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The impact of custodial grandparenting on levels of cognition in a longitudinal sample of grandparents raising grandchildren

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By

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There are currently 2.7 million grandparents raising grandchildren in the United States. As grandparenting has become more prevalent, concerns have surfaced regarding the effect of additional caregiving responsibilities placed on an aging population. The following study uses an existing dataset that interviewed individuals who graduated from Wisconsin high schools in 1957. The present study examined the impact of grandparenting on measures of cognitive ability, both cross-sectionally and longitudinally, which had yet to be examined. Findings from the cross-sectional analysis show that custodial grandparents outperformed their non-custodial grandparent counterparts on the cognitive tests of word recall, category fluency, letter fluency, and cognitive similarities. Findings from the longitudinal analysis show that though custodial grandparents had initially performed worse on the digit ordering task, their scores declined at a much slower rate over-time when compared to non-custodial grandparents. This study provides a unique opportunity to examine the impact of custodial grandparenting on cognition.

DEDICATION

This thesis is dedicated to my loving father and the memory of my beloved mother [Caroline McKay], without whom this would not have been possible. In addition, this thesis is dedicated to my mentor, Dr. Danielle Nadorff, for providing guidance and support throughout our time together.

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CHAPTER I

INTRODUCTION

Overview

Custodial Grandparents, adults who are taking care of their grandchildren on a full-time basis, are an ever-increasing population. In the United States, there are currently 2.7 million grandparents raising grandchildren (United States Census Bureau, 2016). This population is continuing to rise, and has grown 7% since 2009 (Cancino, 2016). As grandchild care has become more visible, concerns have arisen that these benefits may come at the cost of grandparents' well-being (Hughes, Waite, LaPierre, & Luo, 2007). The impact of caring for grandchildren on grandparents' well-being is an area of particular concern. The additional responsibility of caregiving for grandchildren, particularly at a late age in one's life, may place exhausting and unrealistic physical, emotional, or financial demands on custodial grandparents. According to a study done by Jendrek (1993), daily childcare, especially for young children, takes a physical toll on the body, resulting in health declines such as insufficient sleep and increased infections. In addition to these direct effects, grandchild care affects health indirectly, through associated changes in lifestyle, relationships, and social roles (Szinovacz, De Viney, & Atkinson, 1999). However, conflicting evidence has emerged, suggesting that the assumption of additional parental responsibilities may be beneficial in some instances, such as serving as a buffer to the onset of cognitive decline for grandparents caring

for their grandchildren for less than or equal to one day per week (Burn, Henderson, Ames, Dennerstein, & Szoeke, 2014).

The normal aging process is associated with declines in certain cognitive abilities (Harada, Natelson Love, & Triebel, 2013) Like other physical structures in the body, the human brain's ability to perform various functions changes with age (Harada et al., 2013). However, participation in certain activities, building cognitive reserve, and engaging in cognitive retraining may all be approaches to achieving successful aging (Harada et al., 2013). It is possible that custodial grandparents may be participating in some of these reserve-building activities while caring for their grandchildren, such as helping with homework or teaching ABCs. However, there has been little research to date examining the impacts of additional parenting responsibilities placed upon grandparents raising grandchildren on levels of cognition. Given the prevalence of such grandparent-headed families, grandparent interests, and the impacts on aging health, these associations warrant careful examination.

One possible theory that may help to guide this research is the Disuse Theory of Aging (Christensen, 1993). This commonly-applied theory posits that a decline in psychological abilities during aging arises from the discontinuation of the use of various psychological capabilities, such as one's working memory, processing speed, and word recall. The employment of these psychological abilities in later life, such as social engagement, have been shown to serve as a buffer in preventing, and/or delaying the onset of cognitive decline and dementia (James, Wilson, Barnes, & Bennett, 2011). A study done in 2011 examining late-life social activity and cognitive decline concluded that more frequent social activity was associated with subsequently-reduced rates of cognitive decline over an average of five years of follow-up (James et al., 2011). The researchers noted that if social activity does have a causal role in preventing

cognitive decline, the specific mechanisms are unknown. Social activity, they posit, "challenges older adults to participate in complex interpersonal exchanges, which could promote or maintain efficient neural networks" (James et al., 2011). This study, however, was limited by its reliance on self-reported information in assessing participation in social activities. First, this introduces the possibility of social desirability. However, a much larger concern is the validity of participants' recall of social activities in a sample coping with cognitive decline.

Literature Review

Much of the research to date has examined late-life social engagement and its ability to preserve cognition, but very few studies have applied this to the grandparent population. There are many important aspects of grandparenting that may either directly or indirectly affect one's cognition, such as changing levels of social engagement, or practicing cognitive skills through helping children with homework. Though research examining cognition in grandparents is limited, two studies have examined this phenomenon (although they did not separate out custodial grandparents). A study conducted in 2014 by Arpino and Bordone examined whether the provision of child care aids older adults in maintaining better cognitive performance. The study was part of the Survey of Health, Ageing, and Retirement in Europe. The sample was restricted to men and women who had at least one child and who were ages 50-80. Cognitive function was measured using five tests: (verbal fluency, numeracy, immediate recall, delayed recall, and orientation). Researchers confirmed previously-established negative associations between caregiving and cognitive functioning (Arpino & Bordone, 2014). However, they also concluded that verbal fluency was measurably higher among grandmothers and grandfathers who provided child care and was positively correlated with this provision of child

care. Additionally, higher and more intense levels of grandparenting were negatively associated with cognitive functioning (Arpino & Bordone, 2014).

