Association between dependency on community resources and social support among elderly people living in rural areas in China: a cross-sectional study

Ayizuhere Aierken, XiWen Ding, YiYang Pan, Yuan Chen and Ying Li*

Abstract

Background: The prevalence of dependency personality disorder (DPD) is high among elderly people living in rural areas. This study aims to explore the association between dependency on community resources and social support among elderly individuals living in rural areas.

Methods: A cross-sectional study was conducted in 26 locations in China. A total of 1160 participants aged ≥60 years were selected using a complex multistage sampling design. All data were obtained using questionnaires via face-to-face interviews. DPD was measured using the Minnesota Multiphasic Personality Inventory-II in the standardized Chinese version. Self-efficacy was assessed using the Chinese version of the General Self-Efficacy Scale. Social support was measured using the Chinese version of the questionnaires of the Older American Resources and Services scale. Community services and resources comprised 44 items. The association between DPD and levels of social support and self-efficacy was evaluated using a logistic regression model. The association between social support and self-efficacy was assessed using analysis of covariance.

Results: Univariate analysis results showed that elderly people living in rural areas had higher DPD scores and lower levels of self-efficacy compared with those living in urban areas (P<0.001). Logistic regression analysis showed that DPD was positively associated with the received frequencies of community health service, contracted family doctor services, and regular lectures on health knowledge among the elderly people with odd ratios of 1.58 (P<0.001), 2.03 (P=0.013), and 2.67 (P=0.005), respectively. Logistic regression analysis showed significant interaction between social support and self-efficacy effect on DPD was found in the additive model (P<0.001).

Conclusion: DPD was associated mainly with the community resources among elderly people living in rural areas. Social support and self-efficacy were commonly associated with DPD through a synergistic effect. These results suggest that DPD among elderly people may be reduced through effective social support to directly and indirectly promote the elderly's use of community resources and improve their self-efficacy.

Keywords: Dependency, Community resources, Rural areas, Social support, Elderly people, Self-efficacy
dependency personality disorder (DPD) increases with age, especially in the elderly people with lower social capital, it is rapidly becoming an urgent, enormous challenge for individuals and social service systems because it requires immediate solutions [1–3]. However, the association between DPD and health or provision-of-support services is complicated [4].

In case of dependency personality disorder, individuals become highly reliant on others to meet their emotional and physical needs, resulting in the gradual loss of autonomy [5]. An attachment to different dependency objects can lead to nursing dependency, substance dependency, or sleep dependency. Epidemiological studies have demonstrated that DPD can also increase the consequences of chronic diseases, and all-cause mortality [6, 7]. Moreover, DPD is associated with the overuse of healthcare resources, and can lead to premature functional dependency and disability [8].

The etiologic mechanism of DPD is still unclear, but the consequences of DPD and poor health are intimately associated with social environmental factors, especially in elderly people [9]. The prevalence of DPD is high among elderly people in traditional areas, such as the rural regions of China [10]. For a long time, families were considered as their major healthcare resources [11]. However, with the rapid development of society and economy, young people move to urban areas and gradually forget traditional culture or lose the ability to take care of elderly people. Hence, family members cannot be considered as the major healthcare resource for elderly people living in rural areas. In addition, these elderly people would rather live at home than go to a nursing home even when their health condition has deteriorated to the point where they need urgent and emergency care. With aging, elderly people develop complex and increased needs that require sustained input from community health service systems to support independent living. Socially disadvantaged elderly people and those without family to provide unpaid care and sufficient income might prematurely fall into DPD [12]. For elderly people living in rural areas, the local resource is particularly important for their health; however, their community resources are inadequate [13]. A prospective study reported that the availability of social support is an important factor for possible assistance with DPD [14]. Moreover, resource inequality is a barrier in providing the necessary support for independence [15, 16]. The effect of social support on the health outcome of elderly people has long been a topic of concern. Although social support has direct and indirect effects on mental health and DPD, the way of providing social support and the potential mechanism for social support as a mediator related to individual's mental health remain clear [17, 18].

Previous studies on DPD mostly focused on negative consequences; however, recent findings suggest that dependency on health service resources may be considered as a positive condition for individuals with DPD because it can meet the individual’s demand for safe [19, 20]. The state of dependency is dynamic and ever-changing through use of community health service resources. Dependency on community health service resources has been considered a helpful intermediate process from dependency to autonomy [21]. Therefore, it is not an entirely negative event.

