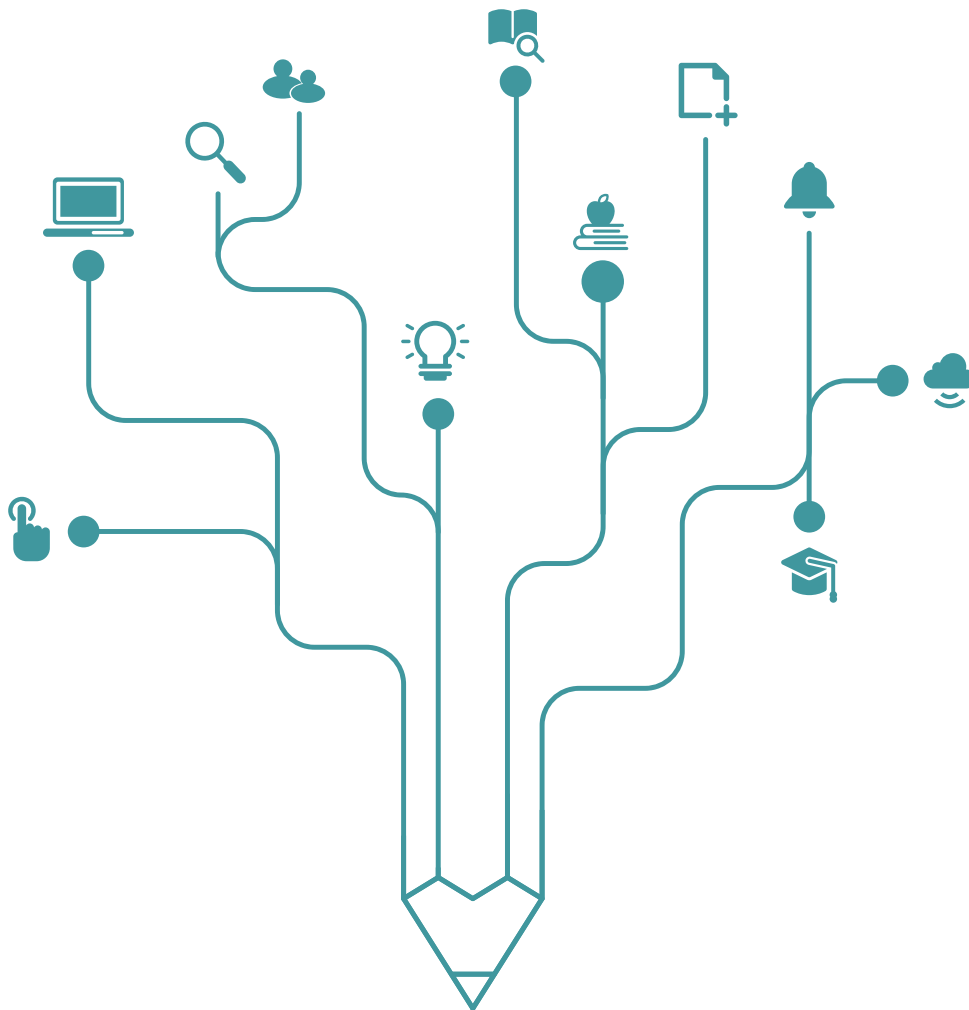


Impact of Expansions of the Personal Assistance Service for the Disabled on Unmet Care in South Korea

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Abstract

While the Korean government allocates approximately 60% of the total budget for the disabled to the Personal Assistance Service, there has been no systematic analysis on the effectiveness of the program. Applying a difference-in-differences methodology to a repeated cross-sectional survey data, we find that eligibility expansions from 2011 to 2015 of the Personal Assistance Service had no significant effect on reducing the unmet needs for personal assistance. Access to the service, however, reduced the amount of care given by family and friends, implying that there may have been a close-to-perfect crowd-out.

Introduction

One in five disabled South Koreans aged 6 through 64 has reported an “unmet need for personal assistance,” which is the difference between personal assistance deemed necessary by an individual and the actual assistance received. Not only is access to adequate assistance a basic civil and human right, an unmet need for personal assistance may result in private and public long-term costs such as worsening of chronic health conditions, higher risks of hospitalization, hospital readmission, emergency care admission, depression, and mortality (Allen and Mor 1997; Kuzuya et al. 2008; Depalma et al. 2013; Hass et al. 2017; He et al. 2015).

The purpose of this paper is to examine the effectiveness of the Korean national Personal Assistance Service (PAS) program for the disabled in reducing the extent of unmet needs for personal assistance since its inception in 2011. All over the world, care for people with disabilities has been informally provided by family members and friends (Batavia et al. 1991). Since the 1970s, however, the independent living model that propagates the civil rights, options, and control over choices in the lives of the disabled resulted in the introduction and popularity of

personal assistance services that assist with daily activities in the disabled person's homes (Batavia et al. 1991). In December 2006, Article 19—Living independently and being included in the community—of the UN Convention on the Rights of Person with Disabilities recognized “the equal rights of all persons with disabilities to live in the community, with choices equal to others” and urged State parties to ensure that “persons with disabilities have access to a range of in-home, residential and other community support services, including personal assistance necessary to support living and inclusion in the community” (UN 2015). The governments of countries such as Canada, Sweden, the US, Austria, and Germany give cash subsidies to the disabled directly, while governments of other countries such as Japan pay the service providers and give the disabled the right to use the services. In 2011, the South Korean government introduced a national PAS program providing vouchers for hiring third-party caregivers, targeting the most severely disabled and slowly expanding the target population to those with less severe disabilities.

Using a difference-in-differences framework, we assessed whether the PAS program has successfully reduced the unmet needs for personal assistance for the target group and reduced the burden of care on family members and friends. In 2021, the South Korean government allocated KRW1.50 trillion to the PAS program, approximately 60% of the total budget for the disabled (KRW2.48 trillion). Due to the large budgetary allocations, making PAS the most expensive disability support program, its effectiveness has attracted policymakers and researchers in South Korea.

While PAS is available nationwide, its effectiveness in meeting its objectives - assisting the disabled and relieving the burden of care on families - has not been carefully tested. This is

mostly due to data limitations. Moreover, concurrently provided services and lack of a proper control group for these programs make it difficult to isolate the effects of the PAS. One strand of literature on the topic focused on the different levels of control the disabled user has over the assistance received. In the US context, there is a debate between consumer-directed PAS over agency-directed PAS. In the agency-directed model, agencies hire and train the care attendants and match them with the disabled, while in the consumer-directed model, the disabled hire, train, and monitor the personal assistants and pay them directly, with the support of public funds (Benjamin 2001). In a quasi-experimental setting, (Beatty et al. 1998) found that recipients of consumer-directed PAS experienced significantly more satisfaction than recipients of non-consumer-directed services. The ability to choose their assistants and have direct control over their work arrangements, including availability during emergencies, seems to have contributed to this. Prince et al.(1995) found that people with sustained spinal cord lesions catered to by attendants they directly employed experienced significantly better health outcomes - fewer rehospitalizations, diminished preventable complications, greater life satisfaction, and lower costs - than those taken care of by agency-provided attendants.