The only other study to examine cognition in grandparents caring for grandchildren was conducted by the Woman's Healthy Aging Project (Burn et al., 2014). It examined the relation between grandparenting and cognitive function in postmenopausal women. Participants were selected from the Women's Health Aging Project (WHAP), a follow-up to the Melbourne Women's Midlife Health Project. The WHAP was made up of 348 white women within the Melbourne, Australia metropolitan area identified through a random telephone dialing in 1991 and re-interviewed annually for 8 years. Women were eligible if they were between 45-55 years of age, were Australian-born, had menstruated 3 months before recruitment, and had not taken estrogen-containing hormone therapy (Burn et al., 2014). However, for this study, 186 women aged 57-68 who had previously completed all relevant neuropsychological measures were included. Cognition was assessed by the administration of three cognitive measures assessing one's verbal episodic memory, and executive functioning. Scores from The California Verbal Learning Task, Symbol-Digit Modalities Test, and the Tower of London test were each thought to reflect one's cognitive abilities, with higher scores indicating better cognitive function.

Findings suggested that post-menopausal grandmothers who spent time with their grandkids had a lower likelihood of developing disorders that affect memory or cognitive ability, such as dementia. However, these cognitive benefits of grandparenting were moderated by the amount of time spent with the grandchild. Spending one day per week with grandchildren was predictive of higher cognitive performance and faster processing speed than those who had spent more than five days per week with a grandchild. Spending five or more days per week was also predictive of lower working memory performance. These results, similar to those found by

Bordone and Arpino (2014), indicate that while moderate levels of grandparenting interaction may be beneficial, highly frequent grandparenting is associated with lower cognitive performance (Burn et al., 2014).

It is important to note, however, that Burn and colleagues did *not* specifically address custodial grandparenting, but rather defined their variables in the form of "time spent with grandchildren." This time could incorporate anything from watching children after school until their parents arrived home from work, to being a custodial grandparent, or even grandparents whose failing health had forced them to move in with their adult children and grandchildren (Burn et al., 2014). It is important to specifically examine cognitive performance levels in custodial grandparents and their peers, to determine the full cognitive impact of this caregiving role.

Despite Burn et al.'s finding that excessive time spent with grandchildren may be linked to poor cognition levels (2014), physical benefits of engaging in custodial grandparenting have also been found. In a study titled "The Impact of Caring for Grandchildren on Grandparent's Health," researchers found no evidence that caring for grandchildren had dramatic and widespread negative effects on grandparents' health (Di Gessa, Glaser, & Tinker, 2016). In fact, although cognition was not directly assessed, Di Gessa and colleagues found that even after controlling for socioeconomic status and chronic conditions, custodial grandmothers enjoyed a positive longitudinal association between physical health and time spent caring for a grandchild (2016).

As summarized above, older adults' cognition is affected by the amount of social engagement in which they partake, as well as the time spent caring for their grandchildren. The only study done to examine the direct cognitive implications of grandparenting found cognitive

benefits of minimal care for one's grandchildren, and a negative relation between spending five or more days per week with one's grandchildren and cognitive performance. However, to date, no study has yet examined the long-term impacts of being a custodial grandparent on levels of cognitive performance or prevalence of dementia. Many of the findings discussed above are cross-sectional and are thus limited in their ability to imply causality. Cognitive decline, or its associated risk factors, may occur prior to the assumption of additional parenting responsibilities, and may thus be incorrectly attributed to one's status as a custodial grandparent in these instances.

It is important to note that grandparents raising grandchildren tend to have fewer emotional, psychological, financial, and even educational resources than a typical parent in the general population (Kelly, Whitley, & Campos, 2011). Additionally, grandparents often assume parental roles due to traumatic reasons such as substance use, neglect, death, or even parental incarceration (Kelley et al., 2011). Due to the numerous aversive and impactful experiences custodial grandchildren may face surrounding the change of primary caregiver, it is not surprising that custodial grandchildren are at greater risk for emotional and behavioral problems than their peers (Smith & Palmieri, 2007). The issues that their grandchildren are facing add further stressors to the parenting role.

Through the cited research above, we can confidently conclude that grandparents raising grandchildren are at an increased risk for cognitive impairments when compared to non-caregiving grandparents. Research suggests that grandparents raising grandchildren for shorter periods of time may perform better cognitively than grandparents who spend more time parenting grandchildren. Though the previous studies were methodologically robust, none of them specifically examined the impact of custodial grandparenting on cognitive performance or

decline. This is crucial to ascertain, as custodial grandparents are such a vulnerable, yet highly-prevalent and important population.

It is necessary to determine whether differences in cognition exist between custodial grandparents and their age-matched peers, which has not yet been examined cross-sectionally. However, it is much more crucial to look at these effects in a longitudinal design, to determine whether within-subject differences in cognition truly occur because of caregiving, as opposed to being better explained by a third variable's influence (e.g. socioeconomic status), such that differences in those individuals most likely to become custodial grandparents will also result in differences in cognitive performance.

Current Study

The primary aims of this investigation were two-fold. First, this investigation sought to determine to what extent custodial grandparents differed from non-caregiving grandparents in their levels of cognitive performance using a cross-sectional design. Second, this investigation sought to examine the impact of a "time by caregiving status" interaction on levels of cognition for both custodial and non-caregiving grandparents, using a longitudinal design. This is the first known study to examine either of these questions. To this end, two predictions were formed:

1. It was predicted that custodial grandparents would exhibit lower levels of cognitive performance than non-caregiving grandparents.
2. It was also predicted that there would be a significant "time by caregiving status" interaction for individual tests of cognition in longitudinal comparisons of cognitive performance over two waves, with custodial grandparents performing worse on tests of cognition.