Resource dependency theory has described the relationship between a resource and resource users [22, 23]. Resource users are highly dependent upon a resource due to they can obtain social and health benefits. To understand why and how individuals are dependent on a resource may provide insights into the condition of resource users and meeting the needs of resource. The objective of this study is to determine the DPD-associated-with-community resources among elderly people living in rural areas the theory of resource dependency and explore further suitable methods to reduce and delay the DPD in elderly people, and to alleviate the problem of community resource shortage in rural areas. In addition, the theory that social support promotes behavior change was verified using the health belief model. The health belief model is one of the first theories of health behavior and remains one of the most widely recognized theories in behavioral science and public health [24]. This model hypothesizes people's beliefs as to whether individual is at high risk for disease and their perspectives of the benefits of taking necessary action to avoid it potentially affect their readiness to act. The recent additions of self-efficacy are the core constructs of the health belief model. A previous study used the health belief model combined with health counseling from local public health authorities to improve the hospital visit rate [25]. The results showed that the frequency of hospital visits in the intervention group increased, and the cumulative incidence of lifestyle-related diseases decreased after the physical examination. We hypothesized that if strategies for improving community resources or behavior changes can be provided based on health belief theory, then it is possible for elderly people to live independently in their familiar and dependent communities for a long time.

Methods

Subjects

This study was included in the “Accessibility Evaluation of Health-Related Resources for the Elderly” project. A population-based cross-sectional study was conducted
to assess the health and health-related accessibility resources and services among elderly people in rural and urban areas. A total of 1160 community residents aged ≥ 60 years were selected using a multistage sampling design. Sampling was conducted in 26 locations (11 urban/15 rural) in four provinces (Zhejiang, Heilongjiang, Xinjiang, and Sichuan) in China from July 2019 to August 2021. Inclusion criteria were as follows: permanent residents of aged 60 years and above, able to answer and understand the study questionnaire, and agreed to participate in the study. Exclusion criteria were as follows: having severe physical and mental disorders and hearing impairment that leads to communication difficulties and unable to complete the questionnaire. All participants provided written informed consent before joining. The study was approved by the institutional review board at the School of Medicine, Zhejiang University (No: ZGL201909-10) and performed in accordance with the Declaration of Helsinki.

Data collection
All data from the program were collected by face-to-face interviews using structured questionnaires. The questionnaire included nine parts and comprised 428 items and other two instruments for measuring cognitive function that uses separate answer sheets. The main contents comprised categories, such as demographics, lifestyle and behavioral habits, self-reported chronic diseases and general health status, environmental and community health service resources, socioeconomic resources, psychological and cognitive assessment, and activities of daily living assessment. The participants were informed in advance of the time required for the investigation. The interview lasted approximately 45–60 min for the majority of the participants.

Characteristic variables
The general characteristics of the participants included age, gender, marital status, income, living arrangement, education level, self-reported health status, and daily behavior and habits. The daily behavior and habits included about smoking, drinking, physical activity, and food intake.

Community resources
Community resources comprised 44 items [26], and the Cronbach's alpha coefficient was 0.89 for total scale. The main questions were as follows: “In the past six months, how many times have you received treatment or a general practitioner's onsite service from community health service organizations”? The answers were divided into four levels of “< 2 times,” “2–3 times,” “4–6 times,” and “> 6 times.” “Do you think someone must examine and assess your overall health status?” “Does your community have a family doctor contract service?” “Does your community conduct regular lectures on health knowledge and use electronic health records?” “Does your community have a counseling service?” “Is there an elder university, cultural activity center or geriatric ward in your community” “Does your community have an emergency call or survival monitoring service?” If the respondents replied “yes” to these questions, then the answer was coded as “1”; otherwise, it was coded as “0”. Many other questions were also asked as follows: “Does your community have a day care service?” “Does your community have a transfer service?” “Does your community hold regular outdoor activities and reemployment guidance?” and “Does your community have medication guidance and care services for chronic patients.

Measurements
Dependency personality disorder
The Chinese version of the standardized Minnesota Multiphasic Personality Inventory-II was used to assess the DPD among the elderly. The DPD scale comprised 57 items, and the test–retest reliability were 0.67 in man and 0.81 in women [27]. The raw score was calculated in accordance with the instruction manual and converted into a standardized T-score. DPD was defined as a standardized T-score greater than or equal to 60 points.

Self-efficacy
The Chinese version of the General Self-Efficacy Scale (GSES) was used to assess self-efficacy, and had a Cronbach's alpha of 0.89 [28]. The GSES consisted of 10 items with a four-point rating scale for a total of 10–40 points, with high scores indicating high levels of self-efficacy.

Social support
Social support was assessed using the Chinese version of the questionnaires of the Older American Resources and Services (OARS) social resource scale. The ratings were summed up to yield a total score, and Cronbach's alpha coefficients ranged from 0.61 to 0.83 [29]. A high level of social support was defined as an OARS score greater than or equal to 11 points.

Depressive symptom
Depressive symptoms were assessed using the 15-item Geriatric Depression Scale (GDS-15). The optimal cut-off point to identify depressive symptoms was 5 points; 0–4 points indicated no depressive symptoms, 5–9 points indicated mild depressive symptoms, and ≥ 10 points indicated moderate to severe depressive symptoms [30].
Personality characteristics

Participants’ personality characteristics were measured using the Eysenck Personality Questionnaire (EPQ), which consists of 88 items and is designed to assess personality dimensions of extraversion, neuroticism, and psychoticism. High scores are highly indicative of an Eysenck personality [31].

