Foundation University Journal of Psychology
Vol 9, No.1 (January, 2025)

FUJP Open Access Journal

Research Article 10.33897/fujp.v9i1.778

The Impact of Spousal Bereavement on Older Adults Cognitive Functioning: The Moderating Role of Social Support

Zoya Waqas[1], Areeba Aaamir[1], Maham Mehtab[1], Ruba Izhar[1], Sumara Mehmood Ul Hassan[1]
[1]National University of Science and Technology (NUST), Islamabad, Pakistan
For Correspondence: Sumara Mehmood Ul Hassan. Email: dr. sumara@s3h.nust.edu.pk

Abstract

Objective. This study examines the relationship between spousal bereavement and the cognitive functioning of older adults and investigates the role of social support as a moderator in this relationship.

Method. The present study employed a cross-sectional research design. Purposive sampling was used to collect data from bereaved and non-bereaved older adults *(n = 192, M = 68.23 years)* in Rawalpindi and Islamabad.

Results. The moderation analysis showed an insignificant moderation effect of social support on the relationship between spousal bereavement and the cognitive functioning of older adults. Furthermore, correlation analyses conducted presented a negative significant relationship between cognitive functioning and spousal bereavement, a positive significant relationship between cognitive functioning and social support, and a negative correlation between spousal bereavement and social support of older adults.

Conclusion & Implications. The study facilitates researchers to build upon current knowledge of cognitive functioning, and social support in older adults to investigate the possible factors that contribute to cognitive decline following spousal bereavement.

Keywords. Older adults, spousal bereavement, cognitive functioning, social support, moderation.

Introduction

The world has observed a drastic increase in the elderly population, as the number of older adults will continue to increase in the coming years (Barragan-Garcia et al., 2021). In Pakistan, approximately 15 million people were 60 and above in 2019, formulating 7% of the total population which will be double by the end of 2050 (HelpAge International, 2015; Hassan et al., 2020). This greying of the population leads to an enhanced burden on the healthcare system of a developing country like Pakistan as elderly individuals experience more health concerns (Abdullah, 2021; Hassan et al., 2023).

With growing age, older adults become more vulnerable to the loss of their loved ones. Subsequently, one event that older adults commonly face that disrupts their mental health is the loss of a spouse (Atalay & Staneva, 2020). Bereavement is a phenomenon that most adults experience after the death of a loved one and is referred to as an inevitable life transition (Seiler et al., 2020). Evidence from stress research has shown that spousal loss is described as one of the most stressful events that becomes a serious threat to the well-being and quality of life of older adults (Van Boekel et al., 2019). Thus, leading to a loss of social engagement as well as decreased mobility (Calatayud et al., 2021). It has a significant effect on several elements of the older adult's functioning, particularly cognitive functioning (Atalay et al., 2020). Several explanations exist for how cognitive functioning is impacted by the loss of a spouse (Worn et al., 2018). Andrew and Rockwood (2010) found that social vulnerability and social isolation, which are frequently brought on by spousal loss, are related to a decline in cognition among the older population, and especially their memory is affected.

Detrimental effects of widowhood in the form of increased grief, and emotional and social isolation (Szabo et al., 2020) last for a prolonged time period. Social support in the context of bereavement can be defined as the provision of resources to someone who has undergone bereavement, with the intention of enhancing the well-being of the recipient (Shumaker & Brownell, 2010). Support provided by one's spouse enables older adults to maintain their mental well-being and social engagement (Ermer & Proulx, 2019). Individuals with a greater sense of perceived support are better at managing stress (Gellert et al., 2018). This is reinforced by the Stress buffering model that posits that social support has been associated with a positive impact on well-being after traumatic events and is considered a protective factor against the negative effects of stressful life events (Cohen et al., 1985) like bereavement.

Moreover, studies highlight that bereaved individuals are unable to experience sufficient support to moderate their bereavement even though social support is considered an integral predictor of psychological outcomes after bereavement (Rodriguez & Cohen, 1998). The widowhood-cognition link is based on the interaction between three forces, one of which is the reduction of social contact (Worn et al., 2020). A decrease in social support and bereavement are interconnected as older adults experience reduced perceived social support after losing their loved one (Xiang et al., 2021). According to Kelly et al. (2017), a relationship exists between social support and the global cognition of older adults, specifically memory. A study conducted in Taiwan also revealed a significant association between social support and cognitive functioning, with higher social support linked to greater cognitive functioning (Yeh & Liu, 2003). Married couples showcased higher scores of cognitive functioning so individuals who face widowhood experience a lack of social support from their spouse and need new sources of social support (Tucker et al., 1999).