CHAPTER II

METHODS

Participants and Procedure

Participants were selected from the Wisconsin Longitudinal Study (WLS), a long-term study of a random sample of 10,317 men and women who graduated from Wisconsin high schools in 1957, and their randomly selected siblings. Within the WLS, survey data were collected from original respondents or their parents in across five waves, and from a selected sibling across four waves. Survey data were also collected once from the spouses of the graduates and the spouses of the siblings. Data were collected using a variety of methods, including in-person and telephone interviews, and mailed surveys. To avoid dependency within the data, only the data from the original graduates was used for the current study. Data from the two most recent waves, 2003 and 2011, was examined within the current project. Listwise deletion was used to remove cases with missing data for the longitudinal analysis. To prevent against sufficient threats to statistical power, pairwise deletion was used in the cross-sectional analysis.

Measures

Measures examined within the current study included cognitive performance, caregiver status, and age of the participants. Throughout the study, participants were assessed on various measures of cognitive ability that included: a general IQ test (administered before the study began), and five measures of cognitive performance: word recall, number series, cognitive

similarities, verbal fluency, and a digit ordering task. All five measures of cognitive performance from the most recent wave of data collections (in 2011) were examined during the cross-sectional comparisons of the study. Additionally, three of these tasks, the cognitive similarities module of cognition, the verbal fluency task, and the digit ordering tasks, were assessed in both the 2003 and 2011 waves, and these were used for the longitudinal comparisons.

Cognition: Word Recall Task. The cognition-word recall module was administered to assess cognitive function and involved asking participants to remember and orally recite as many words possible from a list of ten. Although it occurs in numerous clinical contexts, difficulty with word-recall often presents a diagnostic conundrum where it occurs as a leading or isolated symptom, most often as an indication of a degenerative disease, such as dementia (Rohrer et al., 2008). word recall Tasks, such as the one used in the WLS, are often used as a means of not only determining baseline scores, but as a method of determining if an impairment or a decline in verbal related abilities has occurred.

Cognition: Number Series Task. A modified version of the McArdle & Woodcock number series task was administered to assess induction and reasoning ability with an emphasis on quantitative reasoning. Participants were given a series of numbers (3, 5, 7, 9, 11, _) and were asked to identify the number that correctly completed the series. The task was modified in that participants were only administered six of the fifteen items normally given. Participants were all given the same first three items, and their scores from those items determined which three items they would subsequently receive.

Cognition: Cognitive Similarities Task. The cognitive similarities measure of cognition was a modified version of the Similarities subtest of the Weschler Adult Intelligence

Scale (WAIS; (Wechsler, 2008)). Verbal composite of the WAIS that includes the similarities subtest has been found to be both extremely reliable ($\alpha = .97$), and valid ($r = .91$) (Sattler, 2009).

Cognition: Verbal Fluency Task. The cognition-verbal fluency module is a cognitive measure of verbal functioning and consists of two tasks: category fluency, and letter fluency. For Letter Fluency, participants were asked to think of as many words as possible that start with a particular letter, such as "L" or "A." For the category fluency section, participants were asked to think of as many things that fit into a category as possible, such as "food", or "animals." Tests of verbal fluency are often included in neuropsychological assessments, clinical practice, and research. For instance, they have been used to support diagnoses of attention-deficit hyperactivity disorder, and cognitive impairment in persons with neurodegenerative diseases, such as Alzheimer's disease (Shao, Janse, Visser, & Meyer, 2014).

Cognition: Digit Ordering Task. The cognitive-digit ordering module is a cognitive assessment of verbal working memory, which asks participants to mentally rearrange and verbally restate increasingly lengthy sets of one-digit numbers that are value-ordered from lowest to highest. A study done to examine the adaptive digit ordering test found parallel split-half correlations as well as a significant correlation with a well- established working memory task (two-back task); both of which have indicated significant reliability and concurrent validity of the digit ordering Task (Werheid et al., 2002). Parallel test reliability was equal to a value of .68, while split-half ranged from .75 - .79 (Werheid et al., 2002). The task has been compared to the Wechsler Digit span task (Werheid et al., 2002). Scores were examined separately for individuals who never refused an item, and those who refused one or more items.

Caregiver status. Caregiver status (whether a participant is/was a custodial grandparent or not) was determined by a question asking, "Have you ever had increased responsibility for the care of your grandchildren?" during the Wave 1 data collection. Custodial grandparents were defined as those participants who both answered "yes" to having increased responsibility for their grandchildren, and also reported having at least one grandchild. The comparison, non-caregiving grandparents, were defined as those who had reported "no" to having increased responsibility for their grandchild (during either Wave 1 or Wave 2) and who reported having at least one grandchild**.** Due to the frequently ambiguous nature of the co-parenting versus skipped generation caregiving arrangements, it is rather common to assess CGP involvement based on levels of increased responsibility for a grandchild (Hayslip, Fruhauf, Doblin-MacNab, 2017).

CHAPTER III

RESULTS

To examine Hypothesis 1, that custodial grandparents would exhibit lower levels of cognitive performance than their peers, a one-way Analysis of Variance (ANOVA) was conducted to assess whether differences in cognitive performance (DV) existed based on caregiver status (IV). The measures of cognitive performance included the word recall, digit ordering, cognitive similarities, verbal fluency, and number series tasks from the 2011 data wave (hereafter referred to as "Wave 2"). The IV of caregiver status was divided into two groups: Custodial Grandparents (here defined as those who reported ever having increased responsibility for their grandchildren and reported having at least one grandchild), versus Non-Custodial Grandparents (here defined as those who reported never having this increased responsibility but reported having at least one grandchild). A power analysis indicated that on the basis of Burn's (2014) results, an *n* of approximately 118 total participants would be necessary to obtain statistical power at the recommended 0.8 level (Cohen, 1988). The number of participants that went into each analysis differed. Refer to Table 1 for the number of custodial and non-custodial grandparents that were included in each univariate analysis.

