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Effects of Gender and Age on Performance in Verbal Fluency and Working Memory Measures Among Cognitively Healthy Korean Adults*

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ABSTRACT

The purpose of this study is to examine how gender and aging affect verbal fluency performance depending on the task types and how their performance is associated with working memory capacity in cognitively healthy Korean adults. A total of 120 normal adults (60 males and 60 females) residing in Korea, matched for age and education, were categorized into three age groups: younger (20-39 years), middle-aged (40-59 years), and older adults (60-79 years). Verbal fluency was assessed using semantic and verb fluency tasks. Working memory was evaluated through digit span tasks. Significant gender-related differences were found in verbal fluency tasks, with females consistently outperforming males in all tasks, particularly semantic fluency. Moreover, a noticeable decline in performance on verbal fluency tasks is observed among the different age groups, with young adults displaying the highest performance, followed by middle-aged and older adults. Remarkably, the interplay between task type and gender emphasizes

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that females excel in semantic fluency across all age groups. In younger and older groups, the fluency task that best distinguishes gender was the verb fluency task, and a significant correlation was observed between working memory and all verbal fluency tasks in male and female groups. These findings suggest that males may face challenges in specific verbal fluency tasks compared to females, potentially influenced by various factors and complex interactions.

Key words: verb fluency, semantic fluency, working memory, aging, gender difference

Ⅰ. Introduction

Verbal fluency, which facilitates efficient information retrieval from memory, has garnered substantial attention in cognitive neuroscience (Gierach et al., 2022). The decline in cognitive function represents an integral aspect of the natural aging process on verbal fluency tasks. These tasks have been used to calculate the verbal ability to generate words, notably the semantic fluency task (Benton, 1968), the phonemic fluency task (Newcombe, 1969), and the verb fluency task (Woods et al., 2005). Traditionally, these tasks require individuals to generate unique words within an animal category (semantic or noun fluency) or start with a specified letter (phonemic fluency) within 60 seconds. While early investigations predominantly focused on semantic and phonemic fluency, recent research has thrust verb fluency tasks into the spotlight. Mousavi et al. (2014) suggested that verb fluency was more impaired than semantic fluency in patients with Alzheimer's disease (AD). They argued that investigating verb fluency in susceptible individuals with dementia aids in preventing the progression of the disorder. The verb fluency task is a subtype of verbal fluency tasks, and it entails the generation of verbs associated with actions or movements, emerging as valuable indicators of frontal lobe functionality (Woods et al., 2005).

Previous research has analyzed the intricate interplay among various demographic factors and verbal fluency tasks, such as age (Van Breukelen & Jolles, 2006), education level (Olabarrieta-Landa et al., 2015), gender (Van der Elst et al., 2006) and working

memory (Stolwyk et al., 2014). In general, older individuals tend to achieve lower scores than younger ones, and those with lower levels of education tend to perform less well than those with higher educational attainment (Strauss et al., 2006). Brickman et al. (2005) indicated that in tasks assessing verbal fluency, the impact of aging is more noticeable in semantic(category) fluency compared to phonemic fluency. Another study also shed light on age-related differences in verb fluency, associating variations in task performance with age-related dynamics (Kim, 2022). Another study also showed a gradual decrease in phonemic and semantic fluency tasks with increasing age (Lee & Lee., 2014).

Working memory, which is influenced by age, tends to decline in older adults (Gilbert & Lee, 1971; Parkin & Walter, 1991). Working memory abilities can be assessed through tasks like forward and backward digit span (Dobbs & Rule, 1989) and have been shown to have a close relationship with education level (Ardila & Rosselli, 1989). Previous research has suggested associations between age-related differences in phonemic and semantic fluency and working memory, implying a shared executive processing domain (Tombaugh et al., 1999; Henry & Crawford, 2004). The correlation between working memory and verbal fluency tasks among the older groups has been a subject of interest in previous studies (Nejati., 2012; Kave & Sapir-Yogev., 2020). Other research also suggested a relationship between verbal fluency tasks and working memory and argued that verbal fluency can be a predictor of working memory (Libon et al., 2009).

