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Factors associated with subsequent diabetes-related self-care activities: The role of social support and optimism

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Abstract

Aim: This study aimed to explore how social support (external factor), optimism (internal factor) and their interaction associated with diabetes-related self-care activities (DRSCA) over 3 months among people with type 2 diabetes mellitus (T2DM).

Design: Both questionnaire-based and telephone-based survey were used. The data were collected face to face, the first time by questionnaire and the second time by telephone.

Methods: One hundred and fifty-five patients completed valid survey questionnaires (response rate was about 70% in the first and 62% in the second round). The association of social support and optimism with subsequent DRSCA was examined after adjusting for demographics and disease information.

Results: Based on results, optimism was significantly associated with subsequent DRSCA. In the dimensions of social support, objective social support and support use were significantly associated with subsequent DRSCA. The results showed that the mediation of optimism between the dimensions of social support and DRSCA was not significant after controlling for covariates. The results also indicated that social support and optimism played directly an important role in improving diabetes-related self-care activities.

KEYWORDS
diabetes mellitus, nurses, nursing, optimism, positive thinking, self-care, social support, type II

1 | INTRODUCTION

The main hazards of diabetes are the potential damage to multiple organs, including vascular, renal, retinal and neurological complications and premature disability (Khaw et al., 2004). Diabetes is a global issue which affected more than 425 million people in 2017 (IDF Diabetes Atlas, 2017). Type 2 diabetes mellitus (T2DM) has been the most common form of diabetes (IDF Diabetes Atlas, 2017). A meta-analysis study showed that 9.1% of Chinese suffered

from T2DM (Yang et al., 2016). Many complications of T2DM can be prevented and patients' quality of life could be improved with rigorous diabetes-related self-care activities (DRSCA).

Diabetes-related self-care activities are activities that include taking care of oneself, maintaining health and controlling the progression of diabetes (Wang et al., 2017). The recommended DRSCA for people with T2DM generally include healthy eating, medication, physical activity, blood glucose self-monitoring and foot care (Toobert, Hampson, & Glasgow, 2000). To prevent complications, people with T2DM have

to manage DRSCA daily (Wang et al., 2017). However, based on a systematic review, the performance of DRSCA among people with T2DM was not optimal in China (Luo et al., 2015) and in many other countries (Blackburn, Swidrovich, & Lemstra, 2013). Considering the importance of DRSCA in diabetes management and the difficulty of implementing this task daily by people with T2DM, there is a critical need to understand the individual external and internal factors related to DRSCA.

2 | BACKGROUND

There has recently been substantial progress in research on factors associated with DRSCA (Luo et al., 2015). However, there is a lack of literature focusing at the same time on the positive internal and external factors and their interaction with subsequent DRSCA.

In external factors, social support is an important external factor in DRSCA. People's efforts to maintain DRSCA are often implemented in a social context and in interaction with family and social environment (Rintala, Jaatinen, Paavilainen, & Astedt-Kurki, 2013). For people with chronic diseases, social support has been defined as assistance from family, friends, neighbours or community organizations (Koetsenruijter et al., 2015), comprising an important environmental support resource. Therefore, understanding how it relates to DRSCA has crucial implications for health policy and practice (Miller & Dimatteo, 2013). Most previous research has studied the association of social support with health behaviour (Miller & Dimatteo 2013; Arda Sürücü, Büyükkaya Besen, & Erbil, 2018; Oh & Ell., 2018). However, there is a lack of studies addressing the issue of how social support is directly associated with subsequent DRSCA and especially its influence, in combination with positive internal factors, on DRSCA. The present study will explore these relationships between external factors, internal factors and subsequent DRSCA. In addition, for the purposes of analysis in this study, social support is detailed subjective social support, objective social support and support use.

In internal factors, the internal factor optimism needs to be considered in DRSCA. Optimism has been defined as a positive attitude and belief that outcomes will be favourable and desirable (Matthews, Raikkonen, Sutton-Tyrrell, & Kuller, 2004). Although factors associated with DRSCA have received a lot of research attention, as shown by a meta-synthesis (Schulman-Green, Jaser, Park, & Whittemore, 2016), there is no sufficient explanation for non-adherence to self-care activities (Blackburn et al., 2013). Therefore, interest in exploring the role of psychological resources for promoting DRSCA among patients with T2DM has recently emerged (Al-Hassan, Al-Akour, & Aburas, 2017). It is suggested that researchers should also consider patients' inner strengths (Schiavon, Marchetti, Gurgel, Busnello, & Reppold, 2017; Wu et al., 2011). Optimism is an important inner strength which plays a protective role to avoid exacerbation of illness (Nabi et al., 2010). It is suggested that having an optimistic state of mind can improve confidence and motivation and modulate stress-related neuroendocrine dysregulation, promoting the achievement of goals (Puig-Perez, Hackett, Salvador, & Steptoe, 2017).