Statistical analysis

The general characteristics of participants were described using frequencies and percentages. Chi-square tests were used to compare the characteristics of community resources among the participants living in urban and rural areas.

The association between DPD and community resources in urban and rural areas was evaluated using two separate logistic regression models. All models were adjusted for gender, age, educational level, marital status, individual income, smoking status, alcohol use, levels of physical activity, chronic disease status, EPQ score, and community resources. Logistic regression models were also used to assess the association between DPD and social support or self-efficacy and tested multiplicative and additive interaction. In the additive interaction model, social support and self-efficacy scores were treated as a binary variable. If the participant’s self-efficacy score is greater than 25 points, then it will be regarded as a binary dependent variable expressed by “1”; otherwise, the grade is “0”. A binary variable of social support level was also created using the same method, and three new dummy variables were generated using the two binary variables. All independent variables were added to the logistic regression model through a stepwise method.

Analysis of covariance (ANCOVA) was performed to evaluate the association between the level of self-efficacy and social support score. Normality and variance homogeneity tests were conducted prior to the ANCOVA. The means and standard errors of social support scores were calculated using the levels of self-efficacy. The three categories were compared using the F test, and a linear trend was evaluated using a general linear model.

All analyses were performed at a significance level of \( P < 0.05 \) for two-sided tests by using SAS for Windows (version 9.4).

Results

The general characteristics of the study participants are shown in Table 1. Among the participants, 717 (63.3%) live in rural areas and 415 (36.7%) live in urban areas with an average age of 68 years. Approximately 24.7% and 4.6% of the participants living in rural and urban areas, respectively, reported that they completed only 6 years or less of education. More than 72.9% of the participants living in rural areas reported that they have a low level of income, and only 10.4% of the participants living in urban areas reported that they earn less than 2,000 yuan per month. Elderly people living in rural areas had higher DPD scores and lower levels of self-efficacy compared with those living in urban areas (\( P < 0.001 \)). The mean GDS-15 score were 3.7 points for the participants living in rural areas and 2.2 points for those living in urban areas.

### Table 1  Characteristics of participants in the study

| Variable categories | Rural (N = 717) | Urban (N = 415) |
|---------------------|----------------|-----------------|
|                     | n   | %     | n   | %     |
| Age (yr)            |     |       |     |       |
| 60–69               | 430 | 60.0  | 269 | 64.8  |
| 70–79               | 232 | 32.4  | 132 | 31.8  |
| ≥ 80                | 55  | 7.6   | 14  | 3.4   |
| Gender              |     |       |     |       |
| Male                | 326 | 45.5  | 129 | 31.1  |
| Female              | 391 | 54.5  | 286 | 68.9  |
| Marital status      |     |       |     |       |
| Married             | 566 | 78.4  | 367 | 85.7  |
| Non-married         | 156 | 21.6  | 81  | 14.3  |
| Education (yr)      |     |       |     |       |
| 0–6                 | 177 | 24.7  | 19  | 4.6   |
| 7–9                 | 334 | 46.6  | 112 | 27.0  |
| 10–12               | 142 | 19.5  | 135 | 32.5  |
| 13+                 | 66  | 9.2   | 149 | 35.9  |
| Individual income   |     |       |     |       |
| ¥0 to 1,999         | 523 | 72.9  | 43  | 10.4  |
| ¥2,000 to 3,999     | 139 | 19.4  | 257 | 61.9  |
| ¥4,000 to 5,999     | 48  | 6.7   | 73  | 17.6  |
| ¥6,000 and Over     | 7   | 1.0   | 42  | 10.1  |
| Smoking status      |     |       |     |       |
| Yes                 | 162 | 22.6  | 49  | 11.8  |
| No                  | 555 | 77.4  | 366 | 88.2  |
| Alcohol use         |     |       |     |       |
| Yes                 | 170 | 23.7  | 128 | 30.8  |
| No                  | 547 | 76.3  | 287 | 69.2  |
| Physical activity   |     |       |     |       |
| Yes                 | 224 | 31.2  | 114 | 27.5  |
| No                  | 493 | 68.8  | 130 | 72.5  |
| Chronic disease status |    |       |     |       |
| Yes                 | 475 | 66.2  | 305 | 73.5  |
| No                  | 242 | 33.8  | 110 | 26.5  |

Measured Variables (Mean, SD)

| Dependency scores | 44.2 | 12.4 |
| Self-efficacy scores | 24.9 | 6.7  |
| GDS-15 scores     | 3.7  | 3.0  |
| EPQ scores        | 22.2 | 4.2  |
The main difference in community resources among the participants living in rural and urban areas is shown in Table 2. Univariate analysis results indicated that the received frequencies of community health service in the past 6 months were significantly lower among the participants living in rural areas compared with those among the elderly people living in urban areas ($P<0.001$). The participants living in rural areas had a significantly lower utilization rate of community service and resources, such as family doctor contract service, community counseling service, emergency call system, elder university, and community cultural activity center, than those living in urban areas. The participants living in rural areas had a higher need for health assessment and a lower level of social support than those living in urban areas. All $p$-values were less than 0.05.

