019	2.055***	1.673***	0.047	1.552***	1.200**	0.097	1.278*	0.956*
PGF (ref)									
Family structure									
1 parental generation	0.471***	-3.246***	-2.708***	0.305**	-1.869***	-1.499**	0.167	-1.539*	-1.595*
2 parental generations	0.128	-1.302**	-0.866*	0.060	-0.774*	-0.406	0.045	-0.910	-0.780
More than 3 parental generations (ref)									
Area type									
Urban				0.116	-1.024*	-0.931*	0.030	-0.764	-0.682
Rural (ref)									
Marital status									
With a spouse				0.153	-1.433**	-0.953*	0.226*	-1.722**	-1.301**
Without a spouse (ref)									
Education level									
Compulsory and below							0.068	-0.758	-0.746
Secondary							0.105	-2.319	-2.086
Tertiary and above (ref)									
Work status									
Working							-0.082	-0.380	-0.035
Not working (ref)									
Health status									
Good							0.057	-0.532	-0.425
Medium							0.039	-0.659	-0.517
Poor (ref)									
Care time							0.046*	0.021	-0.001
Frequency of contacting children							-0.037*	0.114	0.090
Number of kinds of social activities				0.059*	-0.395*	-0.349*	0.063*	-0.397**	-0.398**
Personal income				0.003*	-0.028**	-0.026**	0.004*	-0.028**	-0.026*
Number of grandchildren							-0.021	0.034	-0.046
Age of grandparent							0.007	-0.046	-0.041
R square	0.019	0.054	0.039	0.033	0.085	0.062	0.007	0.093	0.069
Number of observations	2563	2427	2607	2540	2405	2584	2172	2056	2210

Note: *p<0.05. ** p<0.01. *** p<0.001

care time, frequency of contact and the number of grandchildren are significantly associated with happiness or depression levels. However, the significance of these variables is not stable because they are not always significant in all the models.

Tables 3–5 discuss the impacts of families with one, two and three or more parental children on grandparental care and their subjective well-being. Table 3 shows that neither of these two models has a significant effect on happiness or depression in relation to the grandparenting type. Thus, the subjective well-being of grandparents in one-child families is not affected by the grandparent–grandchild kinship relation.

Table 4 presents the association between grandparenting kinship type and subjective well-being in families with two adult children. According to the data, there is no significance of happiness among the four groups, but in terms of depression, MGMs and PGMs have significantly higher levels than MGFs and PGFs. In Model 2 and Model 3, the score of the depression level is not significant in the MGM group but is evident in the PGM group. However, the PGFs' depression level score is still significantly higher than that of the total PGF score. Meanwhile,

the happiness and depression levels are not significantly different between the PGF and MGF groups. In terms of the association between grandparenting type and happiness levels, the coefficients of the three models show no significant outcomes.

Table 5 illustrates the subjective well-being of the grandparents in families with three or more grandchildren. There is no substantial change from Table 4 to Table 5 regarding the happiness indicator apart from that of the MGM group in Model 1. However, the indicator of depression sees some changes. In Table 5, the score of the MGM group is significantly higher than that of the PGFs in each model. This implies that the MGMs are the most prone to depression in families with three or more parental children. As for the depression level, in Model 1 and Model 2, the PGM group's level is significantly higher than that of the PGFs. However, there is still no significant difference in Model 3 between the PGMs and PGFs.

In the following section, we will engage in a discussion of evolutionary psychology and kin selection using the evidence from the examination above.

Table 3: General linear models of the families with 1 parental generation.

	Model 1			Model 2		
	Happiness	Depression	CES-D	Happiness	Depression	CES-D
(Intercept)	3.205***	15.988***	15.945***	2.662***	18.157	17.956***
Grandparenting type						
MGM	0.179	0.031	0.038	0.237	-0.095	-0.059
MGF	0.222	-0.383	-0.162	0.301	-0.701	-0.427
PGM	0.033	1.477	1.369	0.153	0.740	0.696
PGF (ref)						
Area type						
Urban				-0.049	-0.674	-0.784
Rural (ref)						
Marital status						
With a spouse				0.493	-0.624	-0.545
Without a spouse (ref)						
Education level						
Compulsory and below						
Secondary						
Tertiary and above						
Work status						
Working						
Not working						
Health status						
Good						
Medium						
Poor						
Care time						
Frequency of contacting children						
Number of kinds of social activities				-0.026	-0.096	-0.082
Personal income				0.004	-0.028	-0.026
Number of grandchildren						
Age of grandparent						
R square	0.007	0.019	0.015	0.047	0.067	0.059
Number of observations	312	307	316	303	299	307

Note: *p<0.05. ** p<0.01. *** p<0.001

Table 4: General linear models of the families with 2 parental generations.