In tandem with investigations into the impact of aging on fluency tasks and working memory, gender-related inquiries have also garnered considerable attention. However, findings within the gender dimension remain inconclusive. Some studies have indicated that females are superior in phonemic fluency tasks (Loonstra et al., 2001; Weiss et al., 2006). In contrast, others have found a male advantage in semantic fluency (Capitani et al., 1998; Van der Elst et al., 2006). According to another study, working memory and verbal fluency performance were higher in the younger group, and males showed higher working memory performance than females (Lee & Lee., 2013).

To explain these gender differences, some research suggests they are tied to variations in the cerebral organization of language function and the structure of the language-related cortex (Harshman, 1985; Hiscock et al., 1999). Strauss et al. (1992) demonstrated that gender differences are linked to variations in the brain's organization of language abilities and the structure of the cortex associated with language. They suggested that language is more lateralized in males than in females. Bilateral language representation in females is believed to lead to enhanced verbal skills. In light of these gender differences, potentially linked to the cerebral organization of language function, this study aims to analyze which verbal fluency tasks most effectively discern gender differences. Specifically, we seek to identify the most discriminative tasks between genders. Kim & Cao (2022) suggested that speaking English activated the left inferior frontal gyrus, left fusiform gyrus, and left superior temporal gyrus more than Korean. Furthermore, given that existing studies have primarily focused on English-speaking populations, this study targets Korean individuals who use the Korean language to observe whether similar results emerge in non-English-speaking populations.

Some studies have reported little difference in working memory abilities based on gender (Orsini et al., 1986). In contrast, others have found that females exhibited significantly higher digit span performance than males (Singh et al., 2010). While studies comparing verbal fluency performance based on age among cognitively healthy adults are common, research on gender-based performance comparison is relatively limited. The specific focus on gender-based performance differences in verbal fluency tasks remains an area that warrants further investigation.

Moreover, previous research has highlighted the relevance of the verb fluency task in distinguishing between populations. For instance, among these fluency tasks, there was a difference in performance between individuals with dementia with Lewy bodies and those with Alzheimer's disease only in the verb fluency task, and a combined verb and noun (animal) fluency score effectively distinguished the two groups (Delbeuck et al., 2013). However, there is a lack of research on whether these semantic and verb fluency tasks effectively distinguish gender.

Therefore, this study aims to investigate differences in task performance in working memory and verbal fluency tasks among normal adults, considering age and gender. It also aims to identify verbal fluency tasks that most effectively distinguish gender differences.

To elaborate on these premises, the research questions are as follows:

1. Are there significant differences in the performance of verbal fluency tasks (semantic and verb fluency) between females and males, depending on the task types and the age groups (younger, middle-aged, and older)?
2. Which verbal fluency tasks (semantic and verb fluency) significantly discriminate between gender groups in each age group?
3. Are there significant correlations among age, working memory, and verbal fluency task performances (semantic and verb fluency) by gender? Also, is the correlation among these variables significant when controlling age?

Ⅱ. Methods

1. Participants

This study was conducted with the approval of the Institutional Review Board (IRB) of Ewha Womans University (No. 2022-0112). This study targeted 120 healthy adults residing in South Korea, comprising 60 males and 60 females. The sample was divided into three distinct age groups using the age group classification criteria from the study of Cocquyt et al. (2022): young-aged adults (ages 20 to 39), middle-aged adults (ages 40 to 59), and old-aged adults (ages 60 to 79). Each age group consisted of 40 participants: 40 individuals in the normal younger group, 40 in the normal middle-aged group, and 40 in the normal old-aged group. Inclusion criteria for all three groups were as follows: (a) Korean native speakers, (b) an education duration of 16 years, (c) results on the Korean-Mini Mental State Examination (K-MMSE; Kang, 2006) were within the normal range, defined as scoring at or above the 16th percentile relative

to years of education and age (Kang, 2006), (d) normal vision and hearing, and (e) no reported history of language, cognitive, neurological, or developmental disorders. For individuals aged 60 and above, an additional criterion was applied. They were selected based on the results of the Seoul Verbal Learning Test (SVLT; Kang et al., 2012), a subtest of the Seoul Neuropsychological Screening Battery 2nd edition (SNSB-II; Kang et al., 2012); those who fall under the normal category of 16%ile or more were selected according to their number of years of education and age.