Optimism has been shown to possibly associate with health behaviour in young adults (Kelloniemi et al., 2005) and older adults

(Steptoe, Wright, Kunz-Ebrecht, & Iliffe, 2006; Barnett & Anderson 2019). However, diabetes self-care activities differ from the lifestyle of community-dwelling people without diabetes. DRSCA are highly demanding and not well achieved among people with type 2 diabetes (Fu et al., 2012; Pamungkas, Chamroonsawasdi, & Vatanasomboon, 2017). However, at present, attention has not been given to the association of optimism with DRSCA and it is unknown whether optimism is associated with DRSCA. Greater optimism was associated with greater high-density lipoprotein cholesterol and lower triglycerides in people with chronic disease (Boehm, Williams, Rimm, Ryffff, & Kubansky, 2013). Identifying the association between optimism and DRSCA may explain whether the internal factor optimism can directly promote DRSCA in diabetes management. Therefore, identifying the association of optimism with DRSCA may provide new knowledge for clinical practice and health promotion in diabetes management. Another consideration is that in a difficult situation, social support may encourage individuals to see things from a positive perspective and is therefore likely to be connected to optimism (Applebaum et al., 2014). A recent study also showed that perceived social support of adolescents increased their positivity (Çevik GB, 2017). Thus, it is conceivable to hypothesize that social support may also be linked to DRSCA through optimism. However, the hypothesis needs to be investigated, especially in a population with T2DM with long-term health problems.

Research on how both social support and optimism relate to DRSCA may provide new and important information for diabetes management practice. Additional knowledge is needed about the association of social support with subsequent DRSCA. Moreover, there are no studies on whether people who have higher optimism tend to have better subsequent DRSCA and attention has not been given to whether optimism mediates the association between social support and DRSCA. Studying the association of social support and optimism with subsequent DRSCA could provide the premise for interventions that aim to improve patient education and health, which is important in clinical practice. Therefore, the study aimed to evaluate the association between social support (subjective support, objective support and support use), optimism and subsequent DRSCA and the mediation of optimism.

The research questions in the study were as follows:

1. Are there any significant associations between social support (subjective support, objective support and support use), optimism and subsequent DRSCA?
2. Is the mediation of optimism between social support (subjective support, objective support and support use) and subsequent DRSCA significant?

3 | THE STUDY

3.1 | Methods

3.1.1 | Design

The study used a survey design with questionnaires over a period from July 2015–July 2016. Data collection on background information, social

support, optimism and DRSCA was conducted at baseline (Time 1) and on the subsequent DRSCA three months later (Time 2) (Figure 1). The controlled variables were background information and DRSCA at Time 1, which generated a measure of each participant's prior self-care behaviour to enable better estimation of the prospective association of social support and optimism with DRSCA during the following 3-month period. The reason for this is that prior behaviour is meaningful in predicting future behaviour and it is thus useful to consider the role of prior behaviour and add explanations for the effects of prior behaviour (Ouellette & Wood, 1998). Therefore, in the study, the prior behaviour (DRSCA at Time 1 in the present study) was evaluated and adjusted as covariate when examining the associations of optimism and social support with subsequent DRSCA. The dependent variable DRSCA was collected at the second time point to produce subsequent self-care activities as it is not certain whether the level of social support and optimism at baseline facilitates further self-care activities. The time it takes for people to establish a habit for healthy behaviour they choose is on average 66 days (Lally, Jaarsveld, Potts, & Wardle, 2010). Therefore, the three-month period used in the study may enable stable evaluation of the association of social support and optimism with subsequent DRSCA.

3.1.2 | Setting and samples

Participants were recruited from two university-affiliated hospitals located in Jiangsu province in eastern China. Inclusion criteria for participants were as follows: no less than 18 years of age; diagnosed with T2DM for more than 3 months; volunteered to participate in the study and provided written informed consent; and no serious complications according to the medical records or the patient's report. G*power software was used to calculate sample size (Faul et al., 2007). A priori linear multiple regression was used: R^2 increase; alpha was set at 0.05; effect size at 0.15, power at 0.80 and both the number of tested predictors and overall number of predictors was set at 17. The total sample size was calculated as at least 146.

3.1.3 | The questionnaire

Data collection included demographics, disease information, social support, optimism and DRSCA.