Most existing evaluations on South Korea are based on one-time cross-sectional data of the beneficiaries and small-scale personal assistance programs before the national PAS was implemented in 2011 (Kim 2005; Lee et al. 2007; Park and Jung 2010). For instance, based on a phone survey of 201 beneficiaries, Lee et al. (2007) found that a small-scale personal assistance program in 2006 in South Korea resulted in an improvement in subjective health and self-reliance perceptions as well as increased participation in their communities, increased employment, and high self-confidence in getting or maintaining jobs. Yang (2020), using propensity score matching and differences-in-differences methodology, analyzed three-year

panel data from 2016 to 2018 and found that the disabled that occasionally used the PAS reported that their social lives have somewhat improved. Kim and Cho (2015) found that the 2013 PAS target group expansion reduced additional private costs incurred due to disability, especially for females.

There is a paucity of literature on the impact of PAS on the burden of care on the family. Shin (2014) conducted a sample survey of 200 family members of the disabled using PAS in the Gyeonggi Province, He found that while the PAS support for physical activities reduced the family members' caregiving hours, support for household chores and social activities did not. Lee (2017) looked at the quality of life and self-esteem level of the main caregiver due to PAS in a panel of 102 people and found that both have increased.

PAS in Korea provides an excellent avenue to estimate its effectiveness because of the gradual expansion of target beneficiaries and multi-year cross-sectional data availability. Though the disability grading system has been officially terminated in South Korea since 2019, South Korea and Japan are the only countries with welfare programs based on the severity of the disability. When it was implemented in 2011, the Korean PAS targeted the most severely disabled (Grade 1). In 2013, eligibility expanded to the next disability tier (Grade 2), and in 2015 to the subsequent disability tier (Grade 3). The 2011, 2014, and 2017 national surveys of disabled persons allow us to examine before and after snapshots of the respective PAS eligibility expansions. The survey also had a direct question on unmet needs for personal assistance, which can be considered more comprehensive than questions simply asking for unmet needs for a handful of ADLs (Activities of Daily Living) or IADLs (Instrumental Activities of Daily Living)

Utilizing the difference-in-differences method, we assessed the impact of expanding the PAS

target on unmet needs for personal assistance, the burden of informal assistance provided by family and friends, and the life satisfaction level of the target disabled vis-a-vis those that are not eligible for PAS.

On the effectiveness of PAS, the 2011, 2013, and 2015 eligibility expansions to all Grade 1, Grade2, and Grade3, respectively, had no statistically significant impact on the probability that a disabled person would experience some unmet need for personal assistance. However, we found that access to PAS significantly increased the probability that respondents would report that they received less informal assistance for the stated years. In addition, while the 2011 and 2013 expansions increased satisfaction with governmental and societal support, the 2015 expansion did not engender a statistically significant increase in satisfaction with governmental support. We also found that the 2011, 2013, and 2015 expansions did not play a statistically significant role in respondents' family life satisfaction and overall life satisfaction. Finally, we found that the 2011 and 2013 expansions led to respondents in the Grades 1 and 2 disability bracket going out more frequently, while the 2015 expansion had no effect.

The rest of the paper is arranged as follows: the next section describes the context, data and research design. This is followed by the results of the analyses and robustness checks, and the discussion.

CONTEXT, DATA, RESEARCH DESIGN

The National PAS of Korea

The objective of Korea's PAS is to promote independent living for people with disabilities and reduce the burden of care on family members by providing services like basic daily activity

assistance, visiting baths, and visiting nursing. A professional care provider helps with physical activities, household chores, and mobility for daily activity assistance; a care worker visits the recipient's home equipped with bathing facilities and provides bathing services under the visiting baths services; and a licensed nurse visits to provide medical assistance, counseling on medical treatments, or oral hygiene services under the visiting nursing services. More than 99% of PAS benefits are used for daily activity assistance, whereas visiting bath and visiting nursing services are rarely demanded. This is possibly due to lower prices and easier access to daily activity assistance (Lee and Kim 2018). There is additional but temporary support—maximum of six months—for births, preparation for independent living, and the temporary absence of the main caretaker.

As of July 2019, the former six-tier disability system, from Grade 1, the most severe, to Grade 6, the least severe, was merged into severe (Grade 1-3) and mild (Grade 4-6). As of December 2020, 263 million people (5.1% of the total population) are legally disabled, of which approximately 37% are severely disabled. In addition, the elderly (aged 65 years and older) make up 50% of the total disabled population.

With the passage of the Disabled Welfare Act in 2007, a pilot personal assistance service program was implemented in July 2009 for persons with severe disabilities (Grade 1). A second pilot program followed this in September 2010. In October 2011, the national PAS was formally launched, extending eligibility to all disabled persons aged between 6 and 64 with Grade 1. In 2013, eligibility was expanded to the next disability tier (Grade 2) and in 2015 to the subsequent disability tier (Grade 3). Finally, PAS eligibility was extended to every disabled person in 2019, after the six-tier disability grading system was abolished.

When a person applies for PAS, an evaluator visits the applicant's home and assesses their need for personal assistance by filling out a Comprehensive Survey of the Service Assistance for the Disabled, formally known as the Personal Assistance Recognition Survey. The survey consists of questions on the extent to which the individual needs assistance with the seven ADLs, eight IADLs, and cognitive-behavioral characteristics. Basic information collected includes social activities - whether one goes to work or school - and household socioeconomic characteristics like residential type. Information about the current level of assistance received and the desired amount of use is also collected.¹ Based on the responses to the survey questions, a service assistance score is calculated, categorized into four groups, and used to determine the respondent's level of benefits. In 2017, 118 personal assistance hours per month were assigned to the first group, 94 hours to the second group, 71 hours to the third group, and 47 hours to the fourth group. Then, ability-to-pay, proxied by the amount of health insurance the household pays, determines the copayment size, which accrues to approximately 6-15% of the total benefits (KRW26,100-105,200 per month).² ³ Once approved, the recipient uses the granted voucher amount to hire professional caregivers or "personal assistants" employed by government-contracted private agencies.

Not all applicants are successful in becoming beneficiaries or receiving satisfactory levels of PAS. Though the actual admission rate to the PAS is classified information, it is well-known that

¹ The Personal Assistance Recognition Survey also collected data on individuals' disease-specific conditions (wheelchair use, auditory ability, visual ability, cognitive abilities and mental conditions), one's behavioral and cognitive characteristics, and social environment (social participation, independent communication, independent use of assistive devices, ability to manage emergency situations) (Lee and Kim 2018).

² Beneficiaries of national basic living security are exempted from the copayment, whereas the low-income group below 50% of median income are required to pay fixed copayment of KRW20,000.

³ Additional benefits can be provided for those who are pregnant, without caregivers, attending school, going to work, living alone, or whose family members are not able to provide care due to their severe disability, age (under 18 years or over 65 years), work/school attendance.

the program has been running on a tight budget (Ablenews 2020), and the beneficiaries have complained about the insufficient voucher amount they receive (Ablenews 2015; Park 2020). Table 1 shows the number of recipients by grade from 2014 to 2018. The table shows that while close to 30% of those with Grade 1 disability status were selected as recipients of PAS, only 8% and 2% of individuals with Grades 2 and 3, respectively, were selected in 2018, years after the individuals in the respective grades had become eligible to apply. Note that the percentage here is downward biased because we could only use a total number of the disabled in Grade 1 of all ages in the denominator, not restricted to those aged between 6 and 64, i.e., the eligible population. If we put the eligible population (disability grade 1, 2, 3 aged 6-64) in the denominator, the proportion of recipients was 18.4% in 2011, 17.7% in 2014, and 13.9% in 2017.

