Patterns of Health Behaviors and Trajectories of Stress among People with Disabilities in Korea

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Abstract

Background: As a health vulnerable group, people with disabilities require more health-promoting behavior than non-disabled people. We aimed to identify the types of health behavior of disabled people and to track the trajectories of stress by the type of health behaviors.

Methods: Data came from the Panel Survey of Employment for the Disabled Second Wave by the Employment Development Institute (EDI) in Korea. We used dataset from the first 6 years of the 2nd wave of PSEDSW (2016-2021). The current study analyzed 3,991 subjects. The types of health behavior were identified through latent class analysis (LCA) and the trajectories of stress were estimated through multi-group latent growth modeling using Mplus 8.0.

Results: Two types of groups in health behaviors, smoking-drinking group (SD), nonsmoking-less drinking group (NLSD) were derived. Depending on the types of health behavior, the trajectories of stress appeared significantly different: the NLSD had significantly lower stress than the SD in the first year, and this low-level stress trajectory was maintained continuously for 6 years.

Conclusion: Health behaviors could be suitable as a stress coping method for people with disabilities. This study suggests that it is necessary to make efforts to create an environment that supports people with disabilities to learn healthier ways to cope with stress.

Keywords: Disability; Health behaviors; Stress; Latent class analysis (LCA)

Introduction

Health behaviors are a crucial contributor to health and wellbeing (1). Disabled people, as a health vulnerable group, require more health-promoting behaviors because they suffer from overweight and obesity due to limitations in physical activity (2,3), and are less healthy than non-disabled people. In particular, people with disabilities had higher smoking and drinking rates than people without disabilities (4-6). Moreover, the disabled people experience various chronic diseases at an earlier age than non-disabled people due to lower physical activity and higher smoking rates (7). People with disabilities may experience higher psychological difficulties due to limitations in daily life

or social discrimination (8,9). In a study comparing the stress of disabled and non-disabled people, the mental distress of the disabled was 4.6 times higher than that of the non-disabled (10). Stress can lead to mental health problems such as depression and suicidal ideation (8) and contributes to an increase in mortality (11). Therefore, efforts to alleviate the stress experienced by people with disabilities are more important than ever these days.

It is necessary to pay attention to health behavior as a major factor related to the stress of people with disabilities. Some studies reveal the relationship between health behaviors and stress (1). People could adopt healthy behaviors to cope with or manage the pain caused by stress. Poorer health behaviors could result in higher stress and negative mental health outcomes, it is necessary to implement studies of the health behavior of the disabled as coping methods. Nevertheless, people with disabilities have been often overlooked in research and intervention programs in the health promotion area (12). Only a few studies have been conducted on the health behaviors of people with disabilities. In addition, though health behaviors such as smoking, drinking, exercise, and nutrition intake are associated with other health behaviors and can appear together, several studies on the health behaviors of people with disabilities have examined health behaviors separately (13). Clustering of these health behaviors occurs in various population groups (14-16). However, the research about clustering multiple health behaviors of disabled people was extremely limited. Further, there were limited studies on how stress is actually managed through health behaviors (1), although the concept of health behavior as a coping method for stress has been widely accepted. In addition, the association between health behavior and stress is difficult to conclude in the causal direction.

Therefore, this study attempted to identify the patterns of health behaviors of the disabled by considering complex health behaviors through latent class analysis (LCA). LCA is a sort of structural equation modeling to derive the subtypes of cases in multivariate categorical data (17). In addition, this study explored the relationship between health behavior and stress longitudinally.

A longitudinal approach may deepen our understanding of the dynamic nature of stress and the relationship between the two. Thus, we aimed to identify the patterns of health behaviors of people with disabilities and then go on to track the stress trajectories.

Materials and Methods

Data and Sample

The original data for this study was based on the Panel Survey of Employment for the Disabled Second Wave (PSEDSW) by Employment Development Institute (EDI) in Korea. EDI was founded as a research institute to revitalize R&D activities, address new challenges, and develop new vocational rehabilitation projects by the Korea Employment Promotion Agency for the Disabled. The PSEDSW is a nationally representative, multi-wave, and longitudinal study that focuses on the economic activities and employment characteristics of people with disabilities (18). Data was collected by asking questions over an annual period to a sample of people with disabilities from the ages of 15 to 64. Participants were selected randomly by a multistage, stratified probability sampling according to geographical area, types of disability, degree of disability, and age (19). The final survey sample included 4,577 persons.

The informed consent was obtained before implementation of the survey (19). The survey was conducted by skilled interviewers using a Tablet PC-Assisted Personal Interviewing to collect accurate information. This study used dataset from the first 6 years of the 2nd wave of PSEDSW (2016-2021) and analyzed 3,991 subjects, excluding 377 people who participated in less than 3 surveys, 194 who did not respond to any of the four health behavior items, and 15 who did not respond to questions of stress in less than 3 of the 6 surveys.

Measures

Health behaviors included exercise, regular meals, smoking, and drinking based on the previous research (20). Responses to the items about health behaviors were used to classify the participants

into 2 groups (met the definition or not) for the following 4 behaviors. First, exercise referred to self-reported data responding to the question "How many days a week do you exercise?". Response of ≥ 1 day were considered as doing exercise. Second, regular meals were measured by responding to the question "Do you tend to eat meals at regular times?". The responses were assigned to one of 3 subcategories: regular, sometimes regular, irregular. Only the response "regular" was classified as taking regular meals. Finally, smoking and drinking were extracted from responses to the question respectively: "Do you usually smoke?", "do you usually drink alcohol?". The response "never", and "former but not current" indicated non-smoking and non-drinking, and the response "do currently" indicated smoking and drinking respectively.

Stress was measured by a question about how much stress they feel in their daily life using a five-point scale (from 'not feel any stress=1' to 'feel very stressed=5') (21,22).

This study also used sociodemographic variables such as gender, age, education level, economic activity, marital status, type of disability, and degree of disability. Gender was divided into male (=1) and female (=0). Age groups were divided into three categories: 15–29, 30–39, 40–49, 50–59 and ≥60 yr. Education level was categorized into three groups: middle school or lower, high school, and college or higher. Economic activity was classified into employed (=1) and unemployed (=0). Marital status was divided into three groups: Single, married/living together, and divorce/bereavement/separation. Type of disability was divided into four groups: physical disability, sensory disability, internal-organ disability, and mental disability. Degree of disability was classified two groups: severe (level 1 to level 3) and mild (level 4 to level 6).

Statistical Analyses

The main analyses consisted of two stages: one was to identify heterogeneous patterns of health behaviors among people with disability; the other was to explore whether trajectories of stress are different according to types of health behavior.

First, to identify latent classes that show different patterns of health behaviors among disabled persons, latent class analysis (LCA) was utilized using Mplus 8.0. A step-wise approach was performed to determine the appropriate model, increasing the number of latent classes until no improvement was observed. Combinations of model fit indexes, such as Bayesian information criteria (BIC) for information criteria, the Lo-Mendell Rubin likelihood ratio test (LMR-LRT), and entropy, were compared. For BIC, smaller values indicate better model fitness, while changes between the models with k and k-1 classes higher than 0.05 means no significant improvement in LMR-LRT (23). For entropy, measured with a range of 0 to 1, higher values are preferred (24). This study also examined the characteristics of the groups of health behavior among people with disability using cross tabulation analysis using spss 27.0 Finally, this study tracked the trajectories of stress experienced by the groups through the multi-group growth modeling, using BCH approach with an arbitrary secondary model by Bakk and Vermunt (25). The model was appropriate for multi-group analysis and went through 2 steps: first was to estimate a latent class model and saved the BCH weights (i.e. ω_{ij}), which means that the i-th observation in class is assigned a weight of ω_{ij}; second was to identify the outcome variable, trajectories of stresses in this study, using these weights.

Results

General health behaviors of persons with disabilities are presented in Table 1. Those who exercised more than one day per week (45.9%) and those who had regular meals (62.5%) were high. In addition, those who did not engage in health-risk behaviors such as drinking and smoking were, 78.4% and 58.9% respectively, which showed that more than half of the participants were actively practicing healthy behaviors.

As for the stress of the disabled, Table 2 shows that it has slightly decreased over the six years on average.

Table 1: General health behavior in the first year (2016) (N=3,991)

Variable		N	%
Exercise	Yes	1,833	45.9
	No	2,158	54.1
Regular meal	Yes	2,495	62.5
	No	1,496	37.5
Smoking currently	Yes	862	21.6
	No	3,129	78.4
Drinking currently	Yes	1,641	41.1
	No	2,350	58.9

Table 2: Stress for 6 years (N=3,991)

Stress	Year	N	Mean (range 1-5)	S.d.
Stress	1th	3,961	3.55	.866
	2nd	3,843	3.54	.823
	3th	3,853	3.52	.784
	4th	3,787	3.54	.770
	5th	3,692	3.49	.770
	6th	3,620	3.51	.773

Using the LCA approach, the research questions in the first stage were explored. To identify the number of latent classes, a series of models were fitted first. Table 3 shows the values of model fit between 1 and 4-class model. To determine optimal number of classes, this study reviewed the various fit indices including BIC, aLMR, entropy. A low BIC value indicates a good model with a large log-likelihood value (26). BIC value refers to a sharp drop between 1- and 2-class model and increases in 4-class model. Although the 3-class model shows goodness of fit through the Lo-Mendell-Rubin (LMR) likelihood ratio test, entropy in this model was apparently lower than 2-class model, indicating a level below the medium (27).

Table 3: Relative fit indices for different latent class models

No. of classes	LL	BIC	aLMR	Entropy
1	-10178.546	20390.259	N/A	N/A
2	-9868.440	19811.505	605.605***	.720
3	-9846.999	19180.082	41.872***	.555
4	-9846.325	19850.194	1.316ns	.567

***$P<.001$, ns $P \geq .05$

Given these indices, 2-class model was considered most appropriate among all the models we tested.

The estimated class percentage was 21.6%(n=862) of class 1 and 78.4%(n=3,129) of class 2. Both

classes showed similar levels at exercise and regular meals, while there were salient differences between smoking and drinking (Fig. 1). According to characteristics of patterns of health behavior, class 1 was named smoking-drinking group (SD) and class 2 was called the nonsmoking-less drinking (NSLD).

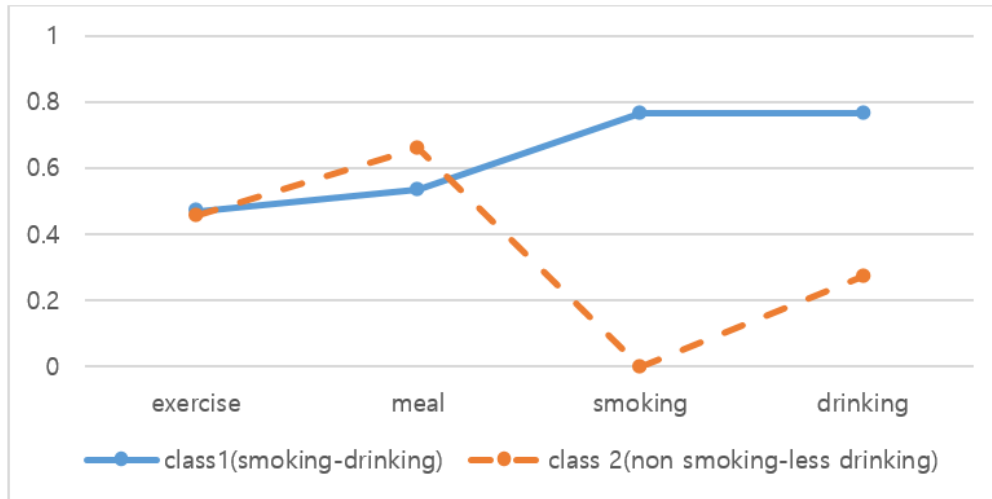The sociodemographic and disability related characteristics of each group are presented in Table 4.

Fig. 1: Unconditional LCA conditional response probabilities

Table 4: The sociodemographic and disability related characteristics by the groups

Variable		SD	NSLD	χ^2	df
Gender	Male	819(31.5)	1,778(68.5)	433.632***	1
	Female	43(3.1)	1,351(96.9)		
Age	15~29yr	47(6.8)	642(93.2)	130.887***	4
	30~39yr	237(24.4)	736(75.6)		
	40~49yr	321(28.6)	801(71.4)		
	50~59yr	181(23.3)	597(76.7)		
	60~64yr	76(17.7)	353(82.3)		
Marital Status	Single	272(16.9)	1,342(83.1)	36.240***	2
	Married/living together	441(24.6)	1,351(75.4)		
	Divorce/bereavement /separation	149(25.5)	436(74.5)		
Education	≤ middle school	214(18.9)	918(81.1)	6.886*	2
	High school	421(22.5)	1,452(77.5)		
	≥ college	227(23.0)	759(77.0)		
Employment	Unemployed	297(14.8)	1,715(85.2)	112.013***	1
	Employed	565(28.5)	1,414(71.5)		
Type of Disability	Physical	608(27.1)	1,638(72.9)	110.981***	3
	Sensory	167(18.9)	717(81.1)		
	Mental	57(10.7)	477(89.3)		
	Internal-organ	30(9.2)	297(90.8)		
Degree of Disability	Severe	163(12.6)	1,715(85.2)	298.431***	1
	Mild	699(25.9)	1,414(71.5)		

***$P<.001$, *$P<.05$

To be more specific, the following persons were more likely to belong to the SD: males, people between the ages of 30 and 59, married people-regardless of whether they are currently living with spouse or not, those with a high school education or higher, those employed, and people with physical disabilities or mild disabilities.

Next, this study performed a mixture multi-group growth modeling to examine the trajectories of stress experienced by the groups. The results of estimating the trajectories for each group by applying a linear model in relation to stress are shown in the Table 5. The estimated mean growth curves representing two different profiles. The stress of NSLD represents low stress in the first year and maintain it until the sixth year, while that of the SD shows higher level of stress at the beginning and apparently decreasing trajectory over time. The difference between the initial values and slopes of the two groups was statistically significant.

Table 5: Growth parameters estimates of stress

Variable	Intercept (S.E.)	Slope (S.E.)	$\chi^{2\,a}$	
			I.(df)	S.(df)
SD	3.688***(.024)	-.024***(.007)	43.122***(1)	6.410* (1)
NSLD	3.491*** (.014)	-.003(.004)		

a.The difference in values between the both groups was made through the wald-test
***$P<.001$, *$P<.05$

Discussion

This study aimed to identify the types of health behaviors of the disabled, to explore the sociodemographic characteristics of the groups, and to find out what the trajectory of stress was according to these types. For this purpose, this study analyzed the data of the 6 years (2016-2021) from PSEDSW.

This study identified that there were two types of groups in health behaviors, smoking-drinking group (SD) and nonsmoking-less drinking group (NSLD), through LCA. The two groups showed marked differences in smoking and drinking behaviors rather than exercise and regular eating. This is in line with the results of a study on Korean elderly people, which found that non-smoking and moderate drinking were more likely to occur at the same time (28). Smoking and drinking are positively correlated and appear together, so the two behaviors are accompanied and represent a clustering phenomenon.

There were significant differences between SD and NLSD in sociodemographic features including gender, age, education, employment, marital status, degree of disability, and type of disability.

Specifically, men, people between the ages of 30 and 59, people married, people with high school education or higher, and people employed were more likely to belong to the SD. Men belong to a group that engages in health risk behaviors compared with women was consistent with the results of a previous study which found that women were more likely to practice health promoting behaviors (20). As for economic activity, employment status was associated with health behavior. The unemployed were less likely to engage in ongoing smoking and problematic drinking (29). This is consistent with the results of previous studies which concluded that men are more likely to smoke or binge drink than women (5,30). Drinking, in particular, is considered an important coping method for strengthening sociality and interpersonal relationships for employed men in Korea (29). This means that we need to consider the cultural meaning of drinking behavior. As for age, there were some differences between the result of this study and that of a previous study. The older the age, the more health-promoting behaviors were practiced, seen as partially consistent with the results of this study (29). In addition, the higher the educational level was, the more one belongs to SD, is different

from the results of previous studies that found that adults practice health-promoting behaviors as their educational level increased (29). These differences suggest that increasing age and educational level may have different meanings for people with and without disabilities. Therefore, further study on this needs to be conducted.