Subsequently, the Cognitive Reserve Theory focuses on the advent of enhancing the resistance of the brain to cognitive decline (Stern, 2003). In the case of bereavement, social activities in the form of social support are considered to be the most significant predictors of psychological outcomes following bereavement (Burke et al., 2013). Social support is considered to promote cognitive reserve (Petkus et al., 2021), with higher social support reducing cognitive decline after bereavement (Bottomley et al., 2015). When individuals with a stronger cognitive reserve experience adverse life events, for example, bereavement, their cognitive problems may emerge with less severity (Stern, 2003). Henceforth, considering a relationship between spousal bereavement and cognitive functioning results in certain variables moderating

this relationship, one of which is social support. Literature highlights that greater levels of perceived social support were connected to higher cognitive functioning scores (Pillemer & Holtzer, 2015), reinforcing that social support that is considered a cognitive reserve serves as a protective factor against cognitive decline (Asmat, 2020).

There is no established treatment for cognitive decline, so identifying older populations at risk becomes significant for the implementation of interventions to increase practices that prevent cognitive decline (Singham et al., 2021). As spousal bereavement leads to increased mortality, 'the widowhood effect' (Sarah et al., 2016), it is integral to identify the older population at risk, as well as consider bereavement-induced cognitive decline.

Hypotheses

Hypothesis 1. There will be a significant association between spousal bereavement and social support with cognitive functioning and its various domains in older adults.

Hypothesis 2. Social support will significantly moderate the relationship between spousal bereavement and cognitive functioning in older adults.

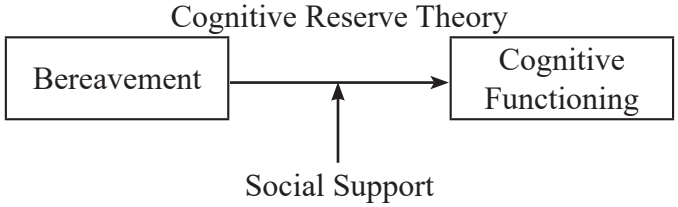
Hypothesis 3. Bereaved and non-bereaved older adults will show significant mean differences in cognitive functioning and social support scores.

Conceptual Framework

The model depicts that there is a direct relationship between spousal bereavement and the decline in cognitive functioning. However, this relationship is moderated by the presence of social support which interferes with the intensity and direction of this relationship. Therefore, the increase or decrease of social support may exacerbate or reduce the possibility of a decline in the cognitive functions of the bereaved elderly.

Figure 1

Conceptual Framework of the study



Methodology

In order to investigate the relationship between study variables, a cross-sectional research design was utilized. The G Power Analysis for Indirect Effects application determined the sample size. With a 5% margin of error, 95% confidence interval, and a 0.15 effect size, a sample size of 107 was established. The total sample size of this study comprised 192 male and female bereaved and non-bereaved older adults. A convenient sampling technique was employed. The research was confined to Rawalpindi and Islamabad.

Sample

The sample comprised two groups, the bereaved group, and the non-bereaved group. The non-bereaved group consisted of older adults aged 60 and above who had experienced the loss of their spouse *(n=132).* For the non-bereaved group *(n=60)* of the sample, the inclusion criteria required individuals who had not experienced spousal loss and were over sixty years old. Exclusion criteria consisted of individuals with physical disabilities or chronic and psychological disabilities. Taking into account the ethical considerations, necessary approvals from the ethical board of the National University of Sciences and Technology (NUST) were taken before the data collection was started.

Assessment Measures

The assessment battery was composed of five parts including the informed consent, the demographic information form, the Montreal Cognitive Assessment (MoCA), Core Bereavement Items (CBI), and the Multidimensional Scale of Perceived Social Support (MSPSS).

Montreal Cognitive Assessment (MoCA). Nasreddine et al. (2005) formed this concise screening measure for the assessment of cognitive decline in older adults. Thirty items assessing various cognitive domains are included in MoCA: short-term memory (5 points), visuospatial abilities through clock drawing (3 points), and a cube copy task (1 point); executive functioning through Trail making test Part B (1 point), phonemic fluency (1 point), and verbal abstraction (2 points); attention, concentration, and working memory through target detection (1 point), serial subtraction (3 points),

digit forward (1 point) and digit backward (1 point), language through naming with less familiar animals (3 points), and repetition of complex sentences (2 points) and orientation to time and place (6 points). MoCA is scored by obtaining a total score for each item. The score range is 0-30. A cut-off score of 26 has been recommended as normal functioning by clinicians out of a total score of 30. Reliability analysis conducted through Cronbach alpha revealed to be 0.78. The already available Urdu-translated version of the assessment tool was used (Nasreddine et al., 2005). MoCA was conducted with both bereaved and nonbereaved participants to assess their cognitive functioning.

Core Bereavement Items (CBI). Burnett et al (1997) developed the Core Bereavement Items scale. However, this scale was translated into Urdu by Agha and Haque (2021) which was used in this study. This measure is intended to assess bereavement experiences and core grief. It consists of 17 items that are divided into three subscales, namely Images and Thoughts (Items 1–7) with a score range of 0-21 and an alpha coefficient of 0.74, Acute Separation (Items 8–12) with a score range of 0-15, and an alpha coefficient of 0.77, and Grief (Items 13–17) with a score range of 0-15 and an alpha coefficient of 0.86. All the items are graded on a 5-point Likert scale ranging from 0 = Never to 3 = A lot of time. Furthermore, the scale has no reverse items. The reliability analysis of the whole scale conducted yielded a Cronbach alpha coefficient of 0.92. CBI was only conducted with the participants in the bereaved group who had experienced spousal bereavement as it measures bereavement experiences and associated grief.