<Table 1> Recipients of PAS (% of disabled person among the total population in the grade category)

	Proportion of recipients in each grade category (%)			
	Total	Grade 1	Grade 2	Grade 3
2014	12.1	26.1	3.9	
2015	7.5	27.1	4.9	0.5
2016	8.2	27.9	6.0	1.0
2017	8.9	28.4	7.0	1.5

2018	9.6	29.5	8.0	2.0
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Source: Annals of disability statistics 2015-2020 collected from the website of the Korea Disabled People's Development Institute <https://www.koddi.or.kr/data/research01.jsp>

Note: The proportion of recipients is calculated as the number of recipients divided by total number of the population with that disability grade. The percentage here is downward biased because the correct denominator should be the eligible population with the disability grade, i.e., those aged 6 to 64 in that disability grade category. However, we could not separate those in that age bracket from the whole population.

Data

We used the 2011, 2014, and 2017 National Survey of Disabled Persons data⁴ for the analyses. It is a cross-sectional survey conducted every three years and available for download from the Health and Welfare Data Portal (Korea Institute for Health and Social Affairs, n.d.). Disability-related variables, such as registered disability status, disability level, disability type, length of disability, daily life assistance, employment, life satisfaction, welfare services, economic conditions, housing, and education, were collected in the survey. For the analysis of the PAS expansion policy effects, we restricted our sample to individuals aged 6-64, i.e., the eligible population. Therefore, close to 50% of the observations were dropped, and our sample size shrunk from 19,368 to 10,364. We also discarded data for individuals without an assigned grade (10,364 to 10,158), and those with missing household income data (10,158 to 10,151).

⁴ We did not add data from 2008 because the answer category changed from a 5-point scale (very good, good, moderate, bad, very bad) to a 4-point scale (very good, good, bad, very bad) from 2011.

Research Design

1) Measure

We measured unmet need for personal assistance using the three following questions in the Personal Assistance of Daily Lives section of the questionnaire⁵ and constructed an indicator variable:

Q1: “Do you need help in your daily life?”

- 1) I can do everything in my daily life by myself
- 2) Most of the things in my daily life I can do by myself
- 3) I need some help from others
- 4) I need help from others mostly
- 5) I need help from others almost always

Q2: “Do you have anyone that helps you with your daily life?”

- 1) Yes
- 2) No
- 3)

Q3: “How much help are you currently receiving?”

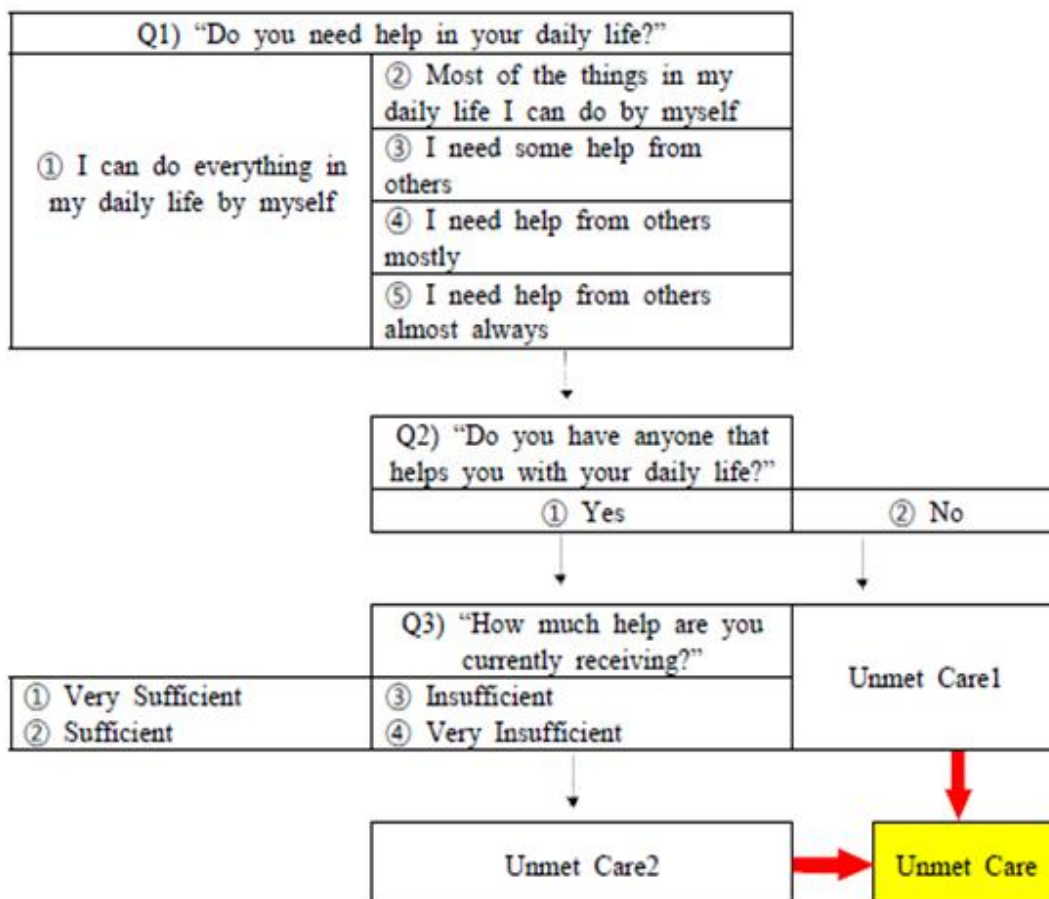
- 1) Very sufficient
- 2) Sufficient
- 3) Insufficient
- 4) Very insufficient

We considered respondents who picked option 1 in question 1 (Q1=1) as not needing personal assistance. We considered those who picked options 2, 3, 4, and 5 (Q1=2,3,4,5) as needing personal assistance. Of those who need personal assistance (Q1=2, 3, 4, 5), we considered those who answered that they have persons helping them with their daily lives but find the assistance

⁵ Following the existing literature, we have also used ADL and IADL as our dependent variables, which did not show much difference in results.

sufficient or very sufficient (Q3=1, 2) *not* to have an unmet need for personal assistance. Furthermore, we considered those who need personal assistance (Q1=2, 3, 4, 5) but answered that they do not have any helpers (Q2=2), and those who need personal assistance (Q1=2, 3, 4, 5), have someone that helps (Q2=1) but find the assistance insufficient or very insufficient (Q3=3, 4) to have an unmet need for personal assistance. Figure 1 is a depiction of the definitions:

[Figure 1] The Definition of Unmet Care



While previous literature has used ADLs and IADLs to measure the extent of unmet needs in personal assistance (Kennedy, 2001; Chen et al, 2018; Haas et al, 2015; Schure et al, 2015), our survey only asked whether a respondent needs any help with each of the ADL or IADL activities, with no further questions about whether the respondent receives any help with that activity or needs more help in that specific activity. Thus we can only use the general question of whether the respondent needs help in one's daily life as described above, receives any help, and whether the help received is enough. Since an individual's daily life consists of activities beyond the basic ADLs and IADLs, we believe perceived unmet needs, as subjective as they may be, can be a more comprehensive indicator. Nevertheless, we used other measures of unmet needs in the robustness check below:

The control variables include age, sex (female =1), marital status (married=1), education status (high school graduate or more =1), currently working (worked during the last week =1), income level (log of monthly average household income), home ownership (homeowner=1), household type (living alone =1), household size (number of family members including oneself), subjective health status (okay, good, very good =1), existence of any chronic condition that has been lasting for more than 3 months (CD=1 if chronic condition exists), Need for ADL assistance (there is need for ② partial support, ③substantial support, or ④ total support for at least one ADL question), Need for IADL assistance (there is need for ② partial support, ③substantial support, or ④ total support for at least one IADL), disability type (physical, mental, internal), disability grade (dummies for Grades 1-2 and Grade 3), duration of disability (subtract the disability occurrence year from current year), regional dummy, and year dummy.