Demographics and disease information

The demographics included age, gender, education, living alone and smoking. Disease information included diabetes duration, family history of diabetes, receiving standardized diabetes education, having symptoms before diagnosis of diabetes and perceived complications. The systolic blood pressure (SBP), diastolic blood pressure (DBP), height and weight were measured by nurses. Body mass index (BMI) was computed using the formula: weight (in kilograms)/height^2 (in metres).
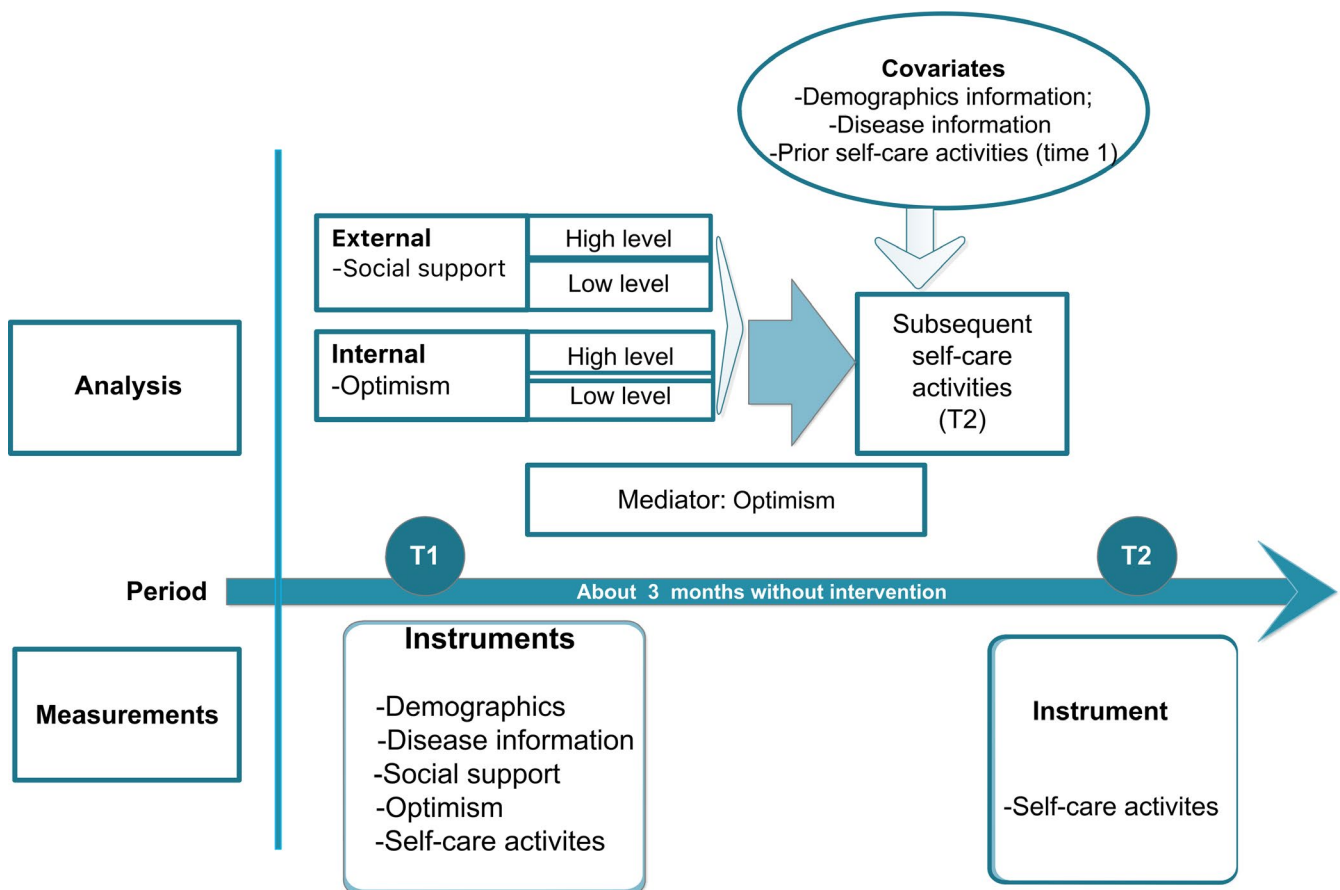
FIGURE 1 Study design