The odds ratios (ORs) of DPD association with community services and resources by logistic regression analysis are shown in Table 3. Model 1 showed that among the participants living in rural areas, the DPD was positively associated with received frequencies of community health service, contracted family doctor services, and regular lectures on health knowledge with ORs of 1.58 (95% CI, 1.21–2.07, $P<0.001$), 2.03 (95% CI, 1.16–3.56, $P=0.013$), and 2.67 (95% CI, 1.34–5.32, $P=0.005$), respectively. The community cultural activity center with an OR of 0.35 (95% CI, 0.18–0.70, $P=0.003$) and the need for health assessment with an OR of 0.25 (95% CI, 0.10–0.61, $P=0.002$) were negatively associated with DPD. Model 2 showed that among the participants living in urban areas, DPD had a positive association with community geriatric ward and utilization of electronic health records with ORs of 2.88 (95% CI, 1.28–6.48, $P=0.011$) and 5.32 (95% CI, 1.80–15.73, $P=0.002$), respectively, and had a negative association with elder university with an OR of 0.39 (95% CI, 0.18–0.84, $P=0.016$).

The results of the association between DPD and social support and self-efficacy are shown in Table 4. High levels of social support and self-efficacy were associated with low DPD scores with ORs of 0.75 (95% CI, 0.65–0.86, $P<0.001$) and 0.92 (95% CI, 0.86–0.98, $P=0.016$), respectively. The levels of social support and self-efficacy had an OR of 0.34 (95% CI, 0.19–0.48, $P=0.003$) and an OR of 0.25 (95% CI, 0.18–0.70, $P=0.003$), respectively. The interaction items for the levels of social support and self-efficacy had an OR of 0.39 (95% CI, 0.18–0.84, $P<0.001$). In the additive model with dummy variables, after the interaction items were added to the logistic regression model, the levels of social support and self-efficacy had a significant effect on DPD scores in the multiplicative model but had a significant interaction in the additive model ($P<0.001$). In the additive model with dummy variables, after the interaction items were added to the logistic regression model, the levels of social support and self-efficacy had a significant effect on DPD scores in the multiplicative model but had a significant interaction in the additive model ($P<0.001$). In the additive model with dummy variables, after the interaction items were added to the logistic regression model, the levels of social support and self-efficacy had a significant effect on DPD scores in the multiplicative model but had a significant interaction in the additive model ($P<0.001$).

As illustrated in Table 5 and Fig. 1, the mean ANCOVA scores of social support for the different levels of self-efficacy were 9.92, 10.88, and 11.59 points in the three level groups “<20,” “20–28,” and “≥29”, respectively, resulting in a significant linear trend ($P<0.001$).

### Discussion

This study found that elderly people living in rural areas had a significantly higher level of DPD and lower level of social support and self-efficacy compared with those living in urban areas. The rural community-dwelling elderly people had fewer community resources and utilization of health service, and their DPD was positively associated with the frequency of received community health service, contracted family doctor services, and regular lectures on health knowledge. Further study showed that social support and self-efficacy had an additive interaction effect on DPD.

Previous studies found that the prevalence of psychiatric disorders, such as alcohol and tobacco dependency, is higher in rural areas than in urban areas. In addition,
tobacco cultivating status was confirmed to be an important risk factor of tobacco dependency [32–34]. However, studies have suggested that the high prevalence of DPD among the elderly people living in rural areas is mainly due to social and economic factors [35]. The focus of studies on DPD has also changed with the continuous development of society and our understanding of the association between health and society. A previous study showed that the support of dependent elderly is conditioned upon the availability of the family, particularly of children. However, determining whether the elderly will have children capable of providing for them is difficult [36]. With the development of the economy and society

### Table 3
The odds ratios of dependency association with community services and resources by logistic regression analysis

| Variables                                                                 | Multivariable adjusted | P value |
|---------------------------------------------------------------------------|------------------------|---------|
|                                                                           | Odd Ratios 95% CI      |
| Rural (model 1)                                                           |                        |         |
| Received community health services (times)                               | 1.58 1.21 2.07         | <0.001  |
| Regular lectures on health knowledge (n/y)                                | 2.67 1.34 5.32         | 0.005   |
| Community cultural activity center (n/y)                                  | 0.35 0.18 0.70         | 0.003   |
| The need for health assessment (n/y)                                      | 0.25 0.10 0.61         | 0.002   |
| Family doctor contract service (n/y)                                      | 2.03 1.16 3.56         | 0.013   |
| Community geriatric ward (n/y)                                            | 0.30 0.07 1.24         | 0.097   |
| Elder university (n/y)                                                    | 2.44 0.56 1.62         | 0.237   |
| Utilization of electronic health records (n/y)                            | 1.04 0.28 3.78         | 0.957   |
| Urban (model 2)                                                           |                        |         |
| Received community health services (times)                               | 1.03 0.68 1.58         | 0.876   |
| Regular lectures on health knowledge (n/y)                                | 0.40 0.12 1.37         | 0.147   |
| Community cultural activity center (n/y)                                  | 0.73 0.25 2.12         | 0.558   |
| The need for health assessment (n/y)                                      | 0.46 0.11 1.95         | 0.289   |
| Family doctor contract service (n/y)                                      | 1.96 0.46 8.39         | 0.364   |
| Community geriatric ward (n/y)                                            | 2.88 1.28 6.48         | 0.011   |
| Elder university (n/y)                                                    | 0.39 0.18 0.84         | 0.016   |
| Utilization of electronic health records (n/y)                            | 5.32 1.80 15.73        | 0.002   |

