SELF CARE IN PATIENTS WITH COLOSTOMY: A STRUCTURAL EQUATION MODELING

LONGYAN BIAN

A DISSERTATION SUBMITTED IN PARTIAL FULFILLMENT OF
THE REQUIREMENTS FOR DOCTOR DEGREE OF PHILOSOPHY
(INTERNATIONAL PROGRAM)
IN NURSING SCIENCE
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ดุษฎีนิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรปรัชญาดุษฎีบัณฑิต (หลักสูตรนานาชาติ)

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The Dissertation of Longyan Bian has been approved by the examining committee to be partial fulfillment of the requirements for the Doctor Degree of Philosophy (International Program) in Nursing Science of Burapha University

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LONGYAN BIAN : SELF CARE IN PATIENTS WITH COLOSTOMY: A STRUCTURAL EQUATION MODELING. ADVISORY COMMITTEE: PORNCHAI JULLAMATE, POONPONG SUKSAWANG CHANANDCHIDADUSSADEE TOONSIRI 2024.

Self-care had a leading role in the perspective of recovery of the colostomy patients' health. The aim of this study was to determine factors influencing self-care in patients with colostomy. A total of 400 participants were recruited from 4 general hospitals out of 9 district general hospitals in Yancheng city using multiple stage sampling. Data was collected by a package of questionnaires. Structural equation modeling by AMOS software was used to test the model.

The results showed the final model fit the empirical data ($\chi 2$ =578.85, $p <$ .001, df = 140, CMIN/ df = 2.28, GFI = .90, AGFI =.86, CFI = .95, RMSEA=.06). The final model remained eight factors, and the total variance explained 83.2%. Health-promoting behaviors, eHealths literacy, knowledge, social support, skill, self-efficacy had positive effects and disease stigma, depression had negative effects on self-care. Health-promoting behaviors, social support had positively indirect effects through self-efficacy on self-care. Disease stigma had a negatively and social support had a positively indirect effect through depression on self-care. Health-promoting behaviors and social support had positively indirect effects through skills, and had negatively indirect effects through disease stigma on self-care. Health-promoting behaviors and eHealths literacy had positively indirect effects through knowledge on self-care.

These findings suggested that nurses could help to improve self-care in patients with colostomy by prompting their levels of health-promoting behaviors, eHealths literacy, knowledge, social support, skills and self-efficacy, decreasing the levels of disease stigma and depression.

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CHAPTER I

INTRODUCTION

Statements and significance of the problem

Colorectal cancer (CRC) which is one of the most common cancers, accounts for 10% of all cancers worldwide (May et al., 2014). In 2020, it was anticipated that there were over 1.9 million new instances of colorectal cancer and over 930,000 deaths from the disease worldwide. Among cancer incidences and mortality, colorectal cancer ranked third and second, respectively (Bray et al., 2018).China has about 376,000 new colorectal cancer cases and 191,000 deaths, about three and four times more than those in the United States, respectively (Chen et al., 2016; Gao et al., 2017). There has been a significant decline in colorectal cancer incidence in developed countries in the past 20 years. However, with the rapid development of China's economy and the change of residents' diet structure and lifestyle, the incidence of colorectal cancer in China shows a continuous growth trend, and most colorectal cancer patients were found in the middle and late stages (Wang, 2019). Globally, the number of new cases of colorectal cancer in China is the highest every year, accounting for 18.6% of all cases (Xian et al., 2018). Colorectal cancer has become one of the main malignant tumors that seriously affect the health of Chinese residents.

The treatment of colorectal cancer is still mainly surgery, and colostomy is often required. It is estimated that 35% of the colorectal cancer patients treated with surgery underwent colostomy (van Ommeren–Olijve et al., 2020). Worldwide, the number of people currently living with an ostomy is about 2,000,000 and 650,000 of them are settled in Europe (FAIS, 2018). There are about 100,000 colostomy patients in the United States every year, so far there are more than 1 million colostomy patients in total (Settlemire, 2017). There are approximately 135,000 neostomas

performed annually in the United Kingdom, including more than 100,000 colostomies patients and it is showing a continuous growth trend (Xian et al., 2018). In China, approximately 100,000 patients have been estimated to undergo colostomy every year from 2005 and on. The total number of colostomy patients was estimated to exceed 1,000,000 by 2015 and predicted to continuously increase according to a statistical study (Hu et al., 2014). The data suggests that in addition to maintaining the ostomy daily, patients have to cope with the changes that result in their body image, sexual function, cognitive functioning, work-related function, and psychosocial functioning due to the ostomy (Colwell et al., 2016; Davis et al., 2011; Furukawa et al., 2013; Lim et al., 2015; Recalla et al., 2013; Simmons et al., 2009). In a previous study of an integrated literature review, the stressors of a following colostomy can be classified as ostomy formation, diagnosis of cancer, preparation for self−care in the hospital, adapting to body image, altered sexuality and impact on social life and activities after discharge (Ang et al., 2013).