Social support scale

Social support was measured with the Social Support Rating Scale (Xiao, 1994) with three dimensions: subjective support, objective support and support use. It is applicable to general population. The response format of eight items is from 1 (none)–4 (full support); eight items are scored from 1–4 and one of them has five sub-questions. Each sub-question is scored 1–4 and the scores of this item are summarized from the five sub-questions. The responses of two items are scored 0–9 based on the number of supporting resources. The total score ranged from 12–66. A higher score indicates a higher level of social support. Test–retest reliability was 0.92, and the consistency of items was between 0.89–0.94 (Xiao et al., 1999). Cronbach's α was 0.71 in the baseline sample of this study. Cut-off score for high or low level of social support was 44 (Dai et al., 2016). The Social Support Rating Scale is easy to understand, has good construct validity and reliability among people with T2DM and has been applied widely among Chinese populations (Xiao et al., 1999; Xie, He, Koszycki, Walker, & Wen, 2009).

Optimism scale

Optimism was measured using the format of a single-item scale (Kemper, Kovaleva, Beierlein, & Rammstedt, 2011) asking: "Please use 1–100 to indicate your optimism: 1 (Not at all optimistic)–100 (very optimistic)". "It has been shown that single-item measures have been indicated to have comparable or equal predictive validity compared with multiple-item measures for constructs in psychological, marketing and medical research" (Hoeppner, 2011, P 306). In the study of Kemper et al. (2011), the single-item optimism had a correlation of 0.63 with optimism in the life orientation test, showing good criterion-related validity as a single-item scale.

Diabetes self-management scale

DRSCA were operationalized as regulating diet, regular physical activity (e.g. walking outside), taking medications, self-monitoring blood glucose and foot care. DRSCA in patients with T2DM were measured with the diabetes self-management scale (Xu, Savage, Toobert, Pan, & Whitmer, 2008). The diabetes self-management scale was translated, culturally adapted and tested for reliability and validity among Chinese people with T2DM from the core items of the Summary of Diabetes DRSCA scale (Toobert et al., 2000), with Cronbach's α of 0.68 (Xu et al., 2008). The scale assessed the DRSCA in the past week and was used at two time points in the study. In the study, eight items were used, which explained over 90% of the variance. The answers were scored from 0–7, with higher score, high level of DRSCA and total score ranging from 0–56.

3.1.4 | Data collection

The data were collected at two time points over the period from July 2015–July 2016. At Time 1 (baseline), data collection included demographics, disease information, social support, optimism and DRSCA. The patients were recruited after screening based on the inclusion criteria when they were admitted to hospital for a short period. To improve the consistency and validity of the survey, the research assistants were given training about the survey procedure. The training included study information, ethical problems, communication skills, questionnaire coding and demonstration of data collection by the main researcher. To ensure anonymity, a study code was assigned to each participant. Three hundred and ten persons were recruited to the survey (response rate about 70%). Two hundred and fifty-one valid questionnaires from three hundred and ten volunteers were analysed. The data collection procedures of the first round and participation rates have been reported separately in more detail (Zhao et al., 2018). The number of participants taking part in the second round was one hundred and fifty-five (return rate of valid participation about 62%).

In the second round (Time 2), these participants were interviewed ($N = 251$) by phone using the same DRSCA scale (Toobert et al., 2000; Xu et al., 2008;). A total of 155 valid questionnaires filled in by telephone interview were collected after excluding those that were unanswered, answered by a family member or lacked valid information. The present sample size ($N = 155$) was adequate.

3.1.5 | Ethical considerations

The study obtained ethical approval from the Ethics Committee of Affiliated Hospital of Nantong University (Ethical approval No. 2015–120). All the participants provided written informed consent. Confidentiality of participants' information and anonymous reporting were ensured. Permissions for using the instruments were obtained via e-mail from the original authors where required.

3.1.6 | Data analysis

Data were analysed by SPSS 23.0 (SPSS Inc., Chicago, IL, USA). The percentage of missing data was less than 5% in single variables except for BMI, SBP and DBP (15%), and the expectation–maximization imputation method was used to replace missing values. Descriptive statistics such as means, standard deviations and percentage were used to describe the data. Chi-square test and independent samples t test evaluated whether there was a difference between the participants at the two time points and the participants lost to follow-up. Hierarchical multiple regression analysis was employed to examine how different levels of social support and optimism were associated with subsequent DRSCA. In step 1, the covariates based on t test and Pearson correlation coefficient in demographics and disease information were adjusted for. In step 2, different levels of social support and optimism were introduced. The mediation of optimism between social support and DRSCA was analysed using the Bootstrapping method (Preacher & Hays, 2008). Standardized coefficients were used to reflect the strength of association between dependent variables and independent variables in the regression model. Statistical significance

was indicated when *p*-value was below 0.05. R^2 value for the dependent variable DRSCA represented the amount of variance explained.