### Table 4
The association between dependency and social support or self-efficacy by logistic regression analysis

| Variables                                                                 | Multivariable adjusted | P value |
|---------------------------------------------------------------------------|------------------------|---------|
|                                                                           | Odd Ratios 95% CI      |
| Model 1                                                                   |                        |         |
| The levels of social support (points)                                     | 0.75 0.65 0.86         | <0.001  |
| The levels of self-efficacy (points)                                      | 0.92 0.86 0.98         | 0.016   |
| Education levels (low/high)                                               | 0.62 0.59 0.98         | 0.043   |
| EPQ scores (points)                                                       | 1.25 1.13 1.39         | <0.001  |
| Gender (m/f)                                                              | 3.74 1.60 8.78         | 0.002   |
| LSS*LSE (Multiplicative interaction)                                      | 0.21 0.01 0.46         | 0.064   |
| Model 2                                                                   |                        |         |
| The levels of social support (low/high)                                   | 0.57 0.46 0.68         | <0.001  |
| The levels of self-efficacy (points)                                      | 0.70 0.58 0.82         | <0.001  |
| Education levels (low/high)                                               | 0.93 0.54 1.63         | 0.592   |
| EPQ scores (points)                                                       | 1.23 1.17 1.30         | <0.001  |
| Gender (m/f)                                                              | 0.94 0.78 1.20         | 0.821   |
| LSS + LSE (Additive interaction)                                          | 0.34 0.19 0.48         | <0.001  |

**LSS** Levels of social support

**LSE** Levels of self-efficacy

*Multiplicative interaction symbol

### Table 5
The levels of self-efficacy association with social support by ANCOVA

| Social support scores (points)                                            | Means  | Standard error | P value | P for trend |
|---------------------------------------------------------------------------|--------|----------------|---------|-------------|
| The levels of self-efficacy                                               |        |                |         |             |
| < 20 (points)                                                             | 9.92   | 0.17           | > 0.001 |             |
| 20–28 (points)                                                            | 10.88  | 0.10           | < 0.001 | < 0.001     |
| ≥ 29 (points)                                                             | 11.59  | 0.13           | < 0.001 | < 0.001     |

---

tobacco cultivating status was confirmed to be an important risk factor of tobacco dependency [32–34]. However, studies have suggested that the high prevalence of DPD among the elderly people living in rural areas is mainly due to social and economic factors [35]. The focus of studies on DPD has also changed with the continuous development of society and our understanding of the association between health and society. A previous study showed that the support of dependent elderly is conditioned upon the availability of the family, particularly of children. However, determining whether the elderly will have children capable of providing for them is difficult [36]. With the development of the economy and society
over the past 30 years, the number of left-behind elderly people has increased rapidly in rural China and other countries [37]. These elderly people have increased DPD risk with regard to physical, mental, social, and economic areas; however, a study showed that only an extremely small proportion of elderly people are physically dependent [38]. Although economic status is mainly associated with the DPD of elderly people, special government funding has not solved this complex problem [39]. Another study suggested that an evidence-based approach is necessary to understand the association between community resources and DPD among elderly people, but only a few investigations have conducted comprehensive analyses of elderly people living in rural areas [40, 41].

In the present study, elderly people living in rural areas were also characterized by a low level of social support and few health-support services and resources. The elderly people living in rural areas were significantly dependent on received community health services, contracted family doctor services, and regular lectures on health knowledge. This finding is similar to previous results stating that DPD may lead to the overuse of healthcare resources [42]. However, in contrast with the negative results, recent studies suggested that dependency on community resources may be regarded as a positive condition for individuals based on the theory of resource dependency. Dependency might be a necessary and helpful temporary phase toward autonomy [43]. On the basis of this theory, the present results suggested that elderly people living in rural areas with a high level of DPD have a great demand for community resources, such as general community health services, contracted family doctor services, and regular lectures on health knowledge. If they can be provided with the appropriate services and social support, then the elderly people with a high level of DPD will gradually move toward autonomy.