Normality and homogeneity of variance assumptions were assessed by examining histograms and Levene's test. Homogeneity of variance was met for each dependent variable, however, the presence of outliers contributed to violations of normality in the word recall,

category fluency, letter fluency, digit ordering, and number series tests of cognition. To correct for such violations of normality, the non-parametric Kruskal-Wallis test was performed.

A Kruskal-Wallis H test showed that there were statistically significant differences on three tests of cognition. Significant differences were found on the word recall test of cognition, ($\chi^2(1) = 5.99$, $p = .014$, $\eta^2 = .001$), with a mean rank test score of 2132.30 for non-custodial grandparents, and 2255.11 for custodial grandparents. Significant differences were found on the category fluency test of cognition, ($\chi^2(1) = 6.10$, $p = .013$, $\eta^2 = .003$), with a mean rank test score of 970.09 for non-custodial grandparents, and 1053.77 for custodial grandparents. Significant differences emerged on the letter fluency test of cognition, ($\chi^2(1) = 5.73$, $p = .017$, $\eta^2 = .001$), with a mean rank of 1965.20 for non-custodial grandparents, and 2082.01 for custodial grandparents. There were no significant differences on the number series test of cognition ($\chi^2(1) = .80$, $p = .37$, $\eta^2 = .00$), with a mean rank of 2145.03 for non-custodial grandparents and 2190.43 for custodial grandparents. As the assumptions were met for our Cognitive Similarities test of cognition, a one-way ANOVA was performed. Significant differences were found between the custodial and non-custodial grandparents, $F(1,3566) = 4.48$, $p = .034$, $\eta_p^2 = .00$.

As shown in Figure 1, non-custodial grandparent's mean word recall scores were much lower at wave 2 ($M = 5.51$, $SD = 1.23$, 95% CI [5.46, 5.47]) when compared to custodial grandparent's mean word recall scores at wave 2 ($M = 5.65$, $SD = 1.20$, 95% CI [5.57, 5.74]). As shown in Figure 2, non-custodial grandparent's mean category fluency scores were much lower at wave 2 ($M = 19.69$, $SD = 6.01$, 95% CI [19.39, 19.98]) when compared to custodial grandparent's mean category fluency scores at wave 2 ($M = 20.51$, $SD = 5.61$, 95% CI [19.91, 21.11]). As shown in Figure 3, non-custodial grandparent's mean letter fluency scores were much lower at wave 2 ($M = 11.30$, $SD = 4.10$, 95% CI [11.16, 11.44]) when compared to

custodial grandparent's mean letter fluency scores at wave 2 (M = 11.69, SD = 4.10, 95% CI [11.38, 12.00]). As shown in Figure 4, non-custodial grandparent's mean cognitive similarities scores were much lower at wave 2 (M = 6.34, SD = 2.30, 95% CI [6.26,6.41]) when compared to custodial grandparent's mean cognitive similarities scores at wave 2 (M = 6.56, SD = 2.25, 95% CI [6.39, 6.73]). The number of custodial and non-custodial grandparents assessed on each cognitive test in the cross-sectional analysis are found in Table 1. Mean age, sex, and socio-economic status for the participants included in the cross-sectional analysis are found in Table 2. Mean ranks and degrees of freedom for the cognitive tests by custodial status are found in Table 4. Correlations for all measures used in the cross-sectional analysis are found in Table 6.

To examine the hypothesis 2, that there would be a significant time by caregiving status interaction affecting cognitive performance over two waves, a mixed factorial ANOVA was conducted. The IV of caregiver status consisted of two groups: custodial grandparents (defined here as those who report taking on increased responsibility during the 2003 data wave and report having at least one grandchild; 312 participants), and non-custodial grandparents (participants who report that they are grandparents, but who never endorsed having increased responsibility for their grandchildren; 1097 participants). The dependent variable of cognition was assessed using the cognitive similarities, verbal fluency, and digit ordering tasks from the 2003 (hereafter referred to as "Wave 1" and 2011 "Wave 2") waves. Based upon Burn's findings (2014), a power analysis indicated that a total 2,456 participants would be sufficient to provide 0.8 statistical power within these analyses.

Normality and Sphericity assumptions were tested using Mauchly's test of sphericity and Shiapiro-Wilks test of normality. The results of the mixed factorial ANOVA indicated that there were significant differences on the digit ordering task as a result of custodial status over time, F

(1,1407) = 4.44, p = .035, (η_p^2) = .00. There were no significant differences on the category fluency task, F (1,1407), = 1.77, p = .184, (η_p^2) = .001, letter fluency task, F (1,1407) = .090, p = .764, (η_p^2) = .00, and cognitive similarities task, F (1,1407) = .763, p = .383, (η_p^2) = .00, as a result of custodial status over time. Post hoc tests revealed were statistically significant differences on scores of digit ordering between time 1 and time 2. As shown in Figure 5, custodial grandparents mean scores on digit ordering were lower at time 1 (M = 5.76, SD = 1.57, 95% CI [5.95,5.93]) but declined at a much slower rate to time 2 (M = 5.73, SD = 1.36, 95% CI [5.58, 5.88]) when compared to non-custodial grandparents, whose scores were initially much higher at time 1 (M = 5.99, SD = 1.57, 95% CI [5.90, 6.08]) but declined at a significantly faster rate to time 2 (M = 5.73, SD = 1.36, 95% CI [5.65, 5.81]). Mean age, sex, and socio-economic status for the participants included the longitudinal analysis are found in Table 3. Means and standard deviations of each cognitive test by custodial status included in the longitudinal analysis are found in Table 5. Correlations for all measures in the longitudinal analysis are found in Table 7.