Creation of a colostomy profoundly influences individual's physical and psychosocial health (Brown & Randle, 2005; Chen et al., 2009; Lynch et al., 2008). On the physical side, patients with colostomy often have complications, such as flux, retraction, stenosis and parastomal herniation, and they also deal with daily stoma-related practical management issues, including stool leakage and odour. Psychosocial problems associated with colostomies comtain depression, anxiety, body image changes, self-esteem problems, sexual dysfunction, denial, loneliness, hopelessness, and stigma..Thus, for patients, it is critical to adjust to colostomy and have a negative impact on their quality of life (QoL). It has been shown in numerous studies that self-care abilities are related to successful adaptation to permanent colostomies (Cotrim & Pereira, 2008; Hu et al., 2014; Lim et al., 2015; Mota et al., 2015; Palma et al., 2012; Recalla et al., 2013). Self-care ability refers to the complex ability that individuals learned to maintain and promote health and physical and mental development. It significantly influences the individual's adjustment and plays a vital role in

rehabilitation following ostomy creation (C. Li, 2006; Piwonka MA & JM, 1999; Zhang J et al., 2006). When colostomy patients are hospitalized, the nurses will teach them the knowledge and skills of colostomy care, and after discharge, the patients must live with colostomy for a long time so they have to take care it by themselves while staying at home.

The concept of self-care refers to a naturalistic decision-making process through which patients interact with others to monitor their behaviors, maintain physiologic and psychological stability, and respond to symptoms that occur to promote their health. Riegel's theory of Self-care in Chronic Illness (ScCI) consists of three core concepts, including self-care monitoring, self-care maintenance, and self-care management. All concepts work together to maintain health and facilitate disease management. A varying linear relationship exists between the three concepts (Riegel et al., 2004). Though self-efficacy is not a part of self-care itself (Riegel & Dickson, 2008; Riegel, Driscoll, et al., 2009), self-efficacy moderates the relationship between self-care and outcomes (Kelly et al., 2005).

In addition to preventing and detecting changes in health status, self-care improves quality of life and clinical results, and reduces medical costs substantially (Jovicic et al., 2006). Patients with good self-care have better quality of life (Auld et al., 2018; Buck et al., 2012; Lee et al., 2015), lower hospitalization rates (Lee et al., 2017; Lee et al., 2011; Vellone et al., 2017; Xu, J. Gallo, et al., 2018; Xu, Z. Zhang, et al., 2018), and less mortality than those with poor self-care (Kessing et al., 2016). In the perspective of recovery of the patient's health, self-care has a leading role (Santos et al., 2019). However, it is found that the self-care ability of patients with colostomy is insufficient. Patients' level of engagement in self-care is suboptimal (van der Wal & Jaarsma, 2008), and recognizing and understanding self-care is a key challenge for health care providers worldwide (Eldh et al., 2004). At present, only a half of patients with colostomy in Europe are completely self-care after discharge (Jensen et al., 2013). Bulkley and colleagues (2018) examined the ongoing ostomy self-care

challenges of patients with colostomy and found that 63% of patients reported having at least one colostomy self-care problem.

In China, the studies have shown that the self-care ability of patients with permanent colostomy is mostly at a medium level which is lower than western countries (Luo et al., 2015; Xiao, 2016). Guo (2006) found that only 12.5% of patients with colostomy mastered self-care before discharge, and their knowledge and skills were less, which affected the postoperative recovery and their return to family and society. More than 60% of patients needed the help of others to implement colostomy care (Wan et al., 2010). Nurses often carry out alternative care to patients, and may not pay more attention to the cultivation of self-care in patients. Due to the lack of self-care ability, the risk of complications of patients is significantly increased, and the quality of life is reduced (Yu, 2004). Therefore, it is of great significance to improve the self-care ability of patients with colostomy (Fan & Zhu, 2015).

Some theories verified the factors with predicting self-care. Connelly (1993) believed in the self-care model, the factors that affected self-care including social support and health promoting behaviors. In Orem's Self-Care Deficit Theory, she emphasized patients' development stage, health status, socioeconomic, family and cultural factors, and aspects related to the health care system had a vital influence on self-care (Hartweg, 1991; Sampaio et al., 2008). According to Riegel's (2012) middle-range theory of self-care of chronic illness, it was believed experience and skills, confidence, social support, habits, functional and cognitive abilities affected self-care. Self-care is contextualized within specific cultural and situational domains, influenced by values, sense of control, confidence, and converged with features of individual healthcare (Gantz, 1990).

Through literature review, the researcher found the studies about the factors affecting self-care.