	Model 1			Model 2			Model 3		
	Happiness	Depression	CES-D	Happiness	Depression	CES-D	Happiness	Depression	CES-D
(Intercept)	2.944***	17.274***	17.137***	2.595***	20.195***	19.833***	1.345*	18.520***	5.591***
Grandparenting type									
MGM	0.019	1.539*	1.685*	0.042	1.145	1.259*	0.068	1.293	2.045*
MGF	0.022	0.081	-0.044	0.013	0.034	-0.087	0.009	0.391	0.289
PGM	0.035	1.916**	1.927**	0.067	1.407*	1.403*	0.079	1.426*	2.138*
PGF (ref)									
Area type									
Urban				0.125	-0.514	-0.371	0.120	-0.676	-0.893
Rural (ref)									
Marital status									
With a spouse				0.126	-1.381	-1.286	0.271	-1.322	-1.700
Without a spouse (ref)									
Education level									
Compulsory and below							0.367	-0.895	-0.783
Secondary							0.357	-1.205	-0.902
Tertiary and above (ref)									
Work status									
Working							0.139	-0.291	-0.142
Not working (ref)									
Health status									
Good							0.032	0.255	0.441
Medium							-0.152	0.728	1.188
Poor (ref)									
Care time							0.002	0.099	0.562
Frequency of contacting children							-0.048	0.072	0.508
Number of kinds of social activities				0.114*	-0.618**	-0.546*	0.086	-0.468	-1.704
Personal income				0.002	-0.035**	-0.036**	0.003	-0.039*	-2.644**
Number of grandchildren							-0.018	0.178	0.888
Age							0.015*	0.023	0.288
R square	0.000	0.020	0.022	0.017	0.062	0.059	0.038	0.071	0.068
Number of observations	865	838	875	855	828	865	734	714	742

Note: *p<0.05. ** p<0.01. *** p<0.001

Table 5: General linear models of the families with more than 3 parental generations.

	Model 1			Model 2			Model 3		
	Happiness	Depression	CES-D	Happiness	Depression	CES-D	Happiness	Depression	CES-D
(Intercept)	2.916	18.198***	17.916***	2.644***	20.370***	19.391***	2.294**	25.807***	24.510***
Grandparenting type									
MGM	-0.364*	3.308***	3.011***	-0.329	2.925***	2.762***	-0.275	2.119**	2.030**
MGF	0.044	-0.256	-0.383	-0.012	0.026	-0.125	0.038	-0.283	-0.509
PGM	-0.055	2.231***	1.570**	-0.001	1.779**	1.180	0.041	1.351	0.789
PGF (ref)									
Area type									
Urban				0.144	-1.482*	-1.421*	0.049	-1.123	-1.025
Rural (ref)									
Marital status									
With a spouse				0.103	-1.379*	-0.769	0.155	-1.793*	-1.207
Without a spouse (ref)									
Education level									
Compulsory and below							-0.066	1.295	0.868
Secondary							-0.010	-1.078	-1.030
Tertiary and above									
Work status									
Working							-0.182	-0.537	0.011
Not working									
Health status									
Good							0.060	-0.504	-0.413
Medium							0.122	-1.032	-0.809
Poor (ref)									
Care time							0.063*	-0.031	-0.054
Frequency of contacting children							-0.033	0.132	0.102
Number of kinds of social activities				0.097	-0.449	-0.341	0.110	-0.483	-0.489
Personal income				0.005	-0.026	-0.021	0.005	-0.019	-0.015
Number of grandchildren							-0.023	0.054	-0.035
Age of grandparent							0.006	-0.083*	-0.068*
R square	0.014	0.045	0.033	0.029	0.071	0.049	0.060	0.089	0.063
Number of observations	1386	1282	1416	1382	1278	1412	1185	1093	1211

Note: *p<0.05. ** p<0.01. *** p<0.001

Discussion

Though the approach of evolutionary psychology remains valuable in many biological and psychological issues, the application is limited when attempting to explain social interactions, as in the cases of inter-generational care. To exercise the explanatory power applied in the analysis of human behaviours from a view of genetic or biological instinct, the altruistic behaviours of family care should be the basic one for family members and in return, we need to test whether or not this effect leads to childcare. The analysis method is mainly used in psychological studies and behavioural experiments, but it looks at the interpretation about the grandparenting focussing on caregiving behaviours and their actions.