Multidimensional Scale of Perceived Social Support (MSPSS). MSPSS was developed by Zimet et al. (1988) and translated and validated by Tonsing et al. (2012). This scale comprises 12 items and assesses the perceived social support of individuals from 3 sources: family, friends, and significant others. However, in this study, only 2 subscales were utilized, particularly family and friends, as significant others of the participants in our bereaved sample had already passed. For the family subscale, the participants responded by taking into consideration the social support provided by the rest of the family following the death of their spouse. So, the scale consisted of 8 items, which collected responses through a 7-point Likert scale (0 strongly disagree, 5 = strongly agree). To calculate the total score, it is required to sum across all 8 items and then divide by the total number of items which in our study is 8. The score range is 0-56. A score between 11-35 was characterized as low perceived social support, a score between 36-43 was characterized as medium perceived social support, and a score between 44-56 was characterized as high perceived social support. A reliability analysis through Cronbach Alpha revealed a reliability value of 0.87. MSPSS was conducted with both bereaved and nonbereaved participants to determine their perceived social support.

Data Analyses

After the data collection, the data was analyzed using Pearson correlation, moderation analysis, t-tests, and analysis of variance in the SPSS software. The first step was to organize and summarize the descriptive statistics of the sample data.

The assumptions for the normality of the data were checked and fulfilled before the final analysis was conducted. Table 1 highlights the background characteristics of the participants in order to understand the demographics of the study sample. Based on the sociodemographic variables, the means have also been presented in the same table. Out of the 192 respondents, 75.5% were female and 24.5% were male. The young older adults with an age range of 60-75 years, comprised 85.4% of the respondents. Majority of the sample have either secondary education (39.1%) or tertiary education (34.9%). 49.5% of respondents had more than one chronic medical condition. A majority of the sample falls in the low socioeconomic status with 39.5% having an average monthly household income of less than 100,000.

Table 1

Demographic Characteristics of the Participants (N = 192)

	Demographic	*f*	%	SB	SS	CF
				Mean		
Gender	Male	145	75.5	26.4	40.9	19.8
	Female	47	24.5	26.3	38.2	17.9
Age	Younger older adults	164	85.4	25.9	38.9	18.5
	Middle older adults	24	12.5	28.2	39.0	17.7
	Older older adults	4	2.1	32.0	39.5	17.5
LSS	Non-bereaved	60	31.3	-	43.8	20.3
	Bereaved	132	68.8	26.3	36.7	17.5
Education	No education	32	16.7	28.0	36.1	14.2
	Primary education	18	9.4	27.6	36.1	13.8
	Secondary education	75	39.1	27.1	37.9	18.6
	Tertiary education	67	34.9	23.8	42.1	21.4
CMC	No CMC	23	12.0	25.1	40.6	18.4
	One CMC	74	38.5	24.6	40.3	19.5
	More than one CMC	95	49.5	27.8	37.4	17.5
EHI	Less than Rs. 50,000	69	35.9	28.5	36.0	14.2
	Rs. 50,000 – 100,000	76	39.5	26.1	39.0	19.4
	Rs. 100,000 – 200.00	31	16.1	23.2	42.8	22.7
	More than Rs. 200,000	16	8.3	20.5	43.1	23.5

Note. LSS = living status of spouse, CMC = Chronic Medical Condition, EHI = Estimate Household Income, SB = Spousal Bereavement, SS = Social Support, CF = Cognitive Functioning.

[a] Spousal bereavement was not measured in non-bereaved participants of the data

Table 2 demonstrates Pearson's correlation analysis of the study variables. These correlations were observed only on the bereaved sample (n=132) as non-bereaved participants were not asked to complete the core bereavement items. The purpose of this analysis was to identify if spousal bereavement and social support were correlated with cognitive functioning. Higher scores of CBI were associated with lower cognitive functioning (r= -.35, n=132, p<.01) and lower social support (r=-.43, n=132, p<.01). Higher cognitive functioning scores were also significantly correlated with lower social support (r=.34, n=132, p<.01), as represented by Table 2.

Table 2 also shows the correlation of specific domains with spousal bereavement. Higher spousal bereavement significantly correlated with lower executive functioning (r = -.33, n = 132, p <.01), attention (r = -.30, p< .01), memory (r=-.24, n=132, p<.01) and abstraction (r= -.20, n=132, p<.05). However, results showed that spousal bereavement was not significantly correlated with language (r = -.13, n = 132, p = .11) and orientation (r=-.06, n=132, p> .05). So, H1 was partially supported.

Table 2
Correlation of Specific Cognitive Functioning Domains with Spousal Bereavement

Variable	*N*	*M*	*SD*	1	2	3	4	5	6	7	8	9
Cognitive Functioning	132	17.5	5.7	1								
Executive functioning	132	2.1	1.7		1							
Naming	132	2.2	0.5		.49**	1						
Attention	132	3.1	1.8		.58**	.40**	1					
Language	132	1.6	1.0		.48**	.24**	.41**	1				
Abstraction	132	1.0	0.8		.33**	.15	.36**	.28**	1			
Memory	132	2.1	1.3		.30**	.17*	.38**	.43**	.19*	1		
Orientation	132	5.1	1.2		.21*	-.06	.25**	.32**	.19*	.26**	1	
Spousal bereavement	132	26.3	9.3	-.35**	-.33**	-.30**	-.30**	-.13	-.20*	-.24**	-0.6	1
Social Support	132	36.7	10.1	.34**								-.43**

p<0.05*, p<0.01**

Simple Moderation Analysis was conducted through the Process Macro Model 1 by Hayes. Results, displayed in Table 3, show spousal bereavement to have a negative, statistically significant direct influence on cognitive functioning, b = -.14, t (128) = -2.74, p<.01. Furthermore, results also demonstrated social support, the moderator variable had a positive direct statistically significant effect on cognitive functioning, b = 0.15, t (128) = 3.23, p <.01. However, the interaction term (X*W), the interaction between spousal bereavement (X) and social support (W) on cognitive functioning (Y) was statistically insignificant b = -0.00, t (128) = -1.33, and p = .85, reflecting that social support did not a significantly moderate the relationship between spousal bereavement on cognitive functioning.

Table 3
Moderation Analysis

Variable	Cognitive Functioning					
	B	*SE*	*t*	*P*	*LL*	*UL*
CBI	-.14	.05	-2.74	.00	-.25	-.04
MSPSS	.15	.04	3.23	.00	.06	.25
CBI x MSPSS	-.00	.00	-1.33	.18	-.01	.00

As few researches investigate the influence of demographic determinants on cognitive functioning, the study conducted ANOVA for age, education level, and estimated household income. The purpose of this analysis was to find whether these variables significantly altered the cognitive functioning of older adults. Results of the research indicated a significant difference (t (147) = 3.17, p<.05) in the cognitive functioning of bereaved and non-bereaved females. However, there was an insignificant difference in the cognitive functioning of the three age groups: F (2, 129) = 0.57, p = .56, as shown by ANOVA. p< .05 was determined for the cognitive functioning scores of respondents with different education levels: F (3, 128) = 18.31, p<.05.

The cognitive functioning of the four categories of estimated household income was statistically higher for higher household income (F (3, 128) = 49.54, p< .05), as shown in Table 4, 5 and 6 respectively.

Table 4
Mean differences between Age and Cognitive Functioning of Bereaved Older Adults

	Younger older adults (n = 113)		Middle older adults (n = 15)		Older older adults (n = 4)				
Variables	*M*	*SD*	*M*	*SD*	*M*	*SD*	*F*	*p*	n^2
Cognitive functioning	17.58	5.71	16.80	5.38	20.25	7.97	.57	.56	.00

Table 5
Mean differences between Education and Cognitive Functioning of Bereaved Older Adults

	No education (n = 26)		Primary education (n = 13)		Secondary education (n = 54)		Tertiary education (n = 39)				
Variables	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*F*	*p*	n^2
Cognitive functioning	13.53	4.06	12.76	3.29	17.94	5.47	21.35	4.79	18.31	.00	.30

Table 6
Mean differences between Household income and Cognitive Functioning of Bereaved Older Adults

	Less than Rs. 50,000 (n = 50)		Rs. 50,000-100,000 (n = 56)		Rs. 100,000 – 200,000 (n = 19)		More than 200,000 (n = 7)				
Variables	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*F*	*p*	n^2
Cognitive functioning	12.72	3.74	19.01	4.51	23.63	2.75	24.2	2.62	49.54	.00	.53

A simple comparison of the prevalence of CMCs in the bereaved and non-bereaved sample was carried out to observe the difference in both groups. The comparison revealed that the bereaved group has a greater number of individuals having CMCs in comparison to the non-bereaved group of elderly. Bereaved individuals were associated with lower cognitive functioning scores than non-bereaved older adults, t (190) = 3.36, p<.05, as shown in Table 7. The lower mean scores of cognitive functioning for the bereaved (*M*= 17.57) as compared to the non-bereaved (*M* = 20.3) indicates that bereaved individuals experience a greater decline in cognitive functioning following the death of their spouse. Thus, H3 was supported. Independent samples t-tests showed significant differences in perceived social support (t (190) = 5.03, p<.05). Non-bereaved older adults had greater levels of perceived support as in comparison to bereaved older adults as shown in Table 7. So, H3 was supported.

Table 7

Mean differences between Perceived Social Support and Cognitive Functioning of Bereaved and Non-Bereaved Older Adults

	Bereaved older adults (n = 132)	Non-bereaved older adults					95% CI		
Variables	*M*	(n = 60)	*M*	*SD*	*t*	*p*	*LL*	*UL*	*d*
Cognitive functioning	17.57	5.72	20.30	3.80	3.36	.00	1.12	4.32	0.56
Perceived social support	36.73	10.19	43.83	5.71	5.03	.00	4.31	9.87	0.85

The mean of cognitive functioning of the bereaved sample from this study was compared with the mean of cognitive functioning of general Indian older population taken from an Indian study (Dhupkar & Shaikh, 2020), to find whether bereaved older adults had lower cognitive functioning than average older adults. The results reported that the bereaved elderly had low scores of cognitive functioning (M=17.57, S. D=5.72) as compared to the general population of elderly from the Indian sample, (M=23.9, S. D=4.09), t (131) =-12.6, p<.05, as illustrated in Table 8.

Table 8

Comparison of Cognitive Functioning of Older Adults in the Study Sample with General Indian Older Adult Population through One Sample T-Test (Test Score = 23.9)

Variable	*n*	*M*	*SD*	*df*	*t*	*p*
Cognitive functioning	132	17.57	5.72	131	-12.69	.00

Discussion

In this study, we aimed to explore the relationship of spousal bereavement and the cognitive functioning of the older population with social support as a moderator. The cognitive functioning of bereaved and non-bereaved older adults was compared which yielded a significant difference in scores of cognitive functioning. Thus bereavement, which is an inevitable life event can challenge several aspects of an older adult's health one of which is cognitive functioning (Ataley & Staneva, 2020). The findings of our study establish that bereaved individuals experience significant deterioration in their cognitive functioning as bereavement is a critical inducer of stress, hence reinforcing the widowhood-cognition link. The difference in cognitive scores across three age groups of older adults is statistically insignificant. As the sample of our study comprises older adults, 60 and above, they fall under the same age bracket, thus identifying age-related changes in cognitive functioning within them is a difficult task as all older adults have experienced some form of cognitive aging by this point. This is in accordance with studies that postulate that a decline in cognitive functioning is a major concern for older adults (Sabia et al., 2012) with lower cognitive abilities at an older age (Deary et al., 2009). This further consolidates our understanding because age-related differences in cognitive functioning could have been better assessed if the sample consisted of both younger and older adults.

The correlation analysis between spousal bereavement, social support, and cognitive functioning of older adults yielded significant

results. The negative correlation between spousal bereavement and cognitive functioning of older adults was supported by prior literature (Ward et al., 2007). Cognitive functioning and social support scores were positive and significant. Previous studies have found a positive association between perceived social support and cognitive function in older adults (Holtzman et al., 2004; Yeh & Liu, 2003), consistent with present results. A negative, significant correlation was observed between spousal bereavement and social support. Similar findings are present in existing literature in which social support was negatively correlated with bereavement (Cakar, 2020). Similarly, the correlations between spousal bereavement and different cognitive domains were assessed. The domains of executive functioning, attention, memory and abstract thinking had significant results with cognitive functioning, indicating that bereaved older adults have poor performance on domains of executive functioning, attention, memory, and abstract thinking. However, the domain of language was insignificant with cognitive functioning. Research has demonstrated that fluid intelligence is subject to change with age whereas crystallized intelligence like language remains stable with age (Park & Bischof, 2013).

The moderating role of social support between spousal bereavement and the cognitive functioning of older adults was assessed. Perceived social support as a moderator was statistically insignificant, contradicting prior literature. The finding can be better explained by the perspective of Richardson et al. (1983), during times of crisis and upheaval, like bereavement, religion has been known to be a provider of emotional and psychological support to people. During data collection, religiosity and trust in God were frequent themes highlighting the participant's acceptance of the death of their spouse. In our sample and cultural context, it may be possible that faith and religiosity have a more important role than the combined influence of spousal bereavement and social support on cognitive functioning after the death of their spouse. This is a form of reserve for them which according to Cognitive Reserve Theory acts as a protective factor against cognitive decline (Stern, 2003). According to previous literature, another factor that was found to moderate the relationship between spousal bereavement and cognitive functioning was marital quality before the loss of a loved one. Respondents whose relationships with their deceased spouse were ambivalent had better cognitive functioning than those who had aversive relationships with their deceased spouse (Min & Song, 2022).

Another key variable that might have contributed to the insignificant interaction effect could be the difference in lifestyles, education, and occupations of older adults. The concept of cognitive reserve has been a very important idea in cognitive decline in older adults (Baltes & Baltes, 1990). This cognitive reserve model suggests that there are certain experiences and behaviors that provide protection from cognitive decline including education, high literacy, engaging in work, and participating in leisure activities (Meng & D'Arcy, 2012). As a result, the older adults who were comparatively better educated, performed cognitively stimulating jobs, and had active lifestyles had subsequently better cognitive reserve which acted as a buffer against cognitive decline.