Another result also confirmed the conclusion from the present study. Compared with those whose health status has not been evaluated by doctors, the elderly people whose overall health has been examined or thoroughly assessed by a doctor in the past 6 months believe it is necessary to check or evaluate their health status and have a low level of DPD. DPD is associated with health promotion behavior. These people will quickly ask for the help of doctors after a physical examination, thus increasing the degree of cooperation and compliance during treatment. The theory of health belief model has also been confirmed in the present study. In this study, the association between self-efficacy and DPD was also explored. High levels of self-efficacy and social support were associated with low DPD scores, and an additive interaction was observed between self-efficacy and social support. The self-efficacy and interaction items were kept statistically significant in the model, and the three dummy variables representing self-efficacy, social support, and interaction item were added to the logistic regression model. The results suggested that self-efficacy may be directly or indirectly associated with DPD, and
self-efficacy and social support are commonly associated with a low level of DPD through a synergistic effect.

Social support is affected by culture, socioeconomic factors, and policies and impacts health through health behavioral pathways or psychological pathways [44]. Social support may affect physical, cognitive, and mental health outcomes and the overall social function and engagement of elderly people [45]. Self-efficacy is an important mediator between social support and health. Integrated interventions of promoting perceived social support may be effective in enhancing self-efficacy [46]. Elderly people face life adversities, poor social support, and limited access to health services, which may affect their health self-efficacy [47]. Self-efficacy is the faith that an individual can successfully execute behaviors to achieve desired aims and improves the ability to change substance use behaviors [48]. Some studies showed a correlation between self-efficacy and individuals with alcohol addiction. Self-efficacy has been proposed as a key predictor of alcohol treatment outcomes and a potential mechanism of success in achieving abstinence following alcohol treatment. In addition, self-efficacy might contribute to cognitive and behavioral changes. Although these previous studies mainly explored the association among social support, self-efficacy, and DPD and the underlying mechanisms, their results provided a strong support for our findings. Self-efficacy is a potentially important factor for mediating the use of community services to reduce dependency based on the health belief model. The present study argued that if elderly people living in rural areas are provided with adequate community health services, contracted family doctor services, and regular lectures on health knowledge, then they will quickly ask for the help of doctors and develop increased self-efficacy to take beneficial action to promote their autonomy and avoid DPD. On the one hand, additional social support can directly reduce the level of dependency on community resources. In addition, individuals can gradually move from dependency to autonomy by increasing their level of self-efficacy. In conclusion, effective social support can be an effective strategy for increasing the self-efficacy of elderly people and improving the utilization of rural community resources. An enhanced self-efficacy would allow these people to take beneficial action to promote their autonomy and avoid DPD.

Conclusions
This study showed that DPD was positively associated with the frequency of received community health services, contracted family doctor services, and regular lectures on health knowledge among elderly people living in rural areas. The high scores of social support were associated with a high level of self-efficacy, and both are important impact factors associated with the low level of DPD. A significant interaction was also observed among these factors. This study suggested that DPD is associated with an increase in the need and use for community resources. Providing additional social support can directly reduce the level of dependency on community resources. In addition, individuals can gradually move from dependency to autonomy by increasing their level of self-efficacy. In conclusion, effective social support can be an effective strategy for increasing the self-efficacy of elderly people and improving the utilization of rural community resources. An enhanced self-efficacy would allow these people to take beneficial action to promote their autonomy and avoid DPD.

Abbreviations
GSES: General Self-Efficacy Scale; OARS: Older American Resources and Services; EPQ: Eysenck Personality Questionnaire; ANCOVA: Analysis of covariance; GDS-15: Geriatric Depression Scale; ORs: Odds ratios.

Supplementary Information
The online version contains supplementary material available at https://doi.org/10.1186/s12877-022-03247-5.

Additional file 1. Accessibility evaluation of health-related resources for the elderly.

Acknowledgements
We thank Xia Gao, Songsong Han, Dongbin Hu and Xuanting Liu for their assistance with survey set up.

Authors' contributions
In this paper, YL and AA were the principal investigators and involved in the study design and conception, manuscript preparation. XWD, YYP and YC performed data collection and analysis. The author(s) read and approved the final manuscript.

Funding
This work was supported by the Leading Innovative and Entrepreneur Team Introduction Program of Zhejiang (2019R01007) and in part by the Key Laboratory of Intelligent Preventive Medicine of Zhejiang Province (2020E10004).
Availability of data and materials
The datasets generated and analysed during the current study are not publicly available due to the privacy of participants but are available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate
All participants provided informed consent before participation. The study was approved by the institutional review board at the School of Public Health, Zhejiang University (No. ZGL201909-10), and performed in accordance with the Declaration of Helsinki.

Consent for publication
Not applicable.

Competing interests
The authors declare no conflict of interest.