4 | RESULTS

4.1 | Participants' characteristics

One hundred and fifty-five people with T2DM completed the valid questionnaires at both times. The average age of the respondents was 59.0 (*SD* 12.9) years. Over half (58.1%) of them were male and a minority (25.8%) lived alone. About a quarter (24.5%) had associate degree or higher and about 44.5% thought they had received standard diabetes education. The duration of diabetes averaged 9.5 years (*SD* = 7.9). About half (53.5%) had felt symptoms prior to diabetes diagnosis. About a quarter (26.5%) of the participants had a family history of diabetes. Table 1.

The demographics and disease information did not differ significantly between the participants over three months and at baseline. Therefore, loss to follow-up did not have a significant impact on the basic characteristics of the sample (Table 1).

4.2 | Social support, optimism and DRSCA

In the study sample, the level of social support (42.6 ± 7.7; Score index: score/possible maximum score, 64.6%; Score range in the study: 16–64) and DRSCA was moderate while the level of optimism (84.6 ± 11.7; Score index, 84.6%; Score range in the study: 50–100) was above moderate level. Among the participants, 43% had high level of social support and 47.7% had high level of optimism (cut-off by median 85; the median was used to divide groups into high or low level of optimism based on scores from participants). Controlled DRSCA scored 33.4 (*SD* 11.0) (Score index, 59.6%; Score range in the study: 6–56) and subsequent DRSCA over three months scored 35.8 (SD10.1) (Score index, 63.9%; Score range in the study: 10–56). Among the DRSCA, most participants were able to take medication and regulate diet daily at both time points. Self-monitoring of blood glucose was least frequently performed, which may be due to the cost of the equipment and test paper or fear of pain (Yang, Hsue, & Lou, 2015).

4.3 | Preliminary analysis: scores of subsequent DRSCA over three months, social support and optimism under different demographics and disease information

t Test and Pearson's correlation analysis showed that subsequent 3-month DRSCA did not differ in terms of demographics and disease information (Table 2). The subsequent 3-month DRSCA was significantly correlated with prior DRSCA (*p* < .01). In demographics, age, living alone and education were associated with social support. Complication was associated with optimism. Table 2.

4.4 | Hierarchical multiple regression analysis for subsequent DRSCA and results for optimism as a mediator

Hierarchical multiple regression analysis was employed to analyse the association of dimensions of social support and optimism with DRSCA over three months. The demographics and disease information was used for control based on *t* test and Pearson's correlation analysis.

In the hierarchical multiple regression analysis, at step 1, prior DRSCA were entered and were significantly associated with subsequent 3-month DRSCA (β = 0.565, *p* < .001). At step 2, objective support (β = 0.197, *p* = .010) and support use (β = 0.145, *p* = .036) were significantly associated with DRSCA, while subjective support (β = −0.039, *p* = .583) was not. At step 3, optimism ((β = 0.195, *p* = .003) was significantly associated with DRSCA. The total variance explained by the total independent variables was 42.4%. Variance inflation factor (VIF)<5 and tolerance (TOL)>0.2 showed that there was no multicollinearity. In the mediation analysis, subjective support, objective support and support use were not indirectly associated with DRSCA. Table 3.

5 | DISCUSSION

There are no similar studies examining both the association of the dimensions of social support and optimism with subsequent DRSCA over three months and the mediating role of optimism between the dimensions of social support and DRSCA. It is not certain whether the dimensions of social support and optimism leading to improved DRSCA and the subsequent DRSCA were used. The subsequent three months were chosen as it takes people around two to three months to establish a new healthy habit (Lally et al., 2010). This study indicated that social support and optimism were significantly associated with subsequent 3-month DRSCA among participants with T2DM.

It is widely known that social support comes from social networks including families, friends, neighbours, communities or anyone an individual can turn to for help. Prior studies have indicated that support from family members and friends was helpful in glycemic control by alleviating distress caused by diabetes (Baig, Benitez, Quinn, & Burnet, 2015; Lee, Piette, Heisler, & Rosland, 2018). In this study, we detailed the dimensions of social support from the perspective of subjective support, objective support and support use. Subjective support is the emotional experience of being supported and understood. Objective support refers to visible, practical or actual support. Support use is the degree of using support (Xiao, 1994). Although subjective social support was associated with life satisfaction (Dumitrache, Rubio, & Rubio-Herrera, 2016), this study showed that actual support and making use of support are more significant in facilitating subsequent DRSCA. One explanation may be that in diabetes self-management, people often meet obstacles and are more likely to implement DRSCA if they receive actual support in advance.