2) Estimation Model

To estimate the effects of PAS expansions on the unmet need for personal assistance, we used a difference-in-differences specification. The treatment group for the 2011 expansion were those with Grade 1, Grade 2 for the 2013 expansion, and Grade 3 for the 2015 expansion. We grouped those with Grade 1 and Grade 2 into Grade 1_2 and denoted it as treatment group 1 (TREAT1), and denoted those with Grade 3 as TREAT2 because they are not separately identified due to the nature of the survey years. The national PAS was introduced in October 2011, targeting people living with Grade 1 disabilities, expanded to Grade 2 in January 2013, and Grade 3 in June 2015. The 2011 data was collected from May to August of 2011, so, it has information on individuals before the introduction of national PAS in October 2011. Unfortunately, since the next available data year, 2014, is after the expansion of PAS eligibility to Grade 2, we could not separately estimate the impact of the 2011 expansion and the 2013 change, given the 2011 and 2014 data. Therefore, we estimated the effects on unmet needs for personal assistance jointly for those living with Grades 1 and 2.

We used the following notations: TREAT1=1 if disability grade is 1 or 2, while TREAT1=0 if disability grade is 3, 4, 5, or 6; TREAT2=1 if disability grade is 3, while TREAT2=0 if disability grade is 1, 2, 4, 5, or 6; POST14=1 if year is 2014 or 2017, while POST14=0 if year is 2011; POST17=1 if year is 2017, while POST17=0 if year is 2011 or 2014. Region and Year are regional and year dummies, respectively.

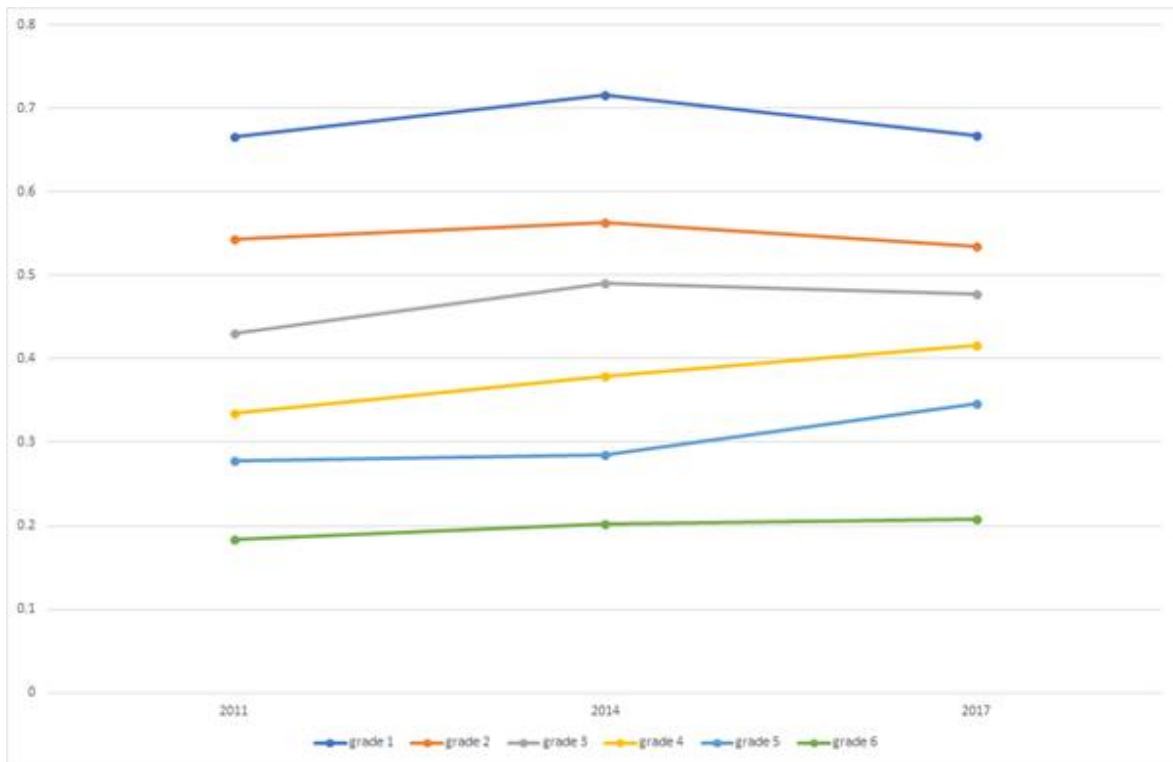
$$Y_j = \beta_0 + \beta_1 TREAT1_j + \beta_2 TREAT2_j + \beta_3 TREAT1_j \times POST14_t + \beta_4 TREAT2_j \times POST17_t + \beta X_j + Region + Year + Region \times Year + u_j$$

For the difference-in-differences estimations to work, two conditions would have to be met.

First, the treatment group - individuals with the disability grades subject to respective treatments - and the control group should have no other differences apart from access to PAS. Moreover, any differences in the changes in unmet needs for personal assistance between the groups would have to be attributable to the national PAS program only. There are similar programs by local municipalities that provide extra support for professional assistance. However, the purpose of these local personal assistance programs is to supplement the national PAS for individuals that are already eligible for the national program and need extra service hours (Kang and Kim 2013; Jeon and Cho 2018). One other program that could potentially affect an individual's unmet needs is subsidies for assistive devices. Before the enactment of the Assistive Devices Act in December 2015, there had been laws that allowed the central and local governments to support the supply, rent, and repair of assistive devices since 1981. In September 2012, under the Welfare of Disabled Persons Act and the Enforcement Rule of the National Health Insurance Act, the National Health Insurance Service began to provide insurance benefits for the purchase of assistive devices. We did not focus how these policies may have affected unmet care because access to assistive devices during the period of our sample remained stable: out of all those that need assistive devices, 37.4% (2011), 38.8% (2014), and 39.0% (2017) had received external support. Figure 2 shows the percentage of those who received external support among those who needed assistive devices by grade. There is not much difference across the three time periods for Grades 1, 2, and 3. We controlled for the remaining confounding effects with region dummies and interaction terms of region and year dummy.