CHAPTER IV

DISCUSSION

To address a significant gap in the literature, the current study examined whether differences in cognition existed between a sample of custodial grandparents and non-custodial grandparents, both cross-sectionally and longitudinally. Results from the cross-sectional analysis indicated that differences between custodial and non-custodial grandparents emerged on tests of verbal fluency (i.e., category fluency and letter fluency) and cognitive similarities, with custodial grandparents performing better than non-custodials on these tasks. Results from the longitudinal analysis indicated differences between custodial grandparents and non-custodial grandparents on the digit ordering task. Though custodial grandparents' scores were lower than non-custodials at Wave 1, they declined at a much slower rate when compared to non-custodial grandparents from Wave 1 to Wave 2. There are a number of reasons to support this disparity in performance.

The results were somewhat consistent with previous research. Though prior research has found negative associations between caregiving, cognitive performance and the likelihood of developing cognitive impairments, findings have also suggested grandparents involved in the rearing of their grandchildren perform better on particular tasks measuring cognitive performance, namely verbal fluency (Arpino & Bordone, 2014). As group differences had only emerged on the digit ordering task in the longitudinal analysis, further examination of this finding is warranted. Though custodial grandparents performed worse during the first wave of data collection, they declined at a much-less progressive rate than their non-custodial

counterparts. Poorer performance during the first wave of data collection can possibly be attributed to adverse circumstantial variables (e.g., lower educational attainment, increased stress levels, and stereotype threat) (Casper & Bryson, 1998). However, the less-progressive cognitive decline over the two waves of data collection suggests a potential buffering effect for custodial caregivers. As mentioned above, the disuse theory of aging postulates that without continued access and use of cognitive abilities, memories of certain information for mental procedures become inaccessible, contributing to declines in performance (Christensen, 1993). Thus, custodial grandparent's additional caregiving responsibilities may have resulted in a continued use of psychological procedures, therefore buffering against the deterioration of these particular cognitive abilities. Another theory which might help to account for the less-progressive cognitive decline in the sample of custodial grandparents is Baltes's Selective Optimization with Compensation theory (SOC). According to the SOC, successful aging occurs when an older adult focuses on his or her most important areas of functioning and compensates for losses in other areas. Custodial grandparents may be likely to select new goals while rearing a grandchild (i.e., elective or loss-based selection). They may subsequently enhance or acquire new resources to help achieve a particular goal (i.e., optimization), thus compensating for restrictions in one's range of plasticity or cognitive performance (Baltes & Baltes, 1993).

It is also important to note that these findings are not only statistically meaningful but have important clinical implications as well. Due to the despairing nature of the findings within the custodial grandparenting literature, an emphasis has been placed upon designing appropriate interventions for CGP's.

According to Hayslip and Kaminski (2005): "Helping efforts with custodial grandparents should be understood in terms of the construct levels of intervention. Thus, efforts to positively

affect custodial grandparents could be directed to the culture at large, to the community, or to the interpersonal and intrapersonal system of grandparents" (Hayslip & Kaminski, 2005).

As outlined in the literature review, there is a well-established research base stressing the negative effects of becoming a custodial grandparent (e.g. increased levels of perceived stress, increased infections, and insufficient sleep), however, custodial grandparents in our sample are performing almost equal to and even slightly better than their aged-matched peers on various tests of cognitive ability. Because performance of CGP's might not exceed their aged-matched peers in all domains of functioning, future interventions may benefit from adopting a more strength-based approach. Further, investing resources in the strengths of CGP's may prove more productive and thus help CGP's to be more effective and more successful in terms of their cognitive abilities.

Limitations

Though our sample size was large, our sample was comprised of graduates of Wisconsin High Schools in 1952, and thus not geographically representative of other states or countries. Our sample was also limited in how custodial grandparenting was defined, although it was an improvement from prior research which has typically examined "time-spent" with a grandchild and did not attempt to parcel out custodial grandparents within the analyses. Our research was also limited in that the use of archival data prevented methodological changes from being implemented that would have aided in the assessment of the original research question(s), such as the ability to look at participants who were living with grandchildren versus those who were not. Additionally, it is important to note that both ceiling and floor effects on various cognitive tests may have reduced variability in the gathered data. Thus, ceiling and floor effects may also have contributed to non-significant results.

Future Directions

Although progress has continued to be made in the custodial grandparenting literature, many important research questions and limitations should be addressed. It is encouraged that future studies obtain and examine cross-sectional and longitudinal samples rich in demographically diverse grandparents raising grandchildren. Additionally, examining the number and type of caregiving responsibilities (e.g., driving grandchildren, helping with homework, cooking meals, and homeschooling,) would help to better understand the influence of not only various of caregiving responsibilities, but also the impact of time spent caregiving (i.e., part-time or full-time) on various cognitive tasks. It would also be wise to examine the effect of appraisal type (i.e., challenge or threat) of the added caregiving responsibilities on the performance of various cognitive tasks. Lastly, as the cognitive subtests in our study were garnered from different cognitive tests (e.g., the McArdle & Woodcock achievement test & WAIS), future research is encouraged to use subtests taken from a single measure to reduce any testing variability that might arise. This would help to reduce any variance on an individual's test scores due to the difference between scores on IQ and achievement tests (Kaya, Juntune, & Stough, 2015)

Conclusions

The present study sought to examine whether differences in cognition exist between custodial grandparents and their aged-matched counterparts both cross-sectionally and longitudinally. The research findings revealed that in the cross-sectional analysis, custodial grandparents outperformed non-custodial grandparents on two tests of cognitive abilities, namely cognitive similarities, letter fluency, and category fluency. Findings also revealed that though custodial grandparents performed worse initially on the digit ordering task, their scores over-time

declined at a much slower rate than their non-custodial grandparent counterparts. Additionally, findings suggest that custodial grandparenting may influence certain components of one's cognitive abilities while leaving others in-tact. In sum, the study employed a rigorous methodological and statistical design to address a research question that had not yet been examined. It also contributes to both the cognitive and custodial grandparenting literature, a heretofore barely examined field. Despite the above-mentioned limitations, the study has made an essential contribution by specifically examining the of impact custodial grandparenting on levels of cognition across various tasks.