Received: 25 December 2021   Accepted: 28 June 2022
Published online: 16 July 2022

References
1. Beard JR, Officer A, de Carvalho IA, Sadana R, Pot AM, Michel JP, Lloyd-Sherlock P, Epping-Jordan JE, Peeters GMF, Mahanani WR, Thiagarajan JA, Chatterji S. The World report on ageing and health: a policy framework for healthy ageing. Lancet. 2016;387:2145–54.
2. Lee J, Phillips D, Wilkins J, Chien YC, Lin YC, Angrisani M, Crimmins E. Cross-Country Comparisons of Disability and Morbidity: Evidence from the Gateway to Global Aging Data. J Gerontol A Biol Sci Med Sci. 2018;73:1519–24.
3. Chang YF, Skirbekk VF, Tryvolas S, Kassebaum NJ, Dieleman JL. Measuring population ageing: an analysis of the Global Burden of Disease Study 2017. Lancet Public Health. 2019;4:e159–67.
4. Clark F, Jackson J, Carlson M, Chou CP, Cherry BJ, Jordan-Marsh M, Knight BG, Mandel D, Blanchard J, Granger DA, Wilcox RR, Lai MY, White B, Hay J, Lamm C, Martorella A, Azem SP. Effectiveness of a lifestyle intervention in promoting the well-being of independently living older people: results of the Well Elderly 2 Randomised Controlled Trial. J Epidemiol Community Health. 2012;66:782–90.
5. Disney KL. Dependent personality disorder: a critical review. Clin Psychol Rev. 2013;33:1184–96.
6. Tabali M, Ostermann T, Jeschke E, Dassen T, Heinze C. Does the care dependency of nursing home residents influence their health-related quality of life?—A cross-sectional study. Health Qual Life Outcomes. 2013;11:41.
7. Hoell A, Weyerer S, Maier W, Wagner M, Scherer M, Stark A, Kuduszkiewicz H, Wiese B, König HB, Rock JK, Stein J, Riedel-Heller SG. The impact of depressive symptoms on utilization of home care by the elderly: Longitudinal results from the AgeMooDe Study. J Affect Disord. 2016;204:247–54.
8. Borstein MF. Illuminating a neglected clinical issue: societal costs of interpersonal dependency and dependent personality disorder. J Clin Psychol. 2012;68:766–81.
9. Alcaraz M, Brugulat P, Guillén M, Medina-Bustos A, Mornant-Penina A, Solé-Auró A. Risk of dependence associated with health, social support, and life satisfaction. Rev Saúd Publica. 2015;49:26.
10. Feng ZL. Global Convergence: Aging and Long-Term Care Policy Challenges in the Developing World. J Aging Soc Policy. 2019;31:291–7.
11. Gusmano MK, Okma KGH. Population Aging and the Sustainability of the Welfare State. Hastings Cent Rep. 2018;48:557–61.
12. Chokkanathan S, Mohanty J. Health, family strains, dependency, and life satisfaction of older adults. Arch Gerontol Geriatr. 2017;71:129–35.
13. Walsh JJ. Meeting compliance under Medicare and Medicaid emergency preparations: Final Rule requirements. J Bus Contin Emer Plan. 2020;14:178–88.
14. Jopp DS, Boerner K, Ribeiro O, Rott C. Life at Age 100. An International Research Agenda for Centenarian Studies. J Aging Soc Policy. 2016;28:133–47.
15. Pinfold V. Building up safe havens… all around the world: users’ experiences of living in the community with mental health problems. Health Place. 2000;6:201–12.
16. Zhang T, Xu Y, Ren J, Sun L, Liu C. Inequality in the distribution of health resources and health services in China: hospitals versus primary care institutions. Int J Equity Health. 2017;16:42.
17. House JS, Landis KR, Umberson D. Social relationships and health. Science. 1988;241:540–5.
18. Gao YX, Xu C, Liu GE, Lin Y. Social support and health related quality of life of the elderly: Evidence from Nantong. Popul Dev. 2013;19:73–81.
19. Geurtsen N, Keijser GPJ, Konradsen J. Resource dependency theory to measure the environment in health care institutions. Int J Equity Health. 2012;20:397–40.
20. Wang XM, Wang K, Huang K, Yu Y, Wong WX, Yang L. The association between demographic characteristics, personality, and mental health of bus drivers in China: A structural equation model. Physiol Behav. 2021;229:113247.
21. Ganz K, Bishop D. The role of behavioral science theory in development and implementation of public health interventions. Annu Rev Public Health. 2010;31:399–418.
22. Bonavigo T, Sandhu S, Pascollo-Fabrici E, Priebe S. What does dependency on community mental health services mean? A conceptual review with a systematic search. Soc Psychiatry Psychiatr Epidemiol. 2016;51:561–74.
23. Shin C, Park MH, Lee SH, Ko YH, Kim YK, Han KM, et al. Usefulness of the 15-item geriatric depression scale (GDS-15) for classifying minor and major depressive disorders among community-dwelling elders. J Affect Disord. 2019;259:370–5.
24. Wang ZZ, Lan Y, Wang L. Research on the Service Accessibility of Home Care Community: the Study Based on the Survey Data of Suzhou City. Popul Dev. 2016;3:90–9.