Disease stigma. As a complex phenomenon, stigma can be expressed subtly as well as overtly. The stigmatizing condition and the individual's social

circumstances can influence how it is experienced subjectively in multiple ways (Fife & Wright, 2000). It has demonstrated stigma has a negative impact on both the individual's self-concept and on the social responses of others (Link et al., 1997; Miles et al., 1997; Sęk, 1986). Patients with colostomy may have a strong sense of stigma due to perceptions of effluent odor, sound, and other changes in body shape associated with a fecal stoma (Danielsen et al., 2013). The stigma may lead to negative consequences for the individual and the society (Ernst et al., 2017; Yılmaz et al., 2017). Stigma can negatively affect patients' self-care ability (Du et al., 2016a; Kato et al., 2016). Stigma is strongly associated with depression, and increasing individualized support may reduce stigma (Cataldo et al., 2012; Hu et al., 2020; Raguram et al., 1996).

Health promoting behaviors. Health promoting behavior is defined as an expression of human actualizing tendency that is directed toward optimal well-being, personal fulfillment, and productive living (Pender et al., 2006). In Connelly's self-care model, health-promoting behaviors is one of the factors affecting self-care. The occurrence and development of colostomy complications are closely related to the patient's health behavior, which is an important factor affecting the patient's self-care ability (Li, 2006; Lu et al., 2018; Zhu et al., 2020). It is believed that promoting health behaviors is beneficial to the improvement of self-care ability. Patients with good health behaviors will pay more attention to their health and enhance the responsibility for self-care (Li, 2006). Studies found that skills and knowledge regarding colostomy care shown to influence health promoting behavior (Chamroonsawasdi et al., 2010; Conner, 2011; Shin et al., 2006; Stavropoulou et al., 2021; Thanavaro et al., 2006).

eHealth literacy. eHealth literacy was defined as one's ability to search, discover, evaluate, and understand health information from internet and apply this knowledge to solve health-related problems (Norman & Skinner, 2006). It can assist in estimating an individual's ability to engage with eHealth programs and interventions (Norman & Skinner, 2006), which can promote self-care ability and

self-care self-efficacy (Bashi et al., 2016; Boyne et al., 2014; Gee et al., 2015; Nolan et al., 2014). eHealth literacy had a direct and positive effect on knowledge and skill of patients, and eHealth literacy had significant and direct effects on self-care management (Chuang et al., 2019). eHealth literacy showed statistically significant positive correlations with health-promoting behaviors (Kim & Oh, 2021; Lee & Oh, 2020).

Knowledge. Knowledge refers to the patients with colostomy should master the knowledge of colostomy self-care, including diet, cleaning activities, and peristomal skin care---factors related to everyday life (Gao & Gu, 2007). Colostomy care knowledge was positively associated with psychosocial adjustment, inferring the greater the colostomy-related knowledge, the better the patient's self-care ability to colostomy (Cheng et al., 2013). Knowledge is necessary to effectively accomplish self-care (Cheng et al., 2013; van Der Wal et al., 2006; Wan et al., 2010). Lack of knowledge contributes to insufficient self-care (Riegel et al., 2012). Studies have shown that colostomy education from nurses provides ostomates with the self-care knowledge patients need to adjust to living with their colostomy (Grant et al., 2013; Sun et al., 2013). The studies revealed that better knowledge and skill enhanced self-care self-efficacy of patients, thereby improving self-care monitoring, self-care maintenance and management (Chuang et al., 2019; Massouh, 2017).

Depression. Depression as a psychiatric disorder is defined as the presence of the following: (a) a pervasive affective disturbance manifested by the patient feeling sad, depressed, and having crying spells or feeling like it; (b) physiological disturbances manifested by diurnal variation, difficulties in sleep, decreases in appetite, weight, and libido, constipation, tachycardia, and increased fatigue; (c) psychomotor disturbances manifested by either agitation or retardation; (d) psychological disturbances manifested by confusion, feelings of emptiness, hopelessness, indecisiveness, irritability, dissatisfaction, personal devaluation, and suicidal rumination (Zung & William, 1972). Depression was significantly associated

with lower self-care (Anjomshoa et al., 2014; Chan et al., 2012; Jerant et al., 2005; Riegel et al., 2007; Turner & Kelly, 2000; van der Wal & Jaarsma, 2008). Dekker (2014) concluded that the grave consequence of depressive symptoms was lessening patients' aptitude for self-care. Depression had a negative and direct effect on self-care maintenance (Chang et al., 2017; Chung et al., 2011; Lee et al., 2017; Riegel, Driscoll, et al., 2009; Siabani et al., 2013).

Social support. Xiao (1994) believed that social support should be divided into two categories, one was objective, visible or practical support, including physical direct assistance and social networks, presence and participation of group relationships; the other one was subjