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Motivational Interviewing and Physical Activity on Quality of Life of Type 2 DM Patients in Makassar City

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Abstract

Objectives: This study aimed to see the effect of a combination of motivational interviewing and physical activity programs on the quality of life of patients with type 2 diabetes mellitus (type 2 DM).

Methods: The design of this study was a quasi-experimental with a non-randomized control group pretest posttest design. The population was all patients with type 2 DM who were recorded in the medical records Public Health Centers. The sampling technique was exhaustive sampling with a sample size of 30 people in the intervention group and 30 people in the control group. Using bivariate data analysis, the two dependent mean difference test and two independent mean difference tests were used.

Results: Statistical analysis show that there are differences in the mean value of the four domains of quality of life in the intervention group before and after treatment (p = 0.0001 for each domain of Physical Health, Psychological Conditions, Social Relations, and Environmental Conditions); there is a difference in the quality of life of type 2 DM patients between the intervention group and the control group with the percentage of improving the quality of life in the good category in the intervention group after being given treatment by 66.7% (p= 0.0001).

Conclusion: Providing a combination of counseling programs with a motivational interviewing approach which is followed by gymnastics exercise is effective in improving the quality of life of type 2 DM patients.

Keywords: *Motivational interviewing, type 2 diabetes, quality of life, gymnastics*

Introduction

Diabetes Mellitus (DM) is a disease related to lifestyle such as diet and activity habits. This risk will increase in individuals with uncontrolled hypertension and lack of physical activity and individuals who are not obedient to diet and have unhealthy lifestyles [1]. DM has become the 6th largest cause of death in the world. International Diabetes Federation (IDF) data in 2017 shows an increase in the number of DM patients aged 20-79 years in the world every year, for example, in 2013 it reached 382 million people, then in 2015 it increased to 415 million people and in the latest data for 2017, it increased to 425 million.

The WHO estimates that globally, 422 million adults over 18 years old suffered from diabetes in 2014 with the highest prevalence in the East Mediterranean Region at 13.6% and Southeast Asia at 8.6%. The number of DM patients has increased over the last few decades due to population growth, an increase in the average age of the population, and an increase in the prevalence of DM

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at each age [2]. The results of the analysis of the World Economic Forum, in the 2012-2030 periods, Indonesia will be burdened by 2,800 trillion rupiah due to DM or twenty times the Indonesian health budget in 2012 as a whole [3].

Type 2 diabetes mellitus is a chronic disease that cannot be completely cured, causing its prevalence to increase every year [4]. On the study by Kaidaliri [5], it is found that DM patients generally have a poor quality of life compared to people without the disease; this is because DM can cause complications if proper DM treatment is not carried out. The goal of DM treatment is not to cure but to improve the functional status of the patient, minimize symptomatic complications, prolong life through secondary prevention, and improve quality of life [4].

The quality of human life according to WHO includes 4 main domains, namely domain 1 is physical health, domain 2 is psychological conditions, domain 3 is social relations, and domain 4 is environmental conditions. Knowing a person's quality of life can help health workers to determine a person's health condition so that it can be a direction or benchmark in determining which interventions should be given according to the patient's condition [6]. Studies that aims to assess quality of life have also been conducted in several other diseases, for example in the treatment of chronic myeloid leukemia [7].

PERKENI [8] states that the management of DM consists of four main pillars including education, nutritional therapy, physical activity, and pharmacological interventions. The level of public knowledge, which is still very minimal, especially in the prevention of DM through the application of a healthy lifestyle, can be intervened by providing educational programs. One of interventions that can be used to change patient behavior/habits by utilizing interpersonal relationships is the motivational interviewing approach. A study by Nugroho [9], shows that there is a difference between the group given motivational interviewing and the control group, where there is a significant difference with p <0.05 on the HbA1C size, thus the intervention can affect the quality of life of DM patients. A study by Miller, et al [10], on African American obese women with Type 2 diabetes shows results that medical nutrition intervention using a motivational interviewing approach is proven to improve respondents' glycemic control and self-confidence.

DM management through physical activity can be done through physical exercise. Regular physical exercise can lower blood sugar levels. Physical exercise in addition to maintaining fitness can also lose weight and improve insulin sensitivity, which will improve blood glucose control. The recommended physical exercises are in the form of aerobic physical exercises such as walking, cycling, jogging, swimming and gymnastics [11]. The results study by Lau and Atik [12], show that the factor of exercise habits is related to the quality of life of elderly people with type 2 diabetes. In addition, a cross sectional study by Halaweh et al [13], reveals that the scores in all Health Related Quality of Life (HRQoL) are significantly higher ($p < 0.05$) in the moderate and high physical activity groups when compared to the low physical activity groups and there is a significant correlation between the five HRQoL dimensions and physical activity levels ($p < 0.001$).

The large number of DM patients in the Pattingaloang Public Health Center (PHC) working area, the heavy burden caused by DM and its complications, how to assess the quality of life of DM patients, and the lack of studies that take the theme of intervention through counseling with a motivational interview approach combined with physical activity, are the reasons for studying the effect of Motivational Interviewing and gymnastics exercise on the quality of life of type 2 DM patients in the region.

Materials and Methods

This study was conducted at two PHC in Makassar City, namely in the Pattingaloang PHC and the Tabaringan PHC working area. The design of this study was a quasi-experimental design with a non-randomized control group pretest posttest design. The study population was all type 2 DM patients who live in the working area. Using the exhaustive sampling technique, the sample size obtained consisted of 30 respondents in the intervention and the control groups.

Secondary data collection was type 2 DM patient data recorded in the medical records in 2020. Then at the time of study, data were obtained through interviews with respondents which consisted of 2 stages,

namely the pretest and posttest stages using a General Characteristics questionnaire and a quality-of-life questionnaire WHOQoL-BREF in Indonesian which has been standardized by WHO. At the intervention stage, the intervention group participated in gymnastics exercise activities led by trained instructors from the PHC then continued with a motivational interviewing counseling session by counselors from trained PHC officers. In the control group, leaflets on guidelines for healthy living and disease management were distributed to DM patients.

Univariate analysis was used to see the description of the characteristics of the respondents presented in the frequency distribution tables and charts. Bivariate analysis was carried out to see the difference between the independent variable and the dependent variables using the T difference test with an alpha-α value of 5%. This study used a quasi-experimental with two types of parametric tests, namely looking at the mean comparison of two groups in pairs using the paired t test and looking at the difference in the mean between two groups of unpaired samples using the unpaired t-test.

Results

Characteristics

Table 1 shows that based on age group, in the intervention group the majority of respondents are in the age group 46 - 55 years and 56 - 65 years, namely 11 respondents (36.7%) respectively and in the control group as many as 10 respondents (33.3%) are in the same age group interval. The majority of respondents are female, in the intervention group there are 24 (80%) and in the control group there are 19 (63.3%) respondents who are women. The latest education of respondents in the intervention group is primary school with as many as 12 respondents (40%), while the latest education of majority of the control group is tertiary education with as many as 12 respondents (40%).

According to the use of diabetes drugs, the data obtained reveal that all respondents in the intervention group (100%) used drugs orally and in the control group, there is 1 respondent (3.3%) who do not use oral and insulin injections. Based on the job characteristics of the respondents, the intervention group is dominated by civil servants and farmers, each of which is 4 respondents (13.3), while in the control group is dominated by civil servants with as many as 10 respondents (33.3%). Based on exercise habits, respondents who never exercised in the intervention group are only 2 respondents (6.7%) while in the control group there are 10 respondents (33.3%).

Bivariate Analysis

Table 2 shows the difference in the mean pretest and posttest values in 4 domains of quality of life in the intervention group. The results of statistical analysis show that there is an increase in the mean value of all quality-of-life domains, namely for the domain of physical health, the difference between the pretest and posttest mean values is 5.76; in the domain of psychological conditions is 3.17; in the domain of social relations is 1.87; and in the domain of environmental conditions is 4.63. The four domains of quality of life have a value of p= 0.0001, which means that there is a mean difference in the four domains before and after the respondent was given intervention. The domain with the greatest increase in mean value is domain 1 (physical health).

Table 3 shows the results of the cross tabulation to see the differences in the quality of life between the two study groups. It appears that there is a very significant increase in the number of respondents with a good quality of life category in the intervention group, namely from 7 respondents (23.3%) at pretest increased to 27 respondents (90%) at posttest and a decrease in the number of respondents with a poor quality of life category, from 22 respondents (73.3%) at pretest to 3 respondents (10%) at posttest. In the control group, it can be seen that there is a significant decrease in the number of respondents with a good quality of life, namely from 19 respondents (63.3%) at pretest to 7 respondents (23.3%) at posttest. The statistical test results show the value of p= 0.0001, which means that there is a difference in the quality of life between the intervention group which was given treatments in form of a combination of motivational interviewing and gymnastics exercise programs and the control group.

Table 1. The Distribution of General Characteristics of Respondents

Characteristics of Respondents	Intervention Group		Control Group	
	n	%	n	%
Age group				
26 - 35	1	3.3	0	0
36 - 45	2	6.7	3	10
46 - 55	11	36.7	10	33.3
56 – 65	11	36.7	10	33.3
> 65	5	16.7	7	23.3
Total	30	100	30	100
Gender				
Men (Male)	6	20	11	6.7
Women (Female)	24	80	19	63.3
Total	30	100	30	100
Level of Education				
No education background	3	10	1	3.3
Elementary School	12	40	5	16.7
Junior High School	8	26.7	3	10
Senior High School	5	16.7	9	30
University (Tertiary Eductaion)	2	6.7	12	40
Total	30	100	30	100
Occupation				
Civil Servants	4	13.3	10	33.3
Private Employees	1	3.3	1	3.3
Entrepreneurs	3	10	5	16.7
Farmers/Fishermen	4	13.3	0	0
Housewives	18	60	14	46.7
Total	30	100	30	100
The use of drugs				
Oral	30	100	25	83.3
Insulin	0	0	4	13.3
Do not use any drugs	0	0	1	3.3
Total	30	100	30	100
Exercise Habits				
Yes	28	93.3	20	66.7
No	2	6.7	10	33.3
Total	30	100	30	100

Table 2. The Difference in Mean Values of Pretest and Posttest in the Four Domains of Quality of Life in the Intervention Group

Domains of Quality of Life	Intervention Group		
	Mean Pretest	Mean Posttest	p-value
Physical Health	20.97	26.73	0.0001
Psychological Condition	17.20	20.37	0.0001
Social Relationship	9.40	11.27	0.0001
Environmental Condition	26.60	31.23	0.0001

Table 3. Bivariate Analysis of the Difference between Quality of Life in Pretest and Posttest of the Intervention Group and the Control Group

Quality of life	Pretest				Posttest				p-value
	Intervention		Control		Intervention		Control		
	n	%	n	%	n	%	n	%	
Good/well	7	23.3	19	63.3	27	90	7	23.3	0.0001
Moderate	1	3.3	3	10	0	0	1	3.3	
Bad	22	73.3	8	26.7	3	10	22	73.3	
Total	30	100	30	100	30	100	30	100	

Discussion

21. Domain 1: Physical Health

The results show that there is an effect of a combination of motivational interviewing and gymnastics exercise programs on Domain 1 type 2 DM patients in the intervention group. The increase in the respondents' score in domain 1 that occurred after the provision of the intervention shows that the study objectives have been achieved because respondents could provide significant changes in aspects of their physical health. Aspects that are assessed or seen are related to the energy they have for activities and work, the pain and discomfort they feel, the physical ability to get along with other people, and sleep and rest patterns. Giving motivational interviews gives respondents a good opportunity to share their complaints with the counselors regarding their physical difficulties due to their illness.

In this process, the counselors provide feedback in the form of empathy with encouragement and understanding of how respondents understand the intricacies of the disease they are experiencing, directing them to be able to independently manage their disease so that in the end the respondent can accept their condition as DM patients. The counselors also provide guidance to respondents regarding lifestyle modifications, drug side effects, and how to regulate diet as well as how to do foot care in the right way.

Physical activity in the form of gymnastics exercise which is done regularly 3 times a week for a month provides enthusiasm and positive energy for respondents to look good and be more fit, and it has also been proven

to increase their vitality. Counseling and gymnastics exercise group become a social group with the same feelings and sufferings that encourage respondents to openly change their wrong mindset. In general, the respondents responded very well to the given gymnastics exercise activities, even during the field observations they came very early before the gymnastics exercise schedule was carried out. This shows that they are very happy and enjoy exercising, and of course this is a positive thing that can affect the quality of life of the respondents.

The results of this study are in line with the study by Buchair [4] in Makassar, which reveal that there is an effect of counseling with a home care approach on the domain of 1 respondents in the intervention group with a value of p = 0.002 (p> 0.05). Likewise with the study by Chlebowy, et al [14], which reveal that motivational interviewing significantly increase the chances of participants following the recommended levels of physical activity (p value = 0.018). A cohort study by Thiel [15] in Canada, also shows that there is a correlation between the high score of Health Related Quality of Life (HRQL) in type 2 DM patients with the patients' physical function; role physically; body aches; and vitality, with all statistical values of p = 0.001 (p <0.05) with routine physical activity recommended by the Canadian Diabetes Association (CDA). This study by Thiel [15] in Canada, also shows that there is a significant positive relationship between physical activity and the Health Related Quality of Life score on the dimensions of physical function, vitality, and general health of type 2 DM patients. The study by Halaweh, et al. [13], among elderly diabetic patients in Palestine reveals that the scores in all dimensions of Health Related Quality of Life (HRQoL) are significantly higher (p <0.05) in the moderate and high physical activity groups when compared to the low physical activity group, and there is also a significant correlation between the five dimensions in HRQoL and the level of physical activity (p <0.001).

b. Domain 2: Psychological Conditions

The results show that there is an effect a combination of motivational interviewing and gymnastics exercise programs on the psychological conditions of type 2 DM patients in the intervention group. The aspects assessed include appearance, negative feelings, positive feelings, self-concept, memory, and concentration. In the motivational interviewing process, respondents are directed by their counselors to understand every problem they face because of their illness and to be able to manage themselves wisely in dealing with the burden of the disease they are experiencing so that they are able to minimize the negative psychological effects that arise.

Feelings of anxiety, stress, and pressure due to bad self-concept slowly get a response and guidance from the counselors so that respondents can reduce the psychological effects instilled in them so far, for example excessive worry and body conditions that can become bad at any time. The value of togetherness in counseling and gymnastics exercise groups together with fellow DM patients creates a sense of kinship and sharing of experiences which can also increase self-confidence and the ability to accept their condition. So that it can minimize the emergence of a sense of discrimination and stigma in society, as mentioned in the results of an article that has been done in Korea [16].

Motivational interviewing makes respondents more open about their daily conditions, have the courage to share their feelings and thoughts and concerns so that they can be guided to develop positive things for themselves. When the researchers first collected pretest data through direct interviews, many respondents complained about their inability to accept health conditions and appearance, many of them also felt they could not enjoy life as well as before they were sick and often felt hopeless. However, during the last meeting in the posttest, in general, respondents rarely complained about this, this can be seen from their faces which can be seen directly, especially in the enthusiasm they show when doing gymnastics exercise.

The results of this study are in line with the study by Buchair [4], which reveal that there is an increase in the mean value of domain 2 in the intervention group after the respondents were given counseling with a value of p = 0.000, which indicates that there is a significant difference in the mean score of domain 2 between the intervention group and the control group. Furthermore, the results of the study by Tristiana [17], also reveal that the most effective method for improving self-management and glycemic control in type 2 DM patients is motivational interviewing training provided by nurses

focusing on behavior change because motivational interviewing is included in psychological interventions with the advantage of helping DM patients accept their disease, improving self-care, and reduce psychological distress.

Diabetes can lead to increased rates of depression, so in the future, depression must be recognized as a social problem thus patients must be equipped with systems that can actively prevent depression. [18]. The study by Thiel [15], also shows that the Canadian Diabetes Association recommendation in terms of moderate physical activity for type 2 DM patients is proven to be related to the emotional and mental health roles of type 2 DM patients with a value of p = 0.001 (p <0.05). The study by Syatriani et al. [19], in patients with type 2 diabetes who are also smokers and alcoholics, shows that the stress level has a significant correlation with health-related quality of life in type 2 DM patients.

c. Domain 3: Social Relations

The results of this study indicate that there is an effect of a combination of motivational interviewing and gymnastics exercise programs on the Social Relations of Type 2 DM patients in the intervention group. The aspects assessed include personal relationships, social support, and sexual activity. The increase in domain 3 scores show that there is a positive effect of giving a combination of motivational interviewing and gymnastics exercise programs to encourage respondents to live more productively, to be more open to sharing their life problems related to their illnesses, and to increase the willingness of social interaction, especially because of togetherness in the counseling and gymnastics exercise groups. During counseling, respondents are guided to understand the importance of socializing, establishing intense and harmonious communication with family members, spouses and neighbors. In a counseling and gymnastics exercise group, respondents can interact with fellow DM patients, share experiences in dealing with the burden of life due to their illness, and seem to have a new family with almost the same experiences and sufferings therefore these are some of the causes of increasing positive changes that occur in respondents.

This is in accordance with the study by Huang, et al [20], on type 2 DM patients in Taiwan, which reveal that the experimental group who was given motivational interviewing through motivation and cognitive enhancement therapy shows a significant improvement in terms of quality of life physically and mentally after being given the intervention compared to the control group which do not change at all throughout the study. Besides, a quasi-experimental study by Buchair [4], on type 2 diabetes mellitus patients in Makassar, also get the same result in which there is a significant difference in the mean score of domain 3 between the intervention group that was given counseling and the control group (18.10; p= 0.000). However, these results are not in line with research by Hayashino, Tsujii and Ishii [21] in Japan, which reveals that there is no significant increase in score in domain 3 Diabetes Therapy-Related Quality of Life (DTR-QOL) in DM patients with p = 0.507.

d. Domain 4: Environmental Conditions

The results prove that there is an effect of a combination of motivational interviewing and gymnastics exercise programs on the environmental conditions of type 2 DM patients in the intervention group. The aspects assessed include financial ability, freedom, availability of health and social services, home environment, physical environment, and transportation. The significance in domain 4 shows that the implementation of a combination of direct motivational interviewing and gymnastics exercise programs has led respondents to make decisions in their lives in maximizing their financial capabilities, trying their best for health and recovery, being moved to carry out routine health checks even though they have to sacrificing their time queuing at the PHC, and caring about the environment in which they live.

Study by Buchair [4] in Makassar reveals that counseling has a positive influence on domain 4 of the quality of life of type 2 DM patients where there is a significant difference in the mean score of domain 4 between the intervention group and the control group of 9.55 with p = 0.008 (p <0.05) . The results of Tristiana's study [17], also show that intervention through motivational interviewing is effective in improving self-management (including activity, diet, and medication areas) and glycemic control in patients with type 2 diabetes mellitus.

The results of this study indicate that there is an increase in the average score (mean) in each domain of

quality of life from pretest to posttest in the intervention group after being given a combination of motivational interviewing and gymnastics exercise programs with a significance value ($p<0.05$). The main result of this study is that the combination of motivational interviewing and gymnastics exercise programs is proven to have an effect on improving the quality of life of type 2 DM patients. The significance that occurs in each domain of quality of life becomes a measure of improving the quality of life of respondents and the success of the given program. The strength in counseling with the motivational interviewing approach is the empathy shown by the counselors, in this case, actively listening to patients without judging or blaming the behavior of DM patients in order to better understand their situation and perspective. As counselors understand that DM patients who are in the early stages of change may not be fully ready to let go of the initial behavior, so the main focus is on building relationships and supporting them in having the ability to change in various ways. The latest development of the motivational interviewing program has now used cellphones and digital platforms in their applications [22].

Physical activity carried out regularly and continuously in the form of gymnastics exercise has a positive impact. In theory, it is understood that gymnastics exercise can provide many benefits in the management of DM, namely controlling blood glucose levels, reducing the risk of complications, losing weight and maintaining it for a long time; psychological benefits because it can improve the level of physical fitness so that patients feel fit, anxiety against the disease is reduced, increased feeling of pleasure and self-confidence, and in the end will improve the quality of life of the patients and can reduce the level of use of oral drugs and insulin.

The combination of motivational interviewing and gymnastics exercise programs has an influence on improving the quality of life of type 2 DM patients, this is possible because of the high enthusiasm of respondents during the study to actively participate and play a role in the interventions given. It can be seen from their regular attendance according to the schedule, they are even enthusiastic about coming earlier [to the scheduled meetings]. At the counseling stage, they have a place to be open, to share their experiences and feelings freely, to feel they have a place to listen to all their complaints and to get guidance for healthier life behaviors which are not limited by the effects of their illness.