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APPENDIX A

FIGURES, TABLES, AND IRB APPROVAL

Table A1

Number of Custodial and Non-Custodial Grandparents included in the Cross-Sectional Analysis.

Variable	*n* (cgp)	*n* (non-cgp)
word recall	708	3596
category fluency	339	1629
letter fluency	656	3312
cognitive similarities	354	3214
number series	708	3596
digit ordering	708	3596

Table A2

Descriptive Statistics for Demographic Variables in Cross-Sectional Analysis.

	n (cgp)	n (non-cgp)	Minimum	Maximum	*m* (cgp)	*m* (non-cgp)	*sd* (cgp)	*sd* (non-cgp)	Mean difference	*t*-value	*p*
age	708	3596	70	74	71.16	71.23	.91	.92	.07	1.85	.07
ses	707	3584	1	5	4.35	4.55	.98	.83	.21	5.31	.00**
sex	708	3596	1	2	1.65	1.53	.48	.50	-.12	-6.03	.00**

** Significant at $p < .001$; * Significant at $p < .05$

Table A3

Descriptive Statistics for Demographic Variables in Longitudinal Analysis.

	n (cgp)	n (non-cgp)	Minimum	Maximum	*m* (cgp)	*m* (non-cgp)	*sd* (gcp)	*sd* (non-cgp)	Mean difference	*t-value*	*p*
age	574	1999	70	74	71.15	71.14	.91	.87	.00	.056	.99
ses	570	1993	1	5	4.45	4.59	.93	.80	.130	2.30	.022*
sex	574	1999	1	2	1.65	1.53	.48	.50	-.130	-.41	.00**

** Significant at p < .001; * Significant at p < .05

Table A4

Mean Rank and Degrees of Freedom of Cognitive Tests by Custodial Status for Cross-Sectional Analysis.

Variable	Mean rank (cgp)	Mean rank (non-cgp)	*df* (cgp)	*df* (non-cgp)	*p*
word recall	2255.11	2132.30	1	1	.014*
number series	2190.43	2145.43	1	1	.372
category fluency	1053.77	970.09	1	1	.013*
letter fluency	2082.01	1956.19	1	1	.017*
digit ordering	1628.94	1644.01	1	1	.731
cognitive similarities	*m* = 6.64	*m* = 6.37	(1, 3566)	(1, 3566)	.034*

** Significant at p < .001; * Significant at p < .05

Table A5

Means and Standard Deviations of Cognitive Tests by Custodial Status for Longitudinal Analysis.

Variable	*m* (cgp)	*m* (non-cgp)	*sd* (cgp)	*sd* (non-cgp)	*p*
cognitive similarities	wv1 = 6.97 wv2 = 6.59	wv1 = 6.96 wv2 = 6.45	wv1 = 2.28 wv2 = 2.23	wv1 = 2.25 wv2 = 2.24	.38
category fluency	wv1 = 21.87. wv2 = 19.99	wv1 = 21.47 wv2 = 20.05	wv1 = 5.86 wv2 = 5.73	wv 1 = 5.94 wv2 = 5.90	.18
letter fluency	wv1 = 11.84 wv2 = 11.56	wv1 = 11.77 wv2 = 11.42	wv1 = 4.06 wv2 = 4.09	wv1 = 4.42 wv2 = 4.03	.76
digit ordering	wv1 = 5.76 wv2 = 5.73	wv1 = 5.99 wv2 = 5.73	wv1 = 1.57 wv2 = 1.36	wv1 = 1.57 wv1 = 1.36	.03*

** significant at p < .001; * significant at p < .05

Table A6

Correlations of Variables for Cross-Sectional Analysis.

	custodial status	letter fluency	category fluency	number series	digit ordering	word recall	cognitive similarities	age	ses	sex
custodial status	1									
letter fluency	0.04**	1								
category fluency	0.05**	0.02	1							
number series	0.02	0.2**	0.02	1						
digit ordering	0	0.26**	0.04	0.25**	1					
word recall	0.04**	0.22**	0.05*	0.15**	0.24**	1				
cognitive similarities	0.04**	0.22**	0.01	0.29**	0.19**	0.23**	1			
age	-0.03*	-0.12**	0	-0.13**	-0.11**	-0.11**	-0.17**	1		
ses	-0.09**	0.04*	-0.03	0.08**	0.09**	0.05**	0.08**	-0.05*	1	
sex	0.09**	0.15**	0.02	-0.12&**	0.02	0.17**	-0.02	-0.02	-0.06	1

** Significant at p < .01; * Significant at p < .05

Table A7

Correlations of Variables for Longitudinal Analysis.