[Figure 2] Percentage of those who received external support out of those that need assistive

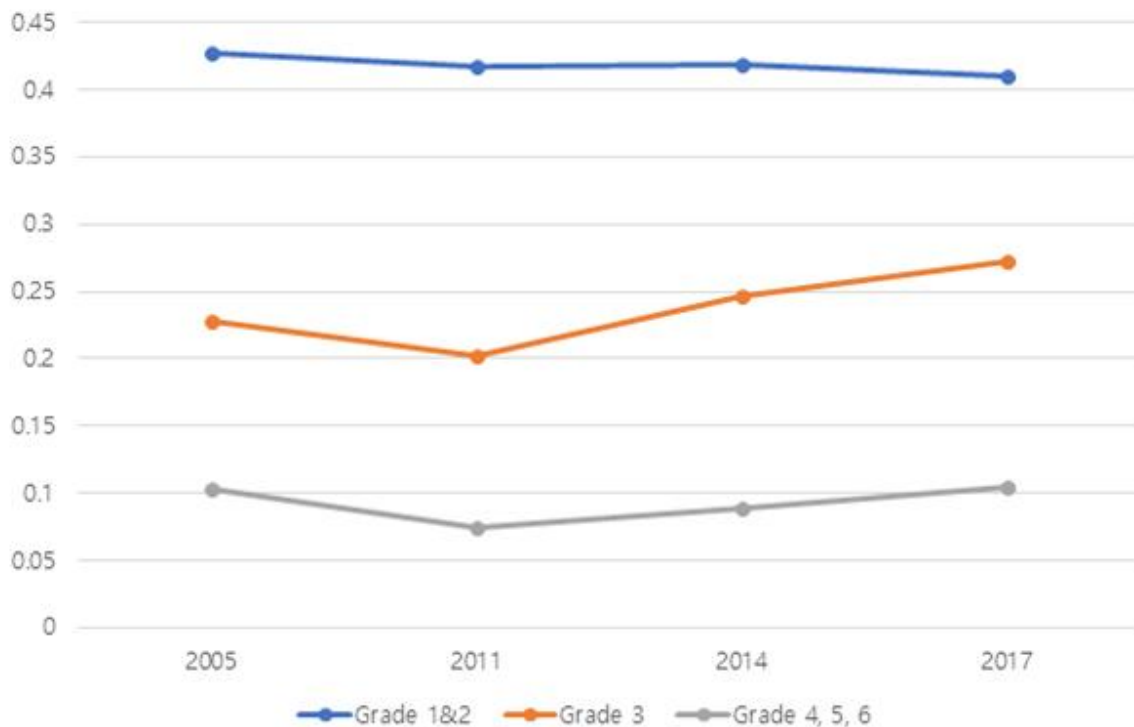
devices



Source: 2011, 2014, and 2017 National Survey of Disabled Persons.

To check for the parallel trends assumption, we plotted the proportion of individuals that answered that they had unmet needs for personal assistance in 2005, 2011, 2014, and 2017. There is 2008 data in which a 5-point Likert scale system was used rather than 4, so we discarded it for consistency and went further back to use 2005 data. Figure 3 shows that there is indeed a parallel trend between 2005 and 2011 (pre-treatment) of different grade groups in the share of those that claim at least some unmet need for personal assistance. We also observed that the change of the share from 2011 to 2014 is more or less identical for Grades 3, 4, 5, and 6.

[Figure 3] % of Having Unmet Care



Note: This graph shows the share of having unmet needs for personal assistance across disability grades (TREAT1 for Grades 1&2, TREAT2 for Grade 3, and control group for Grades 4-6) based on the National Survey of Disabled Persons. The 2008 survey was not used for the consistency of the definition of the variable as the year saw the use of a 5-point Likert scale, while the 2005, 2011, 2014, and 2017 surveys used 4-point Likert scales.

We also examined whether the PAS expansion impacted the treatment groups receiving less informal assistance from friends or family members. According to this survey, 80% of respondents answered that their main caregiver was their spouse, parent, or child. However, only 2.26% answered that their main caregiver is a professional personal assistant supported by the PAS. Given that the average amount of professional assistance is only 4 hours per day, it would be impossible for the main caregiver to change, even if one becomes a beneficiary of the PAS. Ideally, we wanted to know how long professional personal assistants provided care, but the

survey only asked for the identity of the main caregiver. Thus, as a proxy, we examined whether the treatment group was less likely to claim informal caregivers as their main caregivers in association with the PAS expansion.

We also tested whether the treatment group's assessment of government and societal support changed. We used the following questions in the survey and interpreted the answers (1)—very sufficient—and (2)—sufficient—as having experienced satisfactory governmental and societal support. We then coded it as 1 and interpreted (3)—insufficient—and (4)—not sufficient—as having experienced unsatisfactory government support and coded it as 0.

Q4: Chapter 11 Welfare Services 1-3

After you have registered yourself as disabled, how much support do you think you have received from the government as well as the society?

- 1) Very sufficient, 2) Sufficient, 3) Insufficient, 4) Not at all

Lastly, we checked whether the treatment group experienced an increase in family life satisfaction and overall life satisfaction. If informal care is replaced by formal care, we expect the relationship with the family to improve. With less unmet needs, we expected that overall life satisfaction would increase. We coded (1)—very satisfied—and (2)—satisfied—as 1, and the rest as 0 for both questions.

Q5: Chapter 9 Life satisfaction and experience of violence and discrimination

1-1) Are you satisfied with the relationship with your family?

- 1) Very satisfied, 2) satisfied, 3) unsatisfied, 4) very unsatisfied

1-9) Are you satisfied with your present life?

- 1) Very satisfied, 2) satisfied, 3) unsatisfied, 4) very unsatisfied

We also checked whether the treatment group went out more frequently than the control group due to greater access to professional assistance. Given that professional assistance has an explicit objective to assist mobility, we expected the treatment group to shop, take walks, visit the hospital, and go to work more than the control group. We coded freq_goout=1 if a respondent answers that (s)he went out more than once per week (Q6=1 or 2) and 0 otherwise.

Chapter 7 Social, cultural, and extracurricular activities

Q 6). How many times did you go out in the last one month?

- 1) almost every day
- 2) 1-3 times per week
- 3) 1-3 per month
- 4) Never went out

<Table 2> Summary Statistics (N=10,151)

Variables	Mean	S.D.	Max	Min
Unmet Needs (0, 1)	0.20	0.40	0	1
Sex (female=1)	0.36	0.48	0	1
Age	47.6	13.8	6	64
Marital status (Married=1)	0.55	0.50	0	1
Educational status (high school and above=1)	0.56	0.50	0	1
In employment (yes=1)	0.48	0.50	0	1

Monthly Income (10,000KRW)	258.7	245.6	0	9998
Household type (living alone=1)	0.13	0.34	0	1
ADL (need at least one of 12 ADLs=1)	0.25	0.43	0	1
IADL (need at least one of 8 ADLs=1)	0.41	0.49	0	1
Subjective health status (ok, good, very good=1)	0.56	0.50	0	1
Chronic disease of more than 3 months (CD=1)	0.63	0.48	0	1
Type of disability:			0	1
physical	0.76	0.43		
mental	0.18	0.38	0	1
internal organs	0.06	0.25	0	1
Disability duration (years)	9.23	6.41	0	29
Disability grade:			0	1
1	0.09	0.28		
2	0.16	0.37	0	1
3	0.20	0.40	0	1
4, 5, 6	0.55	0.50	0	1
Household size (persons)	2.94	1.30	1	10
Home ownership (owner=1)	0.59	0.49	0	1
Main caregiver: informal	0.31	0.46	0	1
Government/society support: sufficient/very sufficient	0.39	0.49	0	1

Satisfaction(family): good/very good	0.83	0.38	0	1
Satisfaction (overall life): good/very good	0.59	0.49	0	1

<Table 3> Summary Statistics (Unmet needs vs. No Unmet Needs)