The implementation of gymnastics exercise is one of the driving factors for improving the quality of life of type 2 DM patients in this study, which indicates that there is a positive correlation between giving regular exercise to the quality of life of type 2 DM patients, whether it is regarding the patients' physical health, psychological conditions, social relationships, and environmental conditions. This is possible because gymnastics exercise is a form of physical activity that has many benefits for health; and through direct observation and interviews between the researchers and respondents in the field, it is clear how different changes have occurred to respondents from the start to the completion of the study. Respondents expressed a feeling of being fitter, healthier, and generally for those who have difficulty sleeping, can enjoy better quality sleep.

Several studies that support the results in this study are like the study conducted by Miller, et al [10], which reveals that Medical Nutrition Intervention through the Motivational Interviewing approach is shown to improve glycemic control and increase self-confidence related to self-confidence in African American women who are obese and suffer from type 2 diabetes mellitus. Besides, Huang et al [20], through his research in Taiwan also reveals that the experimental group shows a significant reduction in glycosylated hemoglobin, fasting glucose, and depressive symptoms, and a significant increase in physical quality and mental quality of life after being given intervention through motivational interviewing behavioral therapy, whereas patients in the control group with usual care show no change over the study time.

The study by Buchair [4], explains that the counseling services provided to DM patients have a positive impact such as making patients feel comfortable and happy to be visited by health workers who provide information to patients to better manage their disease and have caused them to feel supported so that they can accept their condition and be motivated to improve their quality of life which eventually will help them minimize complications. Counseling is effective as a therapy to improve quality of life, but the counselors play an important role as a person who provides solutions

that can help patients deal with the problems they are experiencing.

Health education or counseling that has been provided to diabetes patients by the PHC is basically good enough to convey messages and information that they need to know about diabetes, including things that must be done for self-care, but this is not enough to make patients make change movements for the improvement of their behavior. A study has shown that motivational interviewing has been proven to be effective in the effectiveness of children's health education [23].

Apart from the fact that respondents usually find it difficult to focus on listening, sometimes counseling is seen only as information that is heard for a moment and after they are home, they forget about it. Therefore, it is necessary to develop a more specific and individual educational program that focuses on the risk perception of each person [24]. Although, it is understood that it is indeed very difficult to build a health service infrastructure in a short time [25].

Counseling through the motivational interviewing approach is one method that can be used to be closer to patients, to rely on empathy to hear patients' complaints and experiences in their daily lives, and to slowly make them to better understand the life-changing principles they need to implement. Besides, the combination with regular gymnastics exercise makes patients be more excited and feel they have a social community which is beneficial for their vitality and fitness. So, it can be considered that to carry out a target group development program to improve daily functions and quality of life, it requires better attention from health professionals [26].

A significant decrease in the quality of life of control group respondents is possible because based on the analysis of general characteristics and health history of respondents, it is known that quite a lot of respondents in the control group are in the elderly group > 65 years. The existence of variations in treatment is an indication of different pathophysiological mechanisms for each individual who experiences type 2 diabetes. However, there are patients who claim not to take the drug. A study shows a significant relationship between age and poor glycemic control in type 2 DM patients so they experience secondary medical complications [27].

From the aspect of daily behavior, when compared to the intervention group, there are more patients in the control groups who still do not manage their diet well, do not exercise enough, and still like to consume sweet foods and drinks, and many of them do not control their blood sugar regularly. In fact, health behaviors such as mental health, eating habits, lifestyle, and physical activity have a significant relationship with health status [28].

The study of Amiruddin et al [29], on patients with gestational diabetes mellitus (DMG) in Makassar City, it is known that the risk of pre-diabetes and DMG increases with a history of less fiber consumption (OR = 2.355, 95% CI: 1.12-4.94) and less history of coffee consumption (OR = 2.406, 95% CI: 1.10-5.25) with a probability of 96%. A diet high in fiber can increase carbohydrate metabolism. It can help to control and prevent increases in blood sugar levels. These factors may be the cause of the decreasing quality of life of type 2 DM patients at posttest in the control group, especially because they do not receive any intervention other than giving healthy behavior leaflets which they do not necessarily read and apply in their daily life.

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