25. Zhang JX, Song WZ, Zhang MQ, Mingnsuda Dou Xiang Ren Ge Ce Yan Zhong Wen Ban Yang Hui Shou Ce. Beijing: The Geological Publishing House, 2004.
26. Leung DYP, Leung AYM. Factor structure and gender invariance of the Chinese General Self-Efficacy Scale among soon-to-be-aged adults. J Adv Nurs. 2011;67:1383–92.
27. Fu D, Shen Y, Xia Z. The reliability of Chinese version of the OARS. J Pre Med Inf. 1997;13:193–7.
28. Cai L, Cui W, You D, He J, Zhao K. Socioeconomic variations in nicotine dependence in rural southwest China. BMC Public Health. 2015;15:1158.
29. Fu D, Shen Y, Xia Z. The reliability of Chinese version of the OARS. J Pre Med Inf. 1997;13:193–7.
30. Noguchi M, Kojima S, Sairenchi T, Kinuta M, Yamakawa M, Nishizawa H, Takahara M, Imano H, Kitamura A, Yoshida T, Shintani A, Saito Y, Yokoya T, Shimomura I, Iso H. Japan trial in high-risk individuals to enhance their referral to physicians (J-HARP)-a nurse-led, community-based prevention program of lifestyle-related disease. J Epidemiol. 2020;30:194–9.
31. Zhang JX, Song WZ, Zhang MQ, Mingnsuda Dou Xiang Ren Ge Ce Yan Zhong Wen Ban Yang Hui Shou Ce. Beijing: The Geological Publishing House, 2004.
32. Leung DYP, Leung AYM. Factor structure and gender invariance of the Chinese General Self-Efficacy Scale among soon-to-be-aged adults. J Adv Nurs. 2011;67:1383–92.
33. Yu Y, Hu M, Liu ZW, Liu HM, Yang JP, Zhou L, Xiao SY. Recognition of depression, anxiety, and alcohol abuse in a Chinese rural sample: a cross-sectional study. BMC Psychiatry. 2016;16:93.
34. Barbaresco G, Sanderman R, Kempen GJ, Rancho AV. Socioeconomic status and the course of quality of life in older patients with coronary heart disease. Int J Behav Med. 2009;16:197–204.
35. Yoshimura KJ. The psychological characteristics of tobacco dependence in a rural area of Japan. Epidemiol. 2000;10:271–9.
36. Yu Y, Hu M, Liu ZW, Liu HM, Yang JP, Zhou L, Xiao SY. Recognition of depression, anxiety, and alcohol abuse in a Chinese rural sample: a cross-sectional study. BMC Psychiatry. 2016;16:93.
37. Adhikari R, Jamapakay A, Chamrarithong A. Impact of children’s migration on health and health care-seeking behavior of elderly left behind. BMC Public Health. 2011;11:143.
38. Zhao M, Zhu Z, Kong C, Zhao C. Caregiver burden and parenting stress among left-behind elderly individuals in rural China: a cross-sectional study. BMC Public Health. 2021;21:846.
38. Hao Y. Dependency of the Chinese elderly: An exploration. J Aust Popul Assoc. 1998;15:171–86.
39. Rent PD, Kumar S, Dmello MK, Purushotham J. Psychosocial Status and Economic Dependence for Healthcare and Nonhealthcare among Elderly Population in Rural Coastal Karnataka. J Midlife Health. 2017;8:174–8.
40. Matthews FE, Bennett H, Wittenberg R, Jagger C, Dening T, Brayne C. Who lives where and does it matter? Changes in the health profiles of older people living in long term care and the community over two decades in a high income country. PLoS ONE. 2016;11:e0161705.
41. Goodman C, Dening T, Gordon AL, Davies SL, Meyer J, Martin FC, Gladman JR, Bowman C, Victor C, Handle M, Gage H, Iliffe S, Zubair M. Effective health care for older people living and dying in care homes: a realist review. BMC Health Serv Res. 2016;16:269.
42. Darbà J, Kaskens L. Relationship between patient dependence and direct medical-, social-, indirect-, and informal-care costs in Spain. Clinicoecon Outcomes Res. 2015;2:387–95.
43. Pinfold V. Building up safe havens… all around the world: users’ experiences of living in the community with mental health problems. Health Place. 2000;6(3):201–12.
44. Cornwell B, Laumann EO. The health benefits of network growth: New evidence from a national survey of older adults. Soc Sci Med. 2013;125(2013):94–106.
45. Wu F, Sheng Y. Social support network, social support, self-efficacy, health-promoting behavior and healthy aging among older adults: A pathway analysis. Arch Gerontol Geriatr. 2019;85:103934.
46. Al-Dwaikat TN, Rababah JA, Al-Hammouri MM, Chlebowy DO. Social Support, Self-Efficacy, and Psychological Wellbeing of Adults with Type 2 Diabetes. West J Nurs Res. 2021;43:288–97.
47. Kong LN, Zhang N, Yuan C, Yu Z, Yuan W, Zhang GL. Relationship of social support and health-related quality of life among migrant older adults: The mediating role of psychological resilience. Geriatr Nurs. 2021;42:1–7.
48. Kadden RM, Litt MD. The Role of Self-Efficacy in the Treatment of Substance Use Disorders. Addict Behav. 2011;36(12):1120–6.

Publisher's Note
Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.