	Unmet need of personal assistance		No Unmet need of personal assistance	
	(N=2,037)		(N=8,114)	
	Mean	S.D.	Mean	S.D.
Sex (female=1)	0.42	0.49	0.34	0.47
Age	44.6	16.2	48.3	13.0
Marital status (Married=1)	0.35	0.48	0.60	0.49
Educational status (high school and above=1)	0.49	0.50	0.58	0.49
In employment (yes=1)	0.23	0.42	0.54	0.50
Monthly Income (10,000KRW)	217.5	218.9	269.0	250.8
Household type (living alone=1)	0.18	0.38	0.12	0.32
ADL(need at least one of 12 ADLs=1)	0.63	0.48	0.15	0.36
IADL(need at least one of 8 ADLs=1)	0.90	0.30	0.28	0.45
Subjective health status (ok, good, very good=1)	0.43	0.49	0.60	0.49
Chronic disease of more than 3 months (CD=1)	0.68	0.47	0.62	0.49
Type of disability: physical	0.63	0.48	0.79	0.41

mental	0.32	0.47	0.14	0.35
internal organs	0.05	0.22	0.07	0.25
Disability duration (years)	9.19	7.08	9.24	6.23
Disability grade:				
1	0.23	0.42	0.05	0.22
2	0.28	0.45	0.13	0.34
3	0.24	0.43	0.19	0.39
4, 5, 6	0.24	0.43	0.63	0.48
Household size (persons)	2.86	1.36	2.96	1.29
Home ownership (owner=1)	0.52	0.50	0.61	0.49
Main caregiver: informal	0.58	0.49	0.24	0.43
Government/society support: sufficient/very sufficient	0.50	0.50	0.36	0.48
Satisfaction (family): good/very good	0.70	0.46	0.86	0.34
Satisfaction (overall life): good/very good	0.37	0.48	0.64	0.48

Results

1) Impact of PAS eligibility expansion on unmet needs for personal assistance

Table 4 shows the estimated differences between the treatment group and the control group after PAS eligibility expansions. Column 1 shows results with neither region nor year fixed effects, column 2 shows results with only year fixed effects, column 3 shows results including region fixed effects and year fixed effects, and column 4 shows results with region*year fixed effects, in

addition to year and region fixed effects. Column 3 shows a weak but significantly negative impact of 2011 and 2013 PAS expansions on grades 1 and 2 vis-a-vis grades 3, 4, 5, and 6 and a positive but nonsignificant impact of 2015 PAS expansion on grade 3 vis-a-vis grades 1, 2, 4, 5, and 6. The slight reduction in unmet care for Grades 1 and 2 associated with the 2011 and 2013 PAS policies shown in columns 1 to 3 seems to have been driven by the local PAS provision as we found no significant impact in column 4. After taking the additional support programs employed at the municipality level into account, we found that the 2011 and 2013 national PAS expansions did not have significantly affect the unmet needs for personal assistance.

<Table 4> Impact of PAS eligibility expansion on unmet needs for personal assistance

	(1)	(2)	(3)	(4)
post14	-0.008			
post14	(0.008)			
post17	-0.001			
post17	(0.009)			
dgrade1_2	0.075***	0.075***	0.073***	0.072***
dgrade1_2	(0.018)	(0.018)	(0.018)	(0.018)
dgrade3	0.006	0.006	0.007	0.007
dgrade3	(0.012)	(0.012)	(0.012)	(0.012)
post14×dgrade1_2	-0.037*	-0.037*	-0.034*	-0.032

post14×dgrade1_2	(0.020)	(0.020)	(0.020)	(0.020)
post17×dgrade3	0.008	0.008	0.007	0.006
post17×dgrade3	(0.020)	(0.020)	(0.020)	(0.020)
Observations	10,151	10,151	10,151	10,151
X's	YES	YES	YES	YES
Year FE	-	YES	YES	YES
Region FE	-	-	YES	YES
Year*Region FE	-	-	-	YES
Adj. R2	0.303	0.303	0.305	0.308
F test	154.66	154.66	91.31	53.26
Prob > F	0	0	0	0

1) *** p<0.01, ** p<0.05, * p<0.10

2) robust standard errors in parenthesis

3) We used a difference-in-differences (DID) model. The dependent variable is whether a respondent has unmet needs for personal assistance (1 if yes, 0 if no). Those who need some help in daily life but have no helper and those who need some help in daily life and do have a helper with insufficient or very insufficient amounts of help received are considered as having unmet care.

2) Impact of PAS eligibility expansion on the burden of care on family members

Why do we see no change in unmet care, even though millions of Korean Won were injected into the PAS system? We utilized survey questions on the identity of the main caretaker, perception of government support, and life satisfaction to explore possible reasons.

Table 5 shows whether the national PAS resulted in the disabled person's main caregiver

changing from family and friends to professionals (personal assistants employed through the PAS program, household service helpers, caregivers for the sick, and care workers for the elderly). We considered this as a proxy for whether more formal assistance was received due to the PAS expansions. We found evidence that the PAS expansions reduced informal care for the beneficiaries, more so for the 2015 expansion than the 2011 and 2013 policy changes. Given that the extent of unmet needs for personal assistance has not changed, we took it as evidence that some hours of informal care have been substituted with formal or professional care due to the PAS expansions.

<Table 5> Impact of PAS eligibility expansion on informal personal assistance

	(1)	(2)	(3)	(4)
post14	-0.006			
post14	(0.007)			
post17	0.01			
post17	(0.008)			
dgrade1_2	0.074***	0.074***	0.073***	0.074***
dgrade1_2	(0.016)	(0.016)	(0.016)	(0.016)
dgrade3	0.061***	0.061***	0.059***	0.057***
dgrade3	(0.011)	(0.011)	(0.011)	(0.011)
post14×dgrade1_2	-0.032*	-0.032*	-0.033**	-0.034**
post14×dgrade1_2	(0.017)	(0.017)	(0.017)	(0.017)
post17×dgrade3	-0.044**	-0.044**	-0.046***	-0.043**

post17×dgrade3	(0.017)	(0.017)	(0.017)	(0.017)
Observations	10,151	10,151	10,151	10,151
X's	YES	YES	YES	YES
Year FE	-	YES	YES	YES
Region FE	-	-	YES	YES
Year*Region FE	-	-	-	YES
Adj. R2	0.598	0.598	0.599	0.602
F test	779.29	779.29	460.24	275.26
Prob > F	0	0	0	0

1) *** p<0.01, ** p<0.05, * p<0.10

2) robust standard errors in parenthesis

3) We used a difference-in-differences (DID) model. The dependent variable is whether a respondent's main caregivers are family and friends, i.e., informal care (1 if yes, 0 if no).

4) Impact of PAS eligibility expansion on satisfaction in government support, family relations, and overall life

Table 6 shows whether the treatment groups' assessment of government and societal support has changed in association with the PAS expansions. We found that the 2011 and 2013 PAS expansions succeeded in increasing satisfaction in the support by government and society for eligible individuals, while the 2015 PAS expansion did not.