	custodial status	cognitive similarities wv1	cognitive similarities wv2	category fluency wv1	category fluency wv2	letter fluency wv1	letter fluency wv2	digit ordering wv1	digit ordering wv2	age	ses	sex
custodial status	1											
cognitive similarities wv1	0	1										
cognitive similarities wv2	0.03	0.53**	1									
category fluency wv1	0.03	0.21**	0.2**	1								
category fluency wv2	0	0.2**	0.2**	0.59**	1							
letter fluency wv1	0.01	0.17	0.15**	0.31**	0.3**	1						
letter fluency wv2	0.01	0.22**	0.19**	0.32**	0.35**	0.58**	1					
digit ordering wv1	-0.06**	0.16**	0.13**	0.15**	0.16**	0.17**	0.18**	1				
digit ordering wv2	0	0.13**	0.17**	0.18**	0.22**	0.18**	0.22**	0.3**	1			
age	0	-0.15**	-.15**	-0.13**	-0.16**	-0.12**	-0.14**	-0.1**	-0.12**	1		
ses	-0.06**	0.06**	0.12**	0.05**	0.08**	-0.02	-0.02	0.06**	0.06**	-0.04	1	
sex	0.11**	0	-0.04**	0.15**	0.16**	0.12**	0.15**	0.05**	0.01**	0.01	-0.	1

** significant at $p < .01$; * significant at $p < .05$

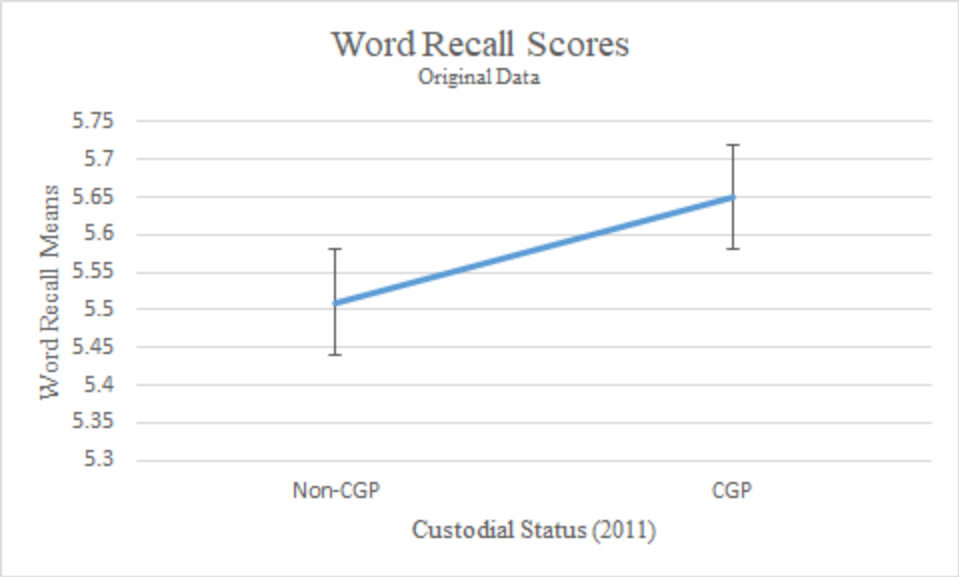

Figure A1. Interaction between word recall scores and custodial status.

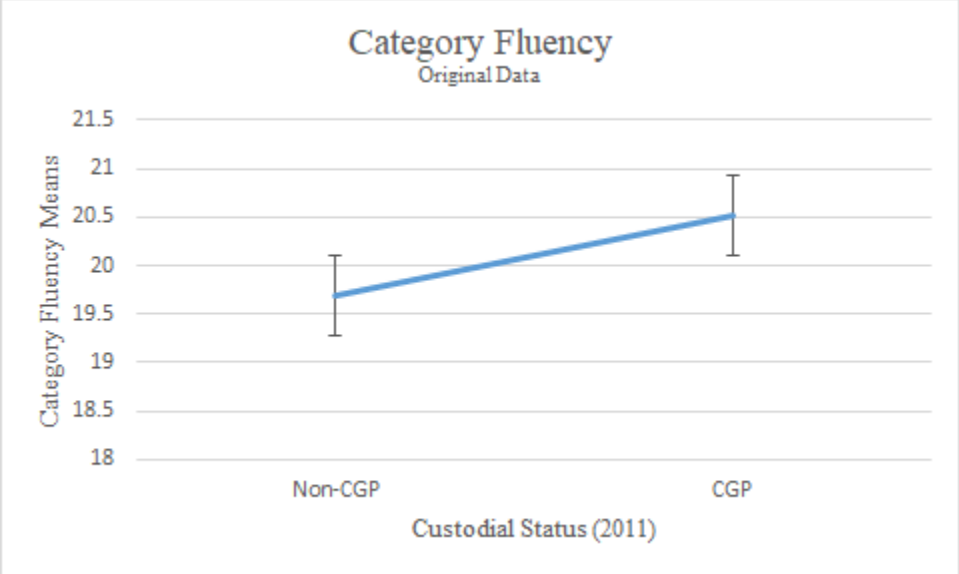

Figure A2. Interaction between category fluency scores and custodial status.