Participants were provided comprehensive explanations of the study's objectives, experimental procedures, duration, and requirements. All participants provided written informed consent. Information on subjects for each group participating in this study was presented in Table 1. One-way ANOVA was performed to determine whether there was a significant difference in age for each group. As a result, the age difference between the two groups was not statistically significant [$F(1,118)=.487$, $p>.05$].

〈Table 1〉 Demographic Information of Participants

	Younger (N=40)		Middle-aged (N=40)		Older (N=40)	
	M (N=20)	F (N=20)	M (N=20)	F (N=20)	M (N=20)	F (N=20)
Age (Yr)	27.60 (4.08)	26.15 (3.55)	49.85 (5.61)	47.35 (5.21)	65.95 (5.88)	63.65 (3.77)

Note. M = Male; F = Female; Yr = Year.
The values are given as mean (SD = Standard Deviation).

2. Materials

Data collection was conducted individually with each participant in a quiet space. The verbal fluency tasks utilized the Controlled Oral Word Association Test (COWAT) by Kang et al. (2000). Digit span is widely used as one of the most common tests for assessing working memory in research (Kasper et al., 2012). Therefore, working memory was assessed using the Digit Forward and Digit Backward assessments from the Seoul Neuropsychological Screening Battery 2nd Edition (SNSB-II; Kang et al., 2012).

3. Procedure

The procedure began with the researcher instructing the participant, "Please produce as many words as possible related to the category I am talking about for a minute from now on." Following this instruction, participants engaged in the verbal fluency tasks. For the semantic fluency task, participants were asked to generate words associated with animals, while for the verb fluency task, participants were tasked with producing words related to movement or action.

After completing the verbal fluency tasks, participants underwent the working memory measures. In the Digit Forward task, participants were instructed to repeat number sequences precisely as presented, while in the Digit Backward task, participants were requested to repeat the sequences in reverse order.

All tests were conducted after ensuring the participant fully understood the implementation method. Utterances were recorded or transcribed with the participant's consent for later analysis. The performance calculation for each task was based on the count of correctly produced words. Verbal fluency task scores were computed by excluding repeated and unintelligible words based on the number of words generated within the time limitation. Only hyponyms were included in the score in cases where hypernyms and hyponyms were produced together.

Waters & Caplan (2003) suggested that when measuring working memory capacity through working memory tasks, using a composite score derived from 2-3 working memory tasks tends to be more stable and reliable than relying on the results of a single task. Therefore, this study conducted a factor analysis using Principal Component Analysis to examine the underlying structure of working memory tasks. The results indicated that the single extracted principal component explained 66% of the total variance, and the scores from two memory tasks (digit forward and backward) were consolidated into a common factor. The sum of the scores from the two tasks served as a single index of working memory capacity.

4. Statistical Analyses

Data analysis was conducted using IBM SPSS Statistics version 28.0. (Statistics Package for Social Sciences, version 28.0). A three-way mixed analysis of variance (ANOVA) was employed to explore potential differences depending on gender (female and male), age groups (young, middle-aged, and old), and verbal fluency task type (semantic and verb fluency) in fluency performance. Stepwise discriminant analyses were performed for each age group to determine the most discriminative factor by gender group. Pearson correlation coefficients were computed to describe the relations among age, working memory, semantic, and verb fluency task performances by gender. In addition, partial correlation coefficients were calculated among working memory, semantic, and verb fluency task performances when age was controlled.

Ⅲ. Results

1. Differences in Verbal Fluency Tasks Between Males and Females Depending on the Task Types and the Age Groups

Descriptive statistics from the three-way mixed ANOVA (gender x age group x task type) for verbal fluency task performance are displayed in Table 2 and Figure 1. A statistically significant main effect of the age group on verbal fluency tasks emerged [$F(1, 114)=38.20$, $p=.001$]. Specifically, a significant difference was shown in performance on verbal fluency tasks among the younger group (M=22.82, SE=.58), the middle-aged group (M=19.87, SE=.58), and the old-aged group (M=15.687, SE=.580). Post-hoc tests using Bonferroni correction were conducted to explore these significant results further. The results indicated that the older group had significantly lower performance than the middle-aged ($p<.001$) and younger ($p<.001$) groups. In addition, the middle-aged group had significantly lower performance than the young-aged group ($p<.001$).