	Participants at both time points N = 155 n (%)/Mean (SD)	Participants baseline N = 251 n (%)/Mean (SD)	χ^2/t	p
Demographics				
Gender				
Male	90 (58.1)	140 (55.8)	0.204	.651
Female	65 (41.9)	111 (44.2)		
Age				
<65 years	100 (64.5)	154 (61.4)	0.409	.523
≥65 years	55 (35.5)	97 (38.6)		
Education				
<College education	117 (75.5)	189 (75.3)	0.002	.966
≥College education	38 (24.5)	62 (24.7)		
Living alone				
Yes	40 (25.8)	57 (22.7)	0.506	.477
No	115 (74.2)	194 (77.3)		
Smoking				
Yes	26 (16.8)	53 (21.1)	1.152	.283
No	129 (83.2)	198 (78.9)		
Drinking alcohol				
Yes	42 (27.1)	68 (27.1)	0.000	.999
No	113 (72.9)	183 (72.9)		
Disease-related information				
Received SSCE[a]				
No	86 (55.5)	144 (57.4)	0.139	.709
Yes	69 (44.5)	107 (42.6)		
Felt symptoms before diabetes diagnosis				
Yes	83 (53.5)	142 (56.6)	0.355	.551
No	72 (46.5)	109 (43.4)		
Family history of diabetes				
Yes	41 (26.5%)	67 (26.7)	0.003	.957
No	114 (73.5%)	184 (73.3)		
Diabetes duration				
<5 years	48 (31.0)	79 (31.5)	0.011	.915
≥5 years	107 (69.0)	172 (68.5)		
Perceived complications				
Yes	50 (32.3)	89 (35.5)	0.436	.509
No	105 (67.7)	162 (64.5)		
BMI[b]	24.5 (3.5)	24.4 (3.8)	0.220	.826
SBP[c], mmHg	133.3 (17.3)	132.6 (17.0)	0.437	.662
DBP[d], mmHg	77.2 (9.5)	77.0 (9.5)	0.124	.902

TABLE 1 The background information including demographics and disease information of participants and participants at baseline

[a]Standardized self-care education.
[b]Body mass index.
[c]Systolic blood pressure.
[d]Diastolic blood pressure.

For example, it was recently indicated that the intake of polyunsaturated fatty acids (PUFAs) was more beneficial for the long-term health of people with T2DM compared with total carbohydrates (Jiao et al., 2019). Having family providing a healthy diet is thus helpful for people with T2DM for implementing diabetic diet therapy. Objective support may also enhance DRSCA via psychological mechanisms by

TABLE 2 Scores of subsequent 3-month DRSCA under different demographics and disease information (N = 155)

Variables	Subsequent 3-month DRSCA Mean (SD)	t	p	Social support Mean (SD)	t	p	Optimism Mean (SD)	t	p
Demographics									
Gender									
Male	35.2 (9.4)	−0.828	.409	43.0(7.9)	0.708	.480	85.2(10.6)	0.801	.424
Female	36.6 (11.2)			42.1(7.5)			83.7(13.0)		
Age									
<65 years	36.3 (10.4)	0.868	.387	44.4(6.9)	4.115	p < .001	84.8(11.5)	0.276	.783
≥65 years	34.8 (9.6)			39.3(8.2)			84.2(12.1)		
Education									
<College education	34.9 (9.8)	−1.783	.077	41.5(7.9)	−3.294	.001	83.9(12.4)	−1.230	.220
≥College education	38.3 (10.9)			46.1(6.2)			86.6(8.6)		
Living alone									
Yes	34.2 (10.5)	−1.133	.259	38.6(9.5)	−4.033	p < .001	81.5(14.0)	−1.969	.051
No	36.3 (10.0)			44.0(6.5)			85.7(10.6)		
Drinking									
Yes	34.0(8.2)	−1.323	.187	43.6(8.4)	0.951	.343	85.2(12.1)	0.382	.703
No	36.4(10.7)			42.3(7.5)			84.4(11.5)		
Smoking									
Yes	34.9 (9.8)	0.510	.613	43.4(8.3)	0.544	.590	83.6(13.7)	−0.484	.629
No	35.9 (10.2)			42.5(7.6)			84.8(11.2)		
Disease information									
Received SSCE[a]									
No	35.5 (10.8)	−0.404	.687	43.2(7.9)	0.965	.336	84.4(12.0)	−0.265	.791
Yes	36.1 (9.4)			42.0(7.5)			84.9(11.3)		
Felt symptoms before diabetes diagnosis									
Yes	34.3 (10.6)	−1.952	.053	41.9(7.8)	−1.290	.198	83.0(11.9)	−1.831	.069
No	37.5 (9.4)			43.5(7.6)			86.4(11.2)		
Family history of diabetes									
Yes	37.0 (9.9)	0.903	.368	43.6(7.8)	0.974	.332	84.9(13.1)	0.207	.836
No	35.3 (10.2)			42.3(7.7)			84.5(11.2)		
Diabetes duration									
<5 years	35.2 (10.5)	−0.431	.667	44.0(7.1)	1.448	.139	83.9(10.7)	−0.510	.611
≥5 years	36.0 (10.0)			42.0(7.9)			84.9(12.1)		
Complication									
Yes	35.5 (10.7)	−0.248	.805	40.9(8.3)	−1.598	.052	81.5(13.3)	−2.318	.022
No	35.9 (9.9)			43.5(7.4)			86.1(10.5)		