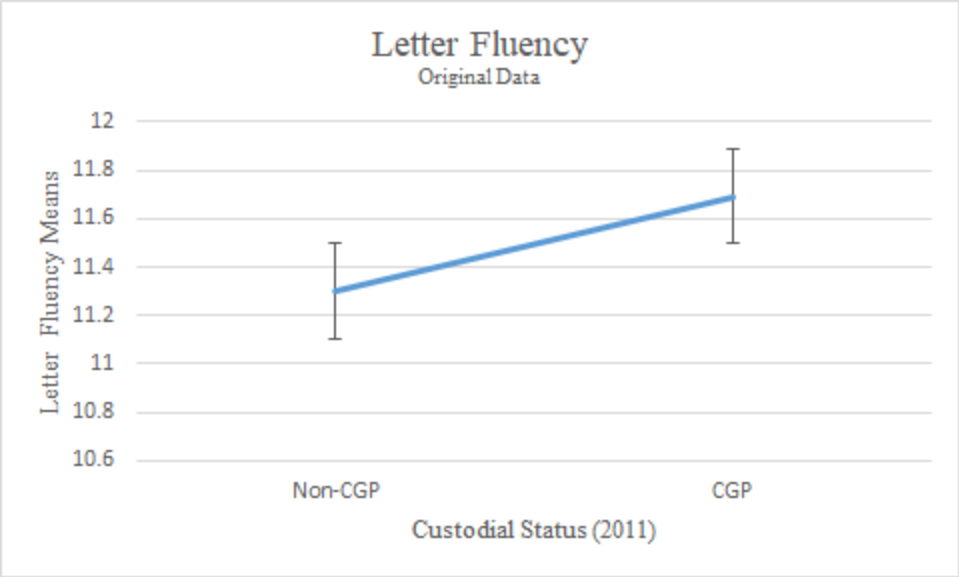

Figure A3. Interaction between letter fluency scores and custodial status.

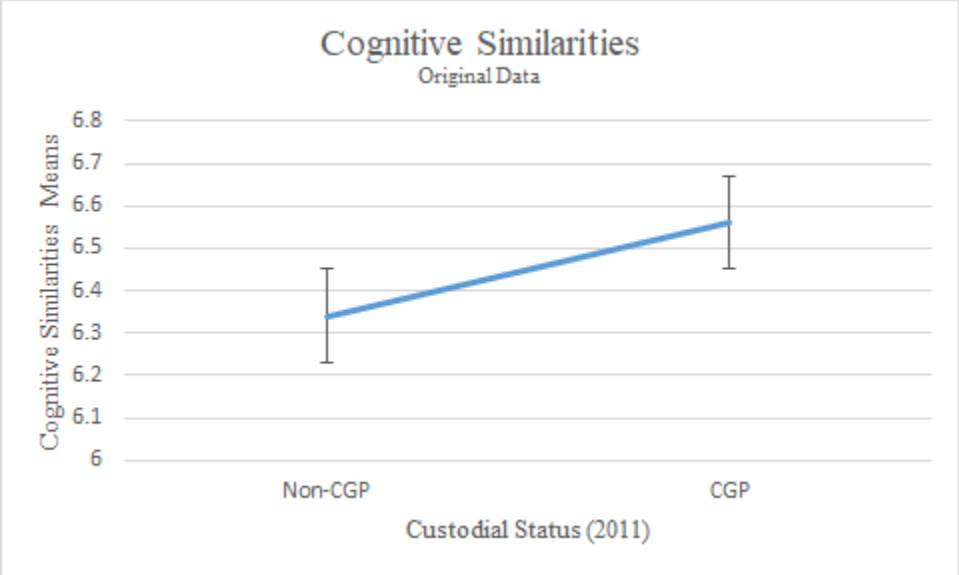

Figure A4. Interaction between cognitive similarities scores and custodial status.

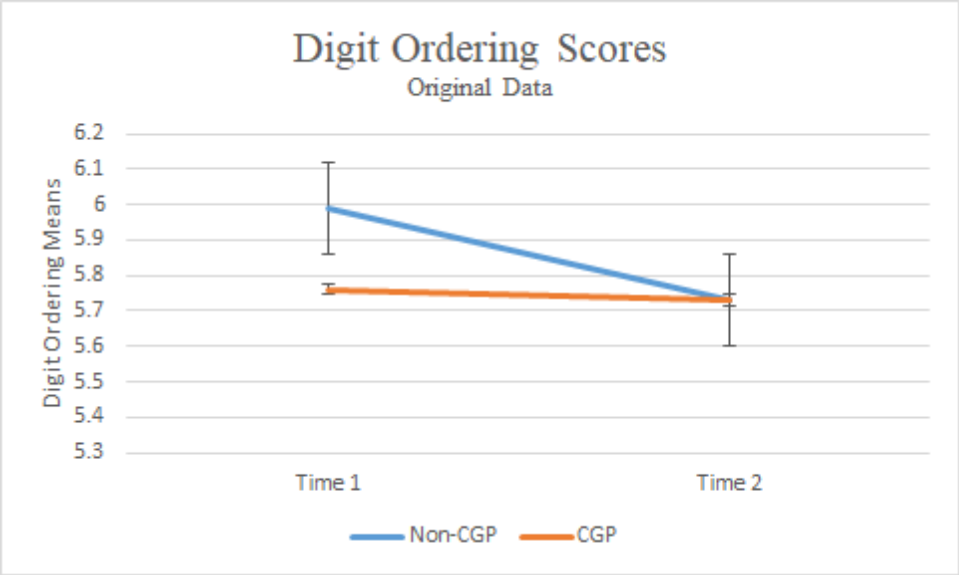

Figure A5. Interaction between digit ordering scores and custodial status by time.

IRB Approval Notice:

Protocol ID: IRB-17-659
Principal Investigator: Danielle Nadorff
Protocol Title: The Effect of Custodial Grandparenting on Levels of Cognition in a Longitudinal Sample.

The review of your study referenced above has been completed. While we sincerely appreciate the submission of your study, it was determined that your research does not require HRPP/IRB oversight at this time.

If in the future, if your research changes, or you feel that the intent has changed, please feel free to contact our office to determine if an existing data application should be submitted.

Though your research does not require HRPP/IRB oversight, we strongly encourage you to use best practices in the conduct of your research. These can include but are not limited to: (a) providing information pertaining to the study so that the participant can make an informed decision; (b) giving them your contact information for future reference; (c) explaining their participation is voluntary and they can stop at any time without penalty; (d) and (e) proper recruitment of participants.

The project may proceed without further review from this office.