A statistically significant main effect of gender was observed [$F(1, 114)=13.27$,

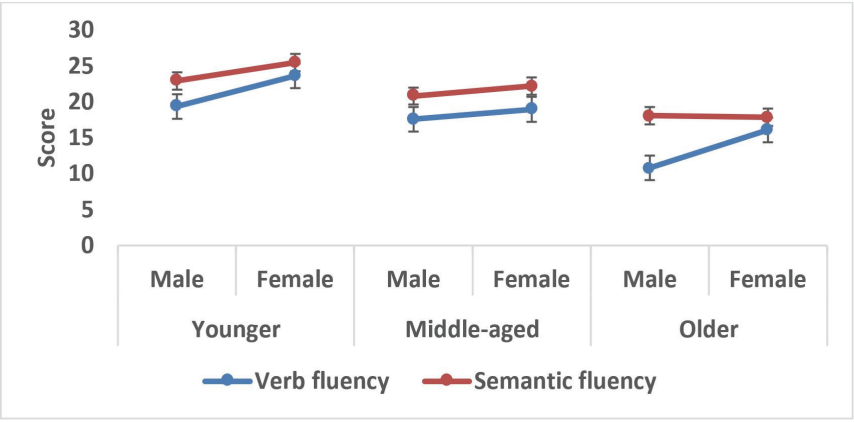
p=.001]. The female group (M=20.68, SE=.47) demonstrated significantly higher performance than the male group (M=18.24, SE=.47).

A two-way interaction between task type and gender was significant [*F*(1, 114)=3.95, *p*=.049]. This result suggests that the influence of task type on performance differs between genders. Females showed higher performance than males, especially in the verb fluency task compared to the semantic fluency task (Figure 2). No further effects were significant: a two-way interaction between task type and age group [*F*(1, 114)=.81, *p*=.446] and the three-way interaction among gender, age groups, and task type [*F*(1, 114)=1.80, *p*=.169].

〈Table 2〉 Descriptive Statistics of Performance in Verbal Fluency Tasks

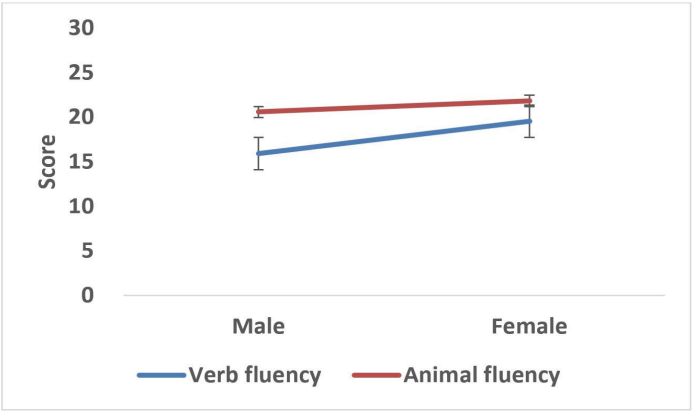
	Younger (N=40)		Middle-aged (N=40)		Older (N=40)	
	M (N=20)	F (N=20)	M (N=20)	F (N=20)	M (N=20)	F (N=20)
VF	19.35 (5.38)	23.60 (5.68)	17.55 (5.67)	18.95 (3.83)	10.80 (4.72)	63.65 (3.77)
SF	22.90 (5.64)	25.45 (6.34)	20.80 (4.00)	22.20 (4.12)	18.05 (4.74)	17.85 (4.47)

Note. VF=Verb fluency; SF=Semantic fluency; M=Male; F=Female; Yr=Year.
The values are given as mean (*SD*).



Note. Error bars reflect standard errors of the means.

〈Figure 1〉 Performance on the Verbal Fluency Tasks by Age Group, Gender, and Task Type



Note. Error bars reflect standard errors of the means.