In this way of approaching to the condition of subjective well-being for the grandparental caregivers, we explore the significant nexus of grandparenting relations. The results of this study indicate that female grandparents are more likely to experience depressive emotions than male grandparents, whereas the levels of happiness for the four grandparenting groups seem not to differ in the context of grandchild care. This study tests whether males are less likely to benefit from grandparenting behaviour as suggested by scholars in the field of evolutionary psychology, and we examine the independent variables for the conditions of grandparenting care. With this evidence, we may discover some

reasons for the applicability of the kin selection theory in the features of grandchild care in the Chinese context.

One issue of the evolutionary psychology approach is that the theory assumes the uncertainty of the kinship relationship between grandfathers and grandchildren is higher than between grandmothers and grandchildren [6]. This allows scholars, in international discourse, to explain the higher level of subjective well-being among female grandparents than their male counterparts. For example, Thomese [30] argues that due to paternity uncertainty in males, grandfathers are more willing to have more grandchildren than grandmothers to enhance the probability of replicating their genes. Pashos [26] argued that patriarchal societies have lowered the paternity uncertainty of the kinship relationships between grandparents and grandchildren. However, this biological and psychological reasoning may draw criticism from scholars interpreting the socio-cultural reasons as being significant.

The socio-cultural interpretation of grandparenting care is evident in many non-Western countries, such as China. Traditions and strong paternal and masculine societal contexts result in a low social status for women in family life, who are portrayed as the main caregivers in terms of paternal kinship. This context generates a strong sense of lineage among people, ensuring high expectations of their children and the offspring of their kin. Many elders believe that male descendants are the

true heirs of the family clan; hence, they are more inclined to invest time, energy and material in male grandchildren. This bias is entrenched in the Confucian tradition of Chinese culture. For these socio-cultural reasons, Chinese families prefer to assign the family obligation of childcare to the side of paternal lineage.

As a result, grandfathers could have a stronger incentive than grandmothers to invest in grandchildren for the future development of the family clan. By extension, both paternal and maternal grandparents may exhibit their interest in caregiving behaviours as family investment behaviour, although their motivations may be substantially different from the socio-cultural and bio-psychological reasons discussed previously. This study shows that in cases where grandparents look after one grandchild, there is no significant difference in happiness between the grandfathers in both the paternal and maternal lines. This signifies the grandfathers' willingness to engage in grandchild care activities, and it has no significant relationship with depression. In order to have an in-depth investigation, we examine the relationship between the indicator of happiness and the four grandparenting groups.

In terms of subjective well-being, this study tests the level of happiness and depression of the paternal and maternal grandparents to illustrate their feelings about and attitudes towards the care of grandchildren. The comparison of the survey data between the four groups of PGFs, PGMs, MGMs and MGFs, demonstrates the degree of subjective well-being for the caregivers as evidence revealing the dynamics of grandparenting care. Through data analysis, we observed significantly higher levels of subjective well-being in the PGF and the MGF groups than that in the MGM and PGM groups, reflecting the fact that grandfathers have a lower level of depression in both paternal and maternal groups. Meanwhile, the comparison of the happiness indicator shows that among caregivers, there is no significant difference between the groups of PGMs and PGFs. This implies that the issue can be answered by various socio-cultural reasons rather than by the kinship underpinned by the theory of kin selection. For instance, factors such as less functional support provided by grandfathers in caring activities may be more fundamental than a reason of kinship to interpret the level of subjective well-being. This difference implies that the grandmothers in paternal families may take on most of the grandchild care responsibilities. Therefore, for the MGMs and the PGMs, participating in grandchild care is associated with more depression symptoms.

On the other hand, if the kin selection theory is workable, we can reasonably assume that MGMs should be the most active caregivers, while PGFs are the most passive caregivers. Nevertheless, in our studies, there is no significant difference in the subjective well-being of grandparents in one-child families between the four kinds of grandparenting. In families with three parental children or more, the attitude changes. Families' demographic structures and patriarchal cultures are also important factors associated with grandparenting effects. Hence, the factor of paternity uncertainty in intergenerational kinship relationships seems to not necessarily play a decisive role in kinship investment.