<Table 6> Impact of PAS eligibility expansion on satisfaction in government support

	(1)	(2)	(3)	(4)
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post14	-0.034***			
post14	(0.012)			
post17	-0.009			
post17	(0.012)			
dgrade1_2	0.251***	0.251***	0.249***	0.250***
dgrade1_2	(0.022)	(0.022)	(0.022)	(0.022)
dgrade3	0.145***	0.145***	0.143***	0.143***
dgrade3	(0.017)	(0.017)	(0.017)	(0.016)
post14×dgrade1_2	0.067***	0.067***	0.067***	0.066***
post14×dgrade1_2	(0.023)	(0.023)	(0.023)	(0.023)
post17×dgrade3	0.014	0.014	0.017	0.018
post17×dgrade3	(0.026)	(0.026)	(0.026)	(0.026)
Observations	10,151	10,151	10,151	10,151
X's	YES	YES	YES	YES
Year FE	-	YES	YES	YES
Region FE	-	-	YES	YES
Year*Region FE	-	-	-	YES
Adj. R2	0.124	0.124	0.127	0.133
F test	69.15	69.15	42.77	27.2
Prob > F	0	0	0	0

1) *** p<0.01, ** p<0.05, * p<0.10

2) robust standard errors in parenthesis

- 3) We use a difference-in-differences (DID) model. The dependent variable is whether a respondent is satisfied with government and societal support for the disabled (1 if yes, 0 if no).

Tables 7 shows whether the treatment groups experienced an increase in family life satisfaction and overall life satisfaction. We found that, in general, the PAS failed to improve family life and overall life satisfaction.

<Table 7> Impact of PAS expansions on satisfaction with family relations and overall life

	Satisfaction of family relations				Satisfaction of overall life			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
post14	-0.009				0.001			
post14	(0.009)				(0.012)			
post17	-0.013				0.018			
post17	(0.009)				(0.012)			
dgrade1_2	-0.016	-0.016	-0.016	-0.018	-0.044**	-0.044**	-0.042**	-0.039*
dgrade1_2	(0.017)	(0.017)	(0.017)	(0.017)	(0.021)	(0.021)	(0.021)	(0.021)
dgrade3	-0.012	-0.012	-0.012	-0.013	-0.02	-0.02	-0.02	-0.021
dgrade3	(0.012)	(0.012)	(0.012)	(0.012)	(0.016)	(0.016)	(0.016)	(0.016)
post14×dgrade1_2	0.016	0.016	0.014	0.016	0.018	0.018	0.014	0.012
post14×dgrade1_2	(0.019)	(0.019)	(0.019)	(0.019)	(0.022)	(0.022)	(0.022)	(0.022)
post17×dgrade3	0.015	0.015	0.015	0.014	0.002	0.002	0.002	0.002

post17×dgrade3	(0.020)	(0.020)	(0.020)	(0.020)	(0.024)	(0.024)	(0.024)	(0.024)
Observations	10,077	10,077	10,077	10,077	10,149	10,149	10,149	10,149
X's	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	-	YES	YES	YES	-	YES	YES	YES
Region FE	-	-	YES	YES	-	-	YES	YES
Year*Region FE	-	-	-	YES	-	-	-	YES
Adj. R2	0.13	0.13	0.13	0.131	0.2	0.2	0.204	0.205
F test	54.56	54.56	32.66	19.51	146	146	89.42	53.02
Prob > F	0	0	0	0	0	0	0	0

1) *** p<0.01, ** p<0.05, * p<0.10

2) robust standard errors in parenthesis

3) We used a difference-in-differences (DID) model. The dependent variable is whether a respondent is satisfied with family relations (1 if yes, 0 if no), and whether a respondent is satisfied with overall life.

Table 8 shows whether PAS eligibility changes have increased the frequency of going out for the treatment group. We found that for Grades 1 and 2, the 2011 and 2013 policies significantly improved beneficiaries going out frequency more than those not eligible for PAS. The 2015 expansion, however, played no role in increasing the frequency of going out. While the substitution to formal care for Grades 1 and 2 may have increased outdoor activities, for Grade 3, it did not make any difference. Even when we repeated the analysis with finer categories of frequencies of going out—1 for never went out and 4 for almost every day—we obtained qualitatively the same results.

<Table 8> Impact of PAS eligibility expansion on the frequency of going-out

	(1)	(2)	(3)	(4)
post14	-0.001			
post14	(0.006)			
post17	0.006			
post17	(0.007)			
dgrade1_2	-0.100***	-0.100***	-0.099***	-0.098***
dgrade1_2	(0.015)	(0.015)	(0.015)	(0.015)
dgrade3	-0.029***	-0.029***	-0.028***	-0.027***
dgrade3	(0.009)	(0.009)	(0.009)	(0.009)
post14×dgrade1_2	0.041**	0.041**	0.041**	0.039**
post14×dgrade1_2	(0.017)	(0.017)	(0.017)	(0.017)
post17×dgrade3	0.016	0.016	0.015	0.014
post17×dgrade3	(0.015)	(0.015)	(0.015)	(0.015)
Observations	10,151	10,151	10,151	10,151
X's	YES	YES	YES	YES
Year FE	-	YES	YES	YES
Region FE	-	-	YES	YES
Year*Region FE	-	-	-	YES
Adj. R2	0.16	0.16	0.163	0.163
F test	49.75	49.75	29.21	16.74

Prob > F	0	0	0	0
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1) *** p<0.01, ** p<0.05, * p<0.10

2) robust standard errors in parenthesis

3) We used a difference-in-differences (DID) model. The dependent variable is whether a respondent goes out frequently (1 if one goes out at least once a week, 0 if not).

Robustness check

First of all, we tried different measures of unmet needs for personal assistance as our dependent variable. We considered the respondents with at least one ADL or IADL with a demand for personal assistance and then went through Q1 to Q3 as above. The results are shown in Appendix Table 1. We still got qualitatively similar results.

To better understand who were more keenly affected by PAS, we looked at those with severe unmet needs, i.e., those with no caretaker, or those who have a caretaker but receive “very insufficient” amounts of care. That means we dropped those who have a caretaker, but the assistance is “insufficient” from the treatment group. The results are shown in Appendix Table 1. We found that the expansion of PAS in 2011 and 2013 significantly reduced severe unmet needs for Grades 1 and 2. PAS benefits fell mainly to those with the least assistance and the program could provide more care for them. On the other hand, the 2015 expansion, which included persons living with Grade 3 disabilities in the PAS program, resulted in an increase in the number of individuals that claimed they experienced severe unmet needs compared to the control group (Grades 1, 2, 4, 5, and 6). We interpreted this as Grade 3 individuals becoming more frustrated with the limited access to PAS after the expansion of PAS in 2015.

Second, given that there is no comprehensive data on local government subsidies, we repeated the analysis without the residents of Seoul (approximately 14% of the total sample). Seoul consistently ranks higher than other municipalities for budgets for health and independent living support and social services (KODAF 2015). Appendix Table 2 shows that the results excluding Seoul are more or less the same with those including Seoul. However, we did not find main caretaker switched from informal to formal for residents outside Seoul for the 2011 and 2013 expansions. This is probably because, unlike other regions, Seoul provides enough subsidies for formal care that some of the families can afford to shift the main care-taking burden to professionals.

Third, we repeated the analysis for those with physical disabilities only because they would be the ones that would most acutely need help for mobility. Appendix Table 3 shows the results. We found that the results demonstrated no difference from the main analysis, probably because they make up 76% of our sample.

Discussion

One concern in utilizing the difference-in-differences method is that other concurrent policy changes targeting the respective disability grades with the PAS changes could affect individuals' unmet needs for personal assistance. The two programs of concern are the local government support for additional PAS and subsidies for assistive devices. Note, however, that the local government provided additional support only to those eligible for the national PAS and the subsidies for assistive devices are granted based on the severity of one's disability. Therefore, if there is any bias due to other policy changes, it would be an upward bias. Since we did not find

any statistically significant differences in the changes of unmet needs across individuals with the gradual expansion of PAS eligibility status—a joint result of the National PAS, local government PAS, and subsidies for assistive devices—we can conclude that the impact of the National PAS eligibility changes would have been at most insignificant in reducing the unmet needs for personal assistance.