〈Figure 2〉 Interaction Effect of Task Type and Gender Group

2. Analysis for Gender Discrimination Using Fluency Tasks by Age Groups

The stepwise discriminant analysis investigated which verb and semantic fluency tasks discriminate effectively between gender groups for each age group. In the younger group, the verb fluency task was the significant predictor in discriminating between the gender groups [$F(1, 38)=5.89$, $p=.020$]. Similarly, in the older group, the verb fluency task was also the significant predictor in discriminating between the gender groups [$F(1, 38)=15.77$, $p<.001$]. In contrast, the stepwise discriminant analysis did not reveal any variables as significant predictors in the middle-aged group. In the younger group, according to the Wilks' Lambda value from the overall equation and the discriminant function emanated from canonical discriminant analysis, Model 1 exhibited sensitivity in classifying males as males at 65% and specificity in classifying females as females at 60%. The verb fluency task accurately classified 62.5% of the original group cases ($\chi^2=5.404$, Wilks' Lambda=.866, $p<.05$). In the older group, according to the Wilks' Lambda value from the overall equation and the discriminant function emanated from canonical discriminant analysis, Model 1 exhibited sensitivity in classifying males as males at 75% and specificity in classifying females as females at 60%. The verb fluency task accurately classified 67.5% of the original group cases ($\chi^2=13.01$, Wilks' Lambda=.707, $p<.05$).

3. Correlations Among Age, Verbal Fluency Tasks, and Working Memory Tasks by Gender

Pearson correlation coefficients were computed to examine the correlations among variables (semantic, verb fluency tasks, working memory, age) by gender. In the female group, age was significantly and negatively correlated with verb fluency task (r=-.545, p=.001), semantic fluency task (r=-.455, p=.001), and working memory (r=-.554, p=.001). Moreover, the verb fluency task showed a significant positive correlation with the semantic fluency task (r=.313, p=.015) and working memory (r=.280, p=.030). A significant positive correlation was demonstrated between the semantic fluency tasks and working memory, with a correlation coefficient of .588 (p=.001). The results of the Pearson correlation in the female group are given in Table 3.

Similarly, in the male group, age showed a significant negative correlation with verb fluency task (r=-.582, p=.001), semantic fluency task (r=-.400, p=.002), and working memory (r=-.674, p=.001). The verb fluency task revealed a significant positive correlation with the semantic fluency task (r=.368, p=.004) and working memory (r=.473, p=.001). A significant positive correlation was shown between the semantic fluency tasks and working memory, with a correlation coefficient of .442 (p=.001). The results of the Pearson correlation in the male group are given in Table 4.

Partial correlations were analyzed while controlling for age to closely examine the correlations among the two fluency task variables and the working memory for each gender group. In the female group, this finding showed that the partial correlation coefficient between the working memory and the semantic fluency task was .453 (p=.001), which decreased compared to the zero-order correlation coefficient of .588 (p=.001) but remained statistically significant (Table 5). Conversely, the partial correlation coefficient between working memory and the semantic fluency task in the male group was not statistically significant (p=.052). The results of the partial correlation in the male group are presented in Table 6.

Also, Pearson correlation analysis was conducted by dividing gender groups by age group. As a result, there was no significant correlation in the younger female group.

In the middle-aged female group, only working memory and animal fluency tasks were significantly correlated (r=.475, p=.034). In the older female group, only working memory and animal fluency tasks were significantly correlated (r=.582, p=.007). In contrast, there was no significant correlation among working memory and verbal fluency tasks in the younger, middle-aged, and older male groups.

〈Table 3〉 Pearson Correlation Coefficients Among Age, Working Memory, and Verbal Fluency Tasks in the Female Group

	Age	VF	SF	WM
Age	1			
VF	-0.545***	1		
SF	-0.455***	0.313*	1	
WM	-0.554***	0.280*	0.588***	1

Note. VF=Verb fluency; SF=Semantic fluency; WM=Working Memory.
*p<.05, ***p<.001

〈Table 4〉 Pearson Correlation Coefficients Among Age, Working Memory, and Verbal Fluency Tasks in the Male Group

	Age	VF	SF	WM
Age	1			
VF	-0.582***	1		
SF	-0.400***	0.368**	1	
WM	-0.674***	0.473***	0.442***	1

Note. VF=Verb fluency; SF=Semantic fluency; WM=Working Memory.
**p<.01, ***p<.001

〈Table 5〉 Partial Correlation Coefficients Among Working Memory and Verbal Fluency Tasks in the Female Group

	VF	SF	WM
VF	1		
SF	0.086	1	
WM	-0.032	0.454***	1

Note. VF=Verb fluency; SF=Semantic fluency; WM=Working Memory.
***p<.001

〈Table 6〉 Pearson Correlation Coefficients Among Age, Working Memory, and Verbal Fluency Tasks in the Female Group

	VF	SF	WM
VF	1		
SF	0.181	1	
WM	0.135	0.254	1

Note. VF=Verb fluency; SF=Semantic fluency; WM=Working Memory.