Variables	*Pearson's correlation analysis*								
	r (Subsequent DRSCA)		*p*	*r (Social support)*		*p*	*r (Optimism)*		*p*
Prior DRSCA	0.565		p < .001	*0.211*		*p < .001*	*0.051*		*.155*
BMI[b]	0.102		.206	0.111		.169	0.010		.898
SBP[c]	0.013		.875	−0.081		.317	0.112		.164
DBP[d]	−0.126		.119	−0.008		.923	0.028		.734

[a]Standardized self-care education.
[b]Body mass index.
[c]Systolic blood pressure.
[d]Diastolic blood pressure.

TABLE 3 Hierarchical multiple linear regression for subsequent 3-month DRSCA and Bootstrapping method for optimism as a mediator

Independent variables		B^a	SE^b	β^c	t	p	Collinearity Statistics Tolerance	VIF[d]	Bootstrap Indirect effect	95%
Mode1	Prior DRSCA	0.520	0.061	0.565	8.479	.000	1.000	1.000		
Model 2	Prior DRSCA	0.456	0.061	0.496	7.507	.000	0.934	1.070		
	Subjective support	−0.089	0.162	−0.039	−0.551	.583	0.815	1.226		
	Objective support	0.569	0.219	0.197	2.594	.010	0.710	1.409		
	Support utility	0.605	0.286	0.145	2.113	.036	0.861	1.162		
Model 3	Prior DRSCA	0.432	0.060	0.470	7.237	.000	0.918	1.090		
	Subjective support	−0.144	0.159	−0.063	−0.906	.366	0.805	1.242	0.068	(−0.013)−0.196
	Objective support	0.539	0.214	0.186	2.523	.013	0.708	1.412	0.058	(−0.045)−0.195
	Support utility	0.606	0.279	0.146	2.173	.031	0.861	1.162	0.027	(−0.112)−0.167
	Optimism	0.170	0.055	0.195	3.065	.003				

[a]Unstandardized coefficients.
[b]Standard error.
[c]Standardized coefficients.
[d]VIF, The variance inflation factor.

buffering the negative consequences of stress (Ng & Jeffery, 2003). Another reason may be that support use may improve DRSCA by making information and resources available, which facilitates self-care behaviour and following treatment regimens (Wallston, Alagna, Devellis, & Devellis, 1983). The finding in the study suggested that in diabetes management, supportive resources should be provided as much as possible for people with T2DM and they should make use of these resources in a supportive environment.

This study indicated that participants who had a high level of optimism had higher subsequent 3-month DRSCA. It is suggested that people with T2DM and a high level of optimism are more likely to use effective coping strategies to solve problems, while pessimists are more likely focus on their emotions (Carver, Scheier, & Segerstrom, 2010). However, there is also a possibility that positive thoughts related with optimism might prevent people from feeling that they need to engage in health behaviours (Weinstein, 1989). The study showed that optimism facilitated the subsequent DRSCA for the people with T2DM. A possible explanation may be that optimistic people may be more capable of developing positive coping strategies and tend to strive to achieve health goals in any case (Brissette, Scheier, & Carver, 2002). This is new information and may arouse the attention of healthcare staff to the role of optimism in self-care programmes for patients with T2DM. Optimism can be boosted. For example, optimism can be improved by the best possible self (BPS) intervention. BPS refers to developing goals for and thinking about the best possible future self (Meevissen, Peters, & Alberts, 2011).