Disability-related characteristics, including the type of disability and the degree of disability, varied for each type of health behavior. Those with physical disabilities were found to more likely belong to the SD. Smoking rates of people with disabilities vary differently depending on the types of disability. According to previous studies, the smoking rate of people with mental and physical disabilities was higher than that of people with other types of disabilities (38.1%, 26.3%) (4) and the prevalence of smoking ranged from 32.4% (self-care difficulty) to 43.8% (cognitive limitation) depending on the type of disability (31). As to drinking, people with physical or sensory disabilities drink more than other types of disabilities (16). Another longitudinal study showed that people with mental disorders and internal-organ disabilities are more likely to belong to the non-drinking group (32).

People with mild disabilities were more likely to belong to the SD. This result was consistent with those of previous studies showing that people with mild disabilities were more likely to smoke (33), and that people with severe mobility impairment had a lower consumption of alcohol (34). As for smoking of the disabled, there were mixed results. Smoking rates are high in the case of people with mild disabilities or no restriction in physical activity because purchasing cigarettes was relatively accessible (35). The risk of unhealthy behaviors such as smoking was likely to be higher for those with severe disability due to restriction of physical activities (36). Although it is difficult to draw consistent conclusions about smoking and drinking by the disability types and degree of disability, it is clear that disability related characteristics is associated with risky health behaviors. Thus, further study should be implemented to examine the relationships between the two.

The trajectories of stress by the types of health behavior presented significantly different results. First, NLSD had significantly lower stress than the smoking-drinking group in the first year, and this low-level stress trajectory was maintained continuously for 6 years. This result is consistent with a previous study suggesting that smoking and drinking were associated with stress (37). Smoking cessation and sobriety contribute to lowering stress. This fact was supported by previous research that showed smoking cessation decreased perceived stress levels (38). One thing to note was that the stress of the smoking-drinking group decreased significantly over time. According to a previous study, smoking and drinking can help alleviate psychological and physiological arousal/stimulation and temporarily regulate mood (39). However, as pointed out by Selva et al. (40), although smoking might relieve stress for a limited period of time, considering that it could lead to problematic smoking or drinking behavior in the future, it might not be the ultimate stress coping methods. For people with disabilities, smoking aggravates existing disabilities but also increases the risk for secondary disability.

In this study, the drinking rate was 41.9% which is similar to the rates of 26%~46% depending on the type of disability and 46.9% in overseas studies, respectively (2,5). This shows that drinking can reduce stress depending on specific situations or individual characteristics (41). During the COVID 19 pandemic, there was a significant increase in drinking in some people with disabilities, which suggests that drinking works as a coping mechanism for stress (42). However, drinking alcohol can deteriorate mental health lead to alcohol dependence if used repeatedly, so it cannot be an appropriate stress coping strategy in the long term. In short, smoking or drinking can be accessible stress coping methods, but since the behaviors that can worsen stress in the long run, it is necessary to find an alternative stress coping strategy for the disabled, and to prepare an environment that supports it.

The limitations of this study are as follows. First, this study analyzed 6 years of longitudinal data. However, more long-term studies are needed to

clearly understand the relationship between health behavior and stress. Second, although demographic characteristics related to health behavior were confirmed through the research results, predictive factors affecting health risk behavior were not investigated. A follow-up study on this is needed.

Conclusion

There were two groups in the health behavior patterns of people with disability through LCA, and the stress trajectory of each group was different. Health behavior functions as a way to cope with stress. Therefore, it is necessary to provide better ways to cope with stress by creating an environment for health promotion behaviors of the disabled. However, follow-up studies are needed to continuously confirm the relationship between the types of health behaviors and stress shown in this study.

Journalism Ethical considerations

Ethical issues (Including plagiarism, informed consent misconduct, data fabrication and/or falsification, double publication and/or submission redundancy, etc) have been completely observed by the authors.

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Conflict of interest

The authors declare that there is no conflict of interests.

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