A small sample size can result in a non-significant moderation with the appropriate solution being collecting more data based on the sample size requirement obtained by the power analysis (Becker et al., 2018). Moreover, the majority of the studies hypothesizing the role of social support as a moderator on the relationship between spousal bereavement and cognitive functioning have been taken from Western literature, but this effect may vary across cultures. However, our study depicted that in the cultural context of Pakistan, the interaction effect of spousal bereavement and social support on cognitive functioning is not statistically significant. This has implications for future research. To add further value to the results, the mean scores of cognitive functioning of bereaved older adults from our study were compared with the mean scores of cognitive functioning of general older adults from an international sample (Dhupkar & Shaikh, 2020) to determine whether bereavement has a negative relationship with the cognitive functioning of elderly.

Implications

The study conducted will further add to the pre-existing literature regarding spousal bereavement and cognitive functioning and how social support plays a

role. Furthermore, the study provides a cultural lens on the relationship between spousal bereavement and cognitive functioning. Previous literature had mixed findings related to correlations between individual cognitive domains and spousal bereavement, so the study fills the gap by exploring these correlations. This addition to the literature can help emphasize other variables as moderators in future research. This study will also create awareness and identify factors that can have an important influence on the experience of bereavement. Once these factors are considered, it may aid them in adopting appropriate and timely interventions. The study explores the effects of demographic determinants on the cognitive functioning of older adults in a Pakistani context.

Limitations and Recommendations

This study has some limitations that need to be addressed. The scale "Montreal Cognitive Assessment" used for measuring cognitive functioning has been associated with the education level of respondents. So, the scores of MoCA can be affected by education levels in addition to the scores of bereavement. We recommend that the education of the respondents should be taken into consideration prior to administering the scale. The sample collected for this study is not representative of gender. The study contained 47 males and 145 females. The unequal representation of the sample can pose practical limitations to the study and the comparisons between the sub-groups of the sample cannot be drawn. The differential relationship between bereavement and cognitive functioning in males and females cannot be assessed significantly. So, future studies should focus on having an equal representation of gender. Similarly, another significant issue revolved around the utilization of older adults as the sample. As most of the older adults were above sixty, their attention span had deteriorated over time. So, administering three scales with multiple items to them required constant repetition and probing. Bereavement is a highly sensitive and personal matter. Older adults during data collection for this study, exhibited considerable hesitation while talking about their spouse and their experience of bereavement. Consequently, taking detailed accounts from them to support our hypothesis was difficult. Several of them also refused to participate once they heard about the sensitive nature of the study.

Conclusion

In the context of the growing old population, and increased risk of spousal bereavement with age, it is important to study the relationship between spousal bereavement and the cognitive functioning of older adults with social support as a moderator. The findings revealed that spousal bereavement and cognitive functioning are directly correlated with one another. However, social support is not a significant moderator. This study is a significant step toward investigating the possible factors contributing to cognitive decline following bereavement. Researchers and medical officials may benefit from this study in reference to designing intervention and prevention programs for older adults experiencing bereavement.

Declaration

Ethical Approval This study was conducted following the ethical guidelines provided by the American Psychological Association and the ethical committee of the National University of Sciences and Technology.

Conflict of Interest The authors have no conflicts to declare.

Funding This study was not funded by any organization.

Consent for Publication The authors have agreed upon the publication of this manuscript.

Reference

Abdullah, S. (2021). Ageing in Pakistan: A Curse or Blessing? *Pide Blog*. https://pide.org.pk/blog/ageing-in-pakistan-a-curse-or-blessing/

Andrew, M. K., & Rockwood, K. (2010). Social vulnerability predicts cognitive decline in a prospective cohort of older Canadians. *Alzheimers & Dementia*, *6*(4), 319. https://doi.org/10.1016/j.jalz.2009.11.001

Asmat, A. (2020). Perceived Social Support Mediates Between Cognitive Functioning and Positive Mental Health in Middle-Aged Adults. *Journal of Pakistan Psychiatry Society*, *volume 17*. https://www.jpps.pk/index.php/journal/article/view/35

Atalay, K., & Staneva, A. (2020). The effect of bereavement on cognitive functioning among elderly people: Evidence from Australia. *Economics and Human Biology*, *39*. https://doi.org/10.1016/j.ehb.2020.100932

Agha, S. A., & Haque, M. A. (2021). Translation and validation of core bereavement items into Urdu language on a sample of bereaved parents and spouses in Pakistan: A pilot study. *JPMA. The Journal of the Pakistan Medical Association*, *71*(3), 990-992. https://doi.org/10.47391/JPMA.374

Baltes, P. B., & Baltes, M. M. (1990). Psychological perspectives on successful aging: The model of selective optimization with compensation. *Successful Aging*, 1-34. https://doi.org/10.1017/cbo9780511665684.003

Barragán-García, M., Ramírez-Aldana, R., López-Ortega, M., Sánchez-García, S., & García-Peña, C. (2021). Widowhood status and cognitive function in community-dwelling older adults from the Mexican health and aging study (MHAS). *Journal of Population Ageing, 15*(3), 605-622. https://doi.org/10.1007/s12062-020-09322-2

Becker, J. M., Ringle, C. M., & Sarstedt, M. (2018). Estimating moderating effects in PLS-SEM and PLSc-SEM: Interaction term generation* data treatment. *Journal of Applied Structural Equation Modeling*, *2*(2), 1-21.