In summary, we found evidence that the introduction and expansion of the national PAS reduced the burden of care on the family, but there is no evidence of greater independence of the disabled based on the unmet needs for personal assistance and overall life satisfaction. Moreover, the reduction in the family's burden of care seems to have been mostly pronounced in Seoul. We think that there is a close-to-perfect substitution of informal care with the professional one that the national PAS did not have a meaningful impact on reducing the extent of unmet need for personal assistance. There is a possibility that, with PAS, the total needs for personal assistance increases with a greater set of activities a respondent can engage in. Still, given that the overall life satisfaction has not changed, we find it not so likely.

In this study, we examined the impacts of early expansions of the PAS program, targeting relatively severely disabled persons (Grade 1, 2, and 3). There have been more expansions for the PAS eligibility: the abolishment of the grading system in 2019 is the most recent expansion that makes all the disabled aged between 6 and 64 eligible for PAS, although this expansion does not necessarily lead to increases in the number of recipients. The age limitation still remains, however, because those who become 65 years old are forced to take up the Elderly Long-term Care Insurance (LTC) instead. The LTC provides less amount of care (4 hours a day at

maximum) compared to PAS (maximum 16-24 hours a day depending on the region⁶), focusing more on providing help with the ADLs and the IADLs rather than supporting activities and physical mobility. Therefore, the elderly disabled are exposed to the risk of receiving insufficient care due to the status change when they become 65. To deal with this abrupt reduction in care for the disabled at the age of 65, the Korean government started allowing dual eligibility for PAS and LTC from 2021, but only for those who experience significant reductions in hours of care (60 hours or more per month). This class of people makes up only 4.4% of the disabled aged 65 (Kim 2021). Since the elderly population among the disabled is nearly 50%, further eligibility expansions for the elderly would be necessary to provide social protection and ensure human rights for the disabled. In addition to these expansions for eligibility, quality improvement in the service is also required. One of the reasons why the Korean National PAS has failed to result in a statistically significant reduction in unmet needs for personal assistance may be its employment of an agency-directed model over a consumer-directed model. Shortage of personal assistants (due to long work hours and low wages)⁷ and limited options for the severely disabled⁸ have led to the passive matching system. Redesigning of the PAS system towards more autonomy of the users as well as providing better working conditions for the personal assistants remain as future policy work.

6 Kyunghyang Shinmun (2020)

7 As of 2018, the number of PAS recipients is 78,202, but the number of personal assistants is 68,673 (2020 Yearly Statistics for the Disabled 2020).

8 Due to higher demand and lower supply of personal assistants, less severely disabled are preferred and matched easily (Choi and Kim, 2019)

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Appendix

<Appendix: Table 1> Impact of PAS eligibility expansion with different definition of unmet needs for personal assistance

	Severe unmet needs				ADL/IADL unmet needs			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
post14×dgrade1_2	-0.037** (0.015)	-0.037** (0.015)	-0.033** (0.015)	-0.031** (0.015)	-0.036* (0.020)	-0.036* (0.020)	-0.033* (0.020)	-0.032 (0.020)
post17×dgrade3	0.031** (0.016)	0.031** (0.016)	0.031** (0.015)	0.031** (0.015)	0.008 (0.019)	0.008 (0.019)	0.008 (0.019)	0.007 (0.019)
Observations	10,151	10,151	10,151	10,151	10,151	10,151	10,151	10,151
X's	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	-	YES	YES	YES	-	YES	YES	YES
Region FE	-	-	YES	YES	-	-	YES	YES
Year*Region FE	-	-	-	YES	-	-	-	YES
Adj. R2	0.102	0.102	0.106	0.109	0.337	0.337	0.339	0.341
F test	31.84	31.84	19.45	12.02	168.45	168.45	98.91	57.15
Prob > F	0	0	0	0	0	0	0	0

1. *** p<0.01, ** p<0.05, * p<0.10

2. () robust standard errors

3. We use a difference-in-differences (DID) model where the dependent variable for unmet care is defined as follows: in column (1)-(4), those who need some help in daily life but have no helper, as well as those who need some help in daily life and do have a helper with very insufficient amounts of help received are considered as having unmet care; in column (5)-(8), among those who have a deficit of care for any of ADL or IADL activities and need some help in daily life, those without a helper and those with insufficient or very insufficient amounts of help received are considered as having unmet care.

<Appendix: Table 2> Impact of PAS eligibility expansion on residents except for Seoul

	Unmet needs for personal assistance				Informal care			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
post14×dgrade1_2	-0.031	-0.031	-0.026	-0.025	-0.026	-0.026	-0.028	-0.029
	(0.022)	(0.022)	(0.022)	(0.022)	(0.019)	(0.019)	(0.018)	(0.018)
post17×dgrade3	0.031	0.031	0.031	0.029	-0.041**	-0.041**	-0.043**	-0.039**
	(0.021)	(0.021)	(0.021)	(0.021)	(0.018)	(0.018)	(0.018)	(0.018)
Observations	8,772	8,772	8,772	8,772	8,772	8,772	8,772	8,772
X's	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	-	YES	YES	YES	-	YES	YES	YES
Region FE	-	-	YES	YES	-	-	YES	YES
Year*Region FE	-	-	-	YES	-	-	-	YES
Adj. R2	0.297	0.297	0.3	0.303	0.603	0.603	0.604	0.607
F test	130.25	130.25	79.23	47.17	696.31	696.31	423.53	260.76
Prob > F	0	0	0	0	0	0	0	0

1. *** p<0.01, ** p<0.05, * p<0.10

2. () robust standard errors

3. We use a difference-in-differences (DID) model where the dependent variables for unmet care and informal care burden are the same as in the main analysis. However, we restrict our sample to non-Seoul residents.

<Appendix: Table 3> Impact of PAS eligibility expansion on those with physical disability

	Unmet needs for personal assistance				Informal care			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
post14×dgrade1_2	-0.019	-0.019	-0.015	-0.011	-0.056**	-0.056**	-0.057**	-0.060**
	(0.027)	(0.027)	(0.028)	(0.028)	(0.026)	(0.026)	(0.026)	(0.026)
post17×dgrade3	0.027	0.027	0.026	0.024	-0.060**	-0.060**	-0.062**	-0.059**
	(0.026)	(0.026)	(0.026)	(0.026)	(0.025)	(0.025)	(0.025)	(0.025)
Observations	7,674	7,674	7,674	7,674	7,674	7,674	7,674	7,674
X's	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	-	YES	YES	YES	-	YES	YES	YES
Region FE	-	-	YES	YES	-	-	YES	YES

Year*Region FE	-	-	-	YES	-	-	-	YES
Adj. R2	0.351	0.351	0.353	0.355	0.519	0.519	0.52	0.523
F test	120.9	120.9	68.86	39.61	274.09	274.09	154.33	91.1
Prob > F	0	0	0	0	0	0	0	0

1. *** p<0.01, ** p<0.05, * p<0.10

2. () robust standard errors

3. We use a difference-in-differences (DID) model where the dependent variables for unmet care and informal care burden are the same as in the main analysis. However, we restrict our sample to those with physical disability.