In addition, a high level of optimism could help avoid exaggerated stress reactions and modulate "stress-related autonomic and neuroendocrine dysregulation" (Puig-Perez et al., 2017, P536), which could buffer the influence of stress on health behaviour. The finding suggests that improving patients' optimism self-management programme (e.g. communicating about diabetes in a positive and

encouraging manner with patients) may help to attain a comparatively higher level of DRSCA. In this study, the median of optimism was 85, which was above middle level. The reason may be that most (69%) participants had diabetes for 5 years and they had some experience and knowledge of how to adapt and manage the disease themselves. Adequate adaptation may help avoid lower well-being and anxiety. Therefore, many participants may feel positive about their future life. However, when considering maximum DRSCA, objective support, support use and optimism should be boosted.

Another finding is that objective support and support use are directly and significantly associated with DRSCA and the indirect effect was not significant. It is indicated that there are more powerful factors associated with optimism, such as quality of life and psychological well-being, which are directly and positively associated (Rai, Jongenelis, Pettigrew, Jackson, & Newton, 2019); another consideration is that controls will lower the overall power and reduce the power for detecting true mediator effects. Further studies are needed to confirm the mediation of optimism between social support and DRSCA in different situations.

5.1 | Limitations

There are some limitations in the study. First, some patients were lost to follow-up (about 38%). We cannot exclude the potential impact of the loss to follow-up on the estimates in this study. However, we consider it unlikely to be substantial, since there were no significant differences between the participants at follow-up and those at baseline. In addition, without intervention, it may not be necessary to measure the DRSCA at two time points. However, we are not sure whether the behaviour is still stable with different levels of social support and optimism at baseline and as the disease condition changes. Therefore, measuring the DRSCA at two time points may provide different information.

Second, the present study measured optimism using a single item. Single-item scales, which are less time-consuming for participants, may have greater survey effectiveness, especially with elderly patients (Hoeppner, 2011). However, the validation of this single-item optimism scale in this study was not tested. The optimism single-item scale developed in Europe has good validity (Kemper et al., 2011). The validity of the similar single-item scale used in this study is possibly good, but due to cultural differences, it needs to be tested in further studies in the Asian culture.

Third, the sensitivity of the measures requires analysis in further studies and self-reports may have a risk of response bias (Johnson et al., 2017). Despite the limitations, self-report measures are one of the most feasible methods for data collection which "can provide actionable information" (Stirrattet al., 2015, P470). Finally, social support and optimism were not measured at different time points; although they are relatively stable without intervention (Dougall, Hyman, Hayward, McFeeley, & Baum, 2001), there may be dynamic changes in them that could not be explored. Despite the aforementioned limitations, importantly, our study observed that there is a significant association between social support and optimism with subsequent DRSCA over three months.

6 | CONCLUSION

The findings showed that objective support, support use and optimism are significantly important factors contributing to subsequent DRSCA. The finding suggested that providing actual support and encouraging people with T2DM to make full use of the support provided by healthcare staff can promote subsequent DRSCA. It was recently suggested that optimism is directly associated with subsequent DRSCA. This information adds the new knowledge that optimism is an important factor in the field of diabetes self-care. In clinical practice and health promotion, it is suggested that measures taken to improve optimism can lead to correspondingly better DRSCA. These findings indicate that it is necessary to use methods to identify the people with T2DM who have low objective support, support use and optimism as they are less likely to perform DRSCA well. Endeavours aimed at improving social support and optimism are highlighted to maximize patients' self-care behaviour in future clinical practice and research. Optimism is not significantly mediated between social support and DRSCA, implying that there may be other more powerful factors than social support associated with optimism.

7 | RECOMMENDATIONS FOR NURSING PRACTICE

The results suggested the importance of objective support, support use and optimism in facilitating DRSCA over time among people with T2DM. The findings indicate in detail that actual support is more significant than subjective support. In diabetes care education, encouraging people with type 2 diabetes to make use of the received support is no less important than getting support for DRSCA. This study also indicated that optimism enables people with T2DM to improve DRSCA. This information may direct nursing practice aimed at providing supporting resources to patients, encouraging them to make full use of these resources at the same time and explore their inner strengths, such as optimism. People with T2DM may differ in terms of levels of social support and optimism. Therefore, the findings may be helpful in directing healthcare professionals to evaluate and then promote corresponding social support and optimism to improve efficiency when strengthening patients' performance of self-care activities in China as well as globally.

CONFLICT OF INTEREST

No conflict of interest has been declared by the author(s).

AUTHOR CONTRIBUTIONS

L-K H, RS and FFZ: Study design; FFZ: Data collection; KJ and FFZ: Data analysis and interpretation; L-K H and RS: Study supervision; FFZ: Manuscript writing; L-K H, RS and KJ Critical revision for important intellectual content.

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