Bottomley, J. S., Burke, L. A., & Neimeyer, R. A. (2015). Domains of Social Support That Predict Bereavement Distress Following Homicide Loss. *Omega–Journal of Death and Dying*, *75*(1), 3–25. https://doi.org/10.1177/0030222815612282

Burnett, P., Middleton, W., Raphael, B., & Martinek, N. (1997). Measuring core bereavement phenomena. *Psychological Medicine*, *27*(1), 49–57. https://doi.org/10.1017/s0033291796004151

Çakar, F. S. (2020). The Role of Social Support in the Relationship Between Adolescents' Level of Loss and Grief and Well-Being. *International Education Studies*, *13*(12), 27. https://doi.org/10.5539/ies.v13n12p27

Calatayud, E., Salavera, C., & Gómez-Soria, I. (2021). Cognitive Differences in the older adults living in the general Community: Gender and Mental Occupational State study. *International Journal of Environmental Research and Public Health*, *18*(6). https://doi.org/10.3390/ijerph18063106

Cohen, S., & Wills, T. A. (1985). Stress, social support, and the buffering hypothesis. *Psychological Bulletin*, *98*(2), 310–357. https://doi.org/10.1037/0033-2909.98.2.310

Deary, I. J., Corley, J., Gow, A. J. (2009). Age-associated cognitive decline. *Br Med Bull*, *92*, 135-152. Doi:10.1093/bmb/ldp033

Dhupkar, A. & Shaikh, A. (2020). Association of Age with Montreal Cognitive Assessment Test Scores: A Cross-Sectional Survey. *International Journal of Health Sciences and Research, 10*(11). https://www.ijhsr.org/IJHSR_Vol.10_Issue.11_Nov2020/17.pdf

Ermer, A. E., & Proulx, C. M. (2019). Associations Between Social Connectedness, Emotional Well-Being, and Self-Rated Health Among Older Adults: Difference by Relationship Status. *Research on Aging*, *41*(4), 336–361. https://doi.org/10.1177/0164027518815260

Gellert, P., Hausler, A., Suhr, R., Gholami, M., Rapp, M., Kuhlmey, A., & Nordheim, J. (2018). Testing the stress-buffering hypothesis of social support in couples coping with early-stage dementia. *PLOS ONE, 13*(1). https://doi.org/10.1371/journal.pone.0189849

Hassan, S. M. U., Hamid, T. A., Haron, S. A., & Ibrahim, R. (2020). Emotional regulation as a mediator between the filial behaviour of the oldest son and subjective well-being of older parents in Pakistan. *Psychogeriatrics*, *20*(1), 59-69. https://doi:10.1111/psyg.12458

Hassan, S. M. U., Jilani, S., & Zubair, M. (2023). Adult attachment and depressive symptoms among community-dwelling older parents: a moderated mediation model of cognitive reappraisal and social connectedness. *Current Psychology*, 1-14. https://doi.org/10.1007/s12144-023-05011-3

HelpAge International. (2015). *Policy Mapping on Ageing in Asia and the Pacific Analytical Report.* Chiang Mai: HelpAge International East Asia/Pacific Regional Office.

Holtzman, R. E., Rebok, G. W., Saczynski, J. S.,

Kouzis, A. C., Doyle, K. W., & Eaton, W. W. (2004). Social network characteristics and cognition in middle-aged and older adults. *Journal of Gerontology: Psychological Sciences, 59,* 278-284.

Kelly, M., Duff, H., Kelly, S., McHugh, J. E., Brennan, S., Lawlor, B. A., & Loughrey, D. G. (2017). The impact of social activities, social networks, social support and social relationships on the cognitive functioning of healthy older adults: a systematic review. *Systematic Reviews*, *6*(1). https://doi.org/10.1186/s13643-017-0632-2

Meng, X., & D'Arcy, C. (2012). Education and dementia in the context of the cognitive reserve hypothesis: A systematic review with meta-analyses and qualitative analyses. *PLoS ONE*, *7*(6). https://doi.org/10.1371/journal.pone.0038268

Min, J., & Song, J. (2022). Spousal loss and cognitive function: The importance of gender and multiple dimensions of marital quality. *Aging & Mental Health*, *27*(4), 755-764. https://doi.org/10.1080/13607863.2022.2084715

Nasreddine, Z. S., Phillips, N. A., Bédirian, V., Charbonneau, S., Whitehead, V., Collin, I., Cummings, J. L., & Chertkow, H. (2005). The Montreal Cognitive Assessment, MoCA: A brief screening tool for mild cognitive impairment. *Journal of the American Geriatrics Society*, *53*(4), 695–699. https://doi.org/10.1111/j.1532-5415.2005.53221

Park, D. C., & Bischof, G. N. (2013). The aging mind: neuroplasticity in response to cognitive training. *Dialogues in Clinical Neuroscience, 15*(1), 109-119.