Accordingly, this study takes social factors to be more influential in determining the behavioural mode of grandchild care than instinctive biological factors. In China, women are the main childcare providers, but female grandparents do not necessarily experience more happiness and less negative emotions by participating in grandchild care due to the heavy childcare bur-

den placed on them. The CHARLS survey data reflects the fact that male grandparents involved in caring for a grandchild have lower levels of depression than female grandparents. At the same time, there was no significant difference in the level of depression between MGFs and PGFs. This finding shows that the nexus between grandparenting and the subjective well-being of grandparents is more likely to be a gender-oriented issue rather than being attributed to paternity uncertainty, although there is some overlap between the gender problems and kinship investment. In fact, there have already been some studies stating that the responsibility of grandchild care includes an aspect of gender inequality [14,16].

Simultaneously, we should also consider the influence of social support on childcare, which has an impact on family childcare's duration and intensity. In Western countries, the average duration of grandchild care is 0–5 hours per day [18], whereas, in China, 46% of grandparents spend an average of 8 hours per day caring for their grandchildren [34]. As calculated by the data in Table 1, Chinese grandparents who only take care of one grandchild spend an average of 5.89 hours per day on childcare. Therefore, the burden of grandchild care for Chinese grandparents is much heavier than that of those in Western societies. This is mainly due to the general lack of public childcare services for children under the age of three in China. In addition, Chinese parents are usually employed in various job positions, but China lacks family policies that support childcare. Therefore, many grandparents have become substitutes for the children's parents as the main caregivers.

As a result, grandchild care has become a labour-intensive task. Under this condition of a heavier care burden than that of grandparents in Western countries, the subjective well-being of Chinese grandparents will have different characteristics. Accordingly, due to the different extent of the care burden, Western grandparents' kinship investment behaviour may be more in line with evolutionary theory, while Chinese grandparents are more influenced by social and familial factors. Hence, to achieve the goal of comparing the explanatory power of evolutionary theories and socio-cultural, institutional theories on grandparenting, a cross-national comparative empirical study is needed to explore future differences [3]. Therefore, the difficulty in explaining the case of grandchild care is caused by a combination of the following influences: patriarchal traditions in family caregiving obligations, current employment norms, the lack of childcare services in modern Chinese society and the differences between rural and urban areas. Thus, an explanation from the approach of evolutionary psychology based on human kinship does not have universal validity, and the hypothesis of kin selection fails to explain the findings of this study.

Conclusion

This study highlights the complex relationship between grandchild care and the subjective well-being of grandparents. The study reveals that the mechanism behind the motivation for grandchild care in China is complex and is affected by both socio-cultural and bio-psychological factors. The study explores the association between grandchild care, grandparenting kinship types and the subjective well-being of grandparents who look after their grandchildren. In seeking the answers, the corresponding subjective well-being of the four grandparenting-type groups needed to be examined. This study discusses the previous studies based on the kin selection theory, which over-emphasises the effect of paternity uncertainty.

In this study, we adopted a method of two-factor analysis to examine the extent of happiness and depression. The results show that the happiness level is insignificant, but the depression level is significantly associated with grandparenting types. This approach helps us to explore policies that support grandchild care and reduce negative emotions in the elderly. The results support the view of the kin selection theory to a certain extent; only when grandparents spend a lot of time and energy caring for their grandchildren might their depression level increase due to mental stress. Furthermore, men who are less involved in family care experience less mental stress and are therefore less likely to experience an increase in depression levels. This indicates that depression is not necessarily increased in conjunction with an increase in the grandchild care burden. Hence, this inference cannot fully support the kin selection theory.

More importantly, grandchild care significantly increases the grandparents' sense of depression, meaning that family care needs policy support to reduce the burden on grandchild caregivers. However, we notice that care time was not a significant factor in increasing depression levels, so the study of bio-psychological issues should be further investigated. Nevertheless, the combination of biological and social approaches may create more difficulties in distinguishing the influential factors. This problem cannot be addressed through current evolutionary psychology theories, which have caused pervasive controversy. Instead, an increased emphasis on studies on behavioural research related to human biological nature, such as gender and kin, is necessary. This theoretical perspective can expand our research horizons and increase the depth of future research, helping to find the best method of childcare and support for familial caregivers.

Author Statements

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Declaration of Interest Statement

The authors report there are no competing interests to declare.

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