Ⅳ. Discussion

This study aimed to investigate the relationships among age, gender, verbal fluency tasks, and working memory. From an in-depth analysis across various age and gender groups, we have gleaned several key insights. Specifically, we evaluated performance in verbal fluency tasks based on age (younger, middle-aged, and older adults) and gender (female and male), using semantic and verb fluency tasks.

Firstly, there were differences among the younger, middle-aged, and older groups. The older group performed significantly worse than both the middle-aged and younger groups. Furthermore, the middle-aged group's performance was significantly lower than the younger group's, underscoring age-related verbal fluency declines. These findings align with prior studies (Van Breukelen & Jolles, 2006; Strauss et al., 2006), which have indicated that cognitive functions tend to decline as part of the natural aging process, leading the older group to lag behind the younger and middle-aged groups in performance.

We observed females consistently outperforming males across the verbal fluency tasks. This is in line with several previous studies that have reported a female advantage in these tasks (Weiss et al., 2006; Loonstra et al., 2001). Notably, prior research has indicated distinct strategies employed by each gender: males often cluster words into phonemic subcategories, while females tend to switch more between categories (Lanting et al., 2009; Weiss et al., 2006). This inclination among females to switch between

categories when producing words might contribute to their enhanced performance in verbal fluency measures compared to males.

Specifically, the differences between females and males were minimal in the semantic fluency task, but females notably had higher performance than males in the verb fluency task. Woods et al. (2005) noted that verb fluency tasks are more sensitive to damage in the frontal system than semantic fluency tasks. These findings highlight the importance of considering verb fluency tasks in future research on gender differences.

This study also investigated the role of the verb fluency task as a tool for discerning gender differences within verbal fluency tasks. Based on the discriminant analysis results, it is evident that the verb fluency task plays a crucial role in effectively discriminating between gender groups, particularly between younger and older age groups. In the previous study, verb fluency tasks have been instrumental in differentiating clinical populations (Delbeuck et al., 2013); they can also serve as a meaningful means of exploring cognitive distinctions between genders. In the middle-aged group, the stepwise discriminant analysis did not reveal any variables as significant predictors. This result indicates that not all age groups exhibit the same gender-based differences in cognitive performance patterns, emphasizing the necessity of additional studies on various age groups. Future studies may delve deeper into the gender-related differences in cognitive tasks and their potential implications for understanding cognitive development, aging, and clinical conditions.

Moreover, we examined the relationships among verbal fluency tasks and working memory in each gender group. The results demonstrated significant negative correlations among age, working memory, semantic and verb fluency, corroborating previous findings that working memory tends to decline with age (Gilbert & Lee, 1971). In the female group, age exhibited a strong, significant negative correlation with performance on the semantic and verb fluency task. These results were similarly observed in the male group, suggesting that their performance on these verbal fluency tasks declines significantly as females and males age. Age also displayed a substantial, negative correlation with working memory, indicating that as females grow older, their working memo-

ry abilities tend to diminish. These correlations highlight the effect of age on cognitive performance, particularly in verbal fluency and working memory, for both females and males. Furthermore, a positive correlation was observed between working memory and the semantic fluency tasks. This suggests that individuals with higher working memory tend to perform better in semantic fluency tasks in females and males.

Interestingly, in contrast to males, even when age was controlled, the correlation between working memory and semantic fluency remained statistically significant in females. These findings suggest that, unlike the verb fluency task, which is influenced by age, working memory and semantic fluency task performance are mutually related in females, irrespective of age. The consistent results indicated a female advantage in working memory (Voyer et al., 2021) and semantic fluency (Acevedo et al., 2000). Based on the current results, it can be inferred that certain cognitive factors in females might be less susceptible to the effects of aging.

This research contributes to understanding the impact of aging on cognitive function, gender-related differences in verbal fluency, and the utility of verb fluency in discriminating between gender groups. Additionally, it underscores the connection between working memory and semantic fluency, emphasizing the importance of considering multiple cognitive domains in research and clinical assessments. This study provides valuable insights into the factors influencing verbal fluency task performance in normal adults. The findings underscore the significance of age and gender in shaping cognitive abilities, particularly in verbal fluency. Comprehending the dynamics of cognitive processes across diverse demographic groups can have significant implications for cognitive assessment and intervention strategies.

The suggestions for future research in this study are as follows. This study analyzed differences among age groups by categorizing them into three groups. However, due to the narrow age ranges, future research should consider further subdividing the age groups (e.g., 20-29, 30-39, 40-49, etc.) to closely examine the gender effects within each interval.

In contrast, according to domestic research results, males performed better than fe-

males in semantic and phonemic fluency tasks (Lee & Lee, 2013). Therefore, following research with a more detailed breakdown of participants and age groups would help clarify gender differences. Furthermore, since this study exclusively targeted Korean individuals, these findings may not generalize to other language groups. Thus, additional research across diverse linguistic backgrounds is warranted to generalize these results.

Also, this study compared performance only among healthy adults. Future research is needed to investigate diverse samples, including individuals with disorders such as aphasia, mild cognitive impairment, dementia, etc. While this study focused on comparing verb and animal fluency tasks, analyzing phonemic and other semantic fluency tasks could provide a more comprehensive comparison of various verbal fluency tasks.

This study evaluated working memory abilities using only the digit span forward and backward tasks. Future research must incorporate additional tasks to assess various aspects of working memory. Expanding the scope of the study in this manner could enhance the generalizability of the research findings and allow for a deeper exploration of the relationship between working memory and verbal fluency.

Future research could explore the underlying mechanisms responsible for gender-related differences in verbal fluency tasks. Additionally, investigations into the impact of other demographic factors, such as education level, on cognitive performance may further enrich our understanding. Furthermore, longitudinal studies tracking cognitive changes can provide a more comprehensive picture of age-related declines and their implications.

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국문요약

성별 및 연령이 구어유창성과 작업기억 수행력에 미치는 영향*

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본 연구의 목적은 성별과 노화가 정상 한국 성인의 구어 유창성과 작업기억 수행력에 미치는 영향을 조사하고 연령 그룹별로 성별을 가장 잘 구분하는 유창성 과제가 무엇인지 분석하는 것이다. 한국에 거주하는 120명의 정상 한국 성인(남성 60명, 여성 60명)을 연령과 교육수준으로 매칭하여 청년층(20~39세), 중장년층(40~59세), 노년층(60~79세)으로 그룹을 나누었다. 구어 유창성 과제(의미 유창성, 동사 유창성)와 작업기억 과제(숫자 따라 말하기)를 평가하였다. 그 결과, 여성은 구어 유창성 과제에서 남성보다 통계적으로 유의미하게 높은 수행력을 보였으며, 특히 의미 유창성에서 높은 수행력이 나타났다. 또한, 연령의 증가에 따라 의미, 동사 유창성 과제의 수행력은 감소하는 경향을 보였다. 구어 유창성 과제와 성별 간 유의미한 상호작용이 나타났으며, 그 중 의미 유창성 과제에서 여성은 청년층과 노년층 그룹에서 더 많은 단어를 산출했다. 청년층과 노년층 그룹에서 성별을 가장 잘 구분하는 유창성 과제는 동사 유창성 과제로 나타났으며, 남성과 여성 그룹에서 모든 구어 유창성과 작업기억 수행력 간에 유의미한 상관관계가 나타났다. 이러한 연구결과는 남성이 여성에 비해 특정한 유창성 과제에서 어려움을 보일 수 있으며, 유창성 과제 수행 시 노화와 성별 같은 다양한 요인과 복잡한 상호 작용에 의해 영향을 받을 수 있음을 시사한다.

주제어: 동사 유창성, 의미 유창성, 작업기억, 노화, 성별 차이

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