Petkus, A. J., & Gomez, M. E. (2021). The importance of social support, engagement in leisure activities, and cognitive reserve in older adulthood. *International Psychogeriatrics*, *33*(5), 433–435. https://doi.org/10.1017/s1041610220003336

Pillemer, S. C., & Holtzer, R. (2015). The differential relationships of dimensions of perceived social support with cognitive function among older adults. *Aging & Mental Health, 20*(7), 727-735. https://doi.org/10.1080/13607863.2015.1033683

Richardson, V., Berman, S., & Piwowarski, M. (1983). Projective assessment of the relationships between the salience of death, religion, and age among adults in America. *The Journal of General Psychology*, *109*(2), 149-156. https://doi.org/10.1080/00221309.1983.10736081

Rodriguez, M. S., & Cohen, S. (1998). Social Support. *Encyclopedia of Mental Health, 3*, 535-544.

Sabia, S., Singh, M. A., & Hagger, J. G. (2012). Influence of individual and combined healthy behaviors on successful aging. *Canadian Medical Association Journal, 184*(18), 1985-1992. https://doi.org/10.1503/cmaj.121080

Sarah, T., Arnold, A., Richard, S.H., 2016. Mortality after bereavement: the role of cardiovascular disease and depression. *Psychosom. Med. 78*(6), 697–703.

Seiler, A., Von Känel, R., & Slavich, G. M. (2020). The Psychobiology of Bereavement and Health: A Conceptual Review from the Perspective of Social Signal Transduction Theory of Depression. *Frontiers in Psychiatry*, *11*. https://doi.org/10.3389/fpsyt.2020.565239

Shumaker, S. A., & Brownell, A. (2010) Toward a theory of social support: closing conceptual gaps. *J Soc Issues 40*(4), 11–36. https://doi.org/10.1111/j.1540-4560.1984.tb01105.x

Singham, T., Bell, G., Saunders, R., & Stott, J. (2021). Widowhood and cognitive decline in adults aged 50 and over: A systematic review and meta-analysis. *Ageing Research Reviews*, *71*. https://doi.org/10.1016/j.arr.2021.101461

Stern, Y. (2003). The concept of cognitive reserve: A catalyst for research. *Journal of Clinical and Experimental Neuropsychology, 25*, 589–593.

Stroebe, M. S., Schut, H., Stroebe, W. (2007). Health outcomes of bereavement. *Lancet 370,* 1960–1973.

Szabo, A., Kok, A. A., Beekman, A. T., & Huisman, M. (2020). Longitudinal examination of emotional functioning in older adults after spousal bereavement. *The Journals of Gerontology: Series B*, *75*(8), 1668–1678. https://doi.org/10.1093/geronb/gbz039

Tonsing, K., Zimet, G. D., & Tse, S. (2012). Assessing social support among South Asians: The multidimensional scale of perceived social support. *Asian Journal of Psychiatry*, *5*(2), 164-

168. https://doi.org/10.1016/j.ajp.2012.02.012

Tseng, F.M., Petrie, D., & Leon-Gonzalez, R. (2017). The impact of spousal bereavement on subjective wellbeing: Evidence from the Taiwanese elderly population. *Economics & Human Biology*, *26*, 1–12. https://doi.org/10.1016/j.ehb.2017.01.003

Tucker, J. S., Tomlinson-Keasey, C., & Herzog, A. R. (1999). Adult health behaviors and early life mortality: The Terman study and the childhood environment. *Psychology and Aging, 14*(2), 361-376. https://doi.org/10.1037/0882-7974.14.2.361

Van Boekel, L. C., Cloin, J. C., & Luijkx, K. G. (2019). Community-dwelling and recently widowed older adults: Effects of spousal loss on psychological well-being, perceived quality of life, and health-care costs. *The International Journal of Aging and Human Development*, *92*(1), 65–82. https://doi.org/10.1177/0091415019871204

Ward, L., Mathias, J., & Hitchings, S. (2007). Relationships between bereavement and cognitive functioning in older adults. *Gerontology, 53*(6), 362-372. https://doi.org/10.1159/000104787

Worn, J., Comijs, H. C., & Aartsen, M. (2018). Spousal Loss and Change in Cognitive Functioning: An Examination of Temporal Patterns and Gender Differences. *The Journals of Gerontology: Series B*, *75*(1), 195–206. https://doi.org/10.1093/geronb/gby104

Xiang, N., Liu, E., Li, H., Qin, X., Liang, H., & Yue, Z. (2021). The association between widowhood and cognitive function among Chinese elderly people: Do gender and widowhood duration make a difference? *Healthcare, 9*(8), 991. https://doi.org/10.3390/healthcare9080991

Yeh, S. J., & Liu, Y. (2003). Influence of social support on cognitive function in the elderly. *BMC Health Services Research, 3*(1). https://doi.org/10.1186/1472-6963-3-9

Zimet, G. D., Dahlem, N. W., Zimet, S. G., & Farley, G. K. (1988). The Multidimensional Scale of Perceived Social Support. *Journal of Personality Assessment, 52*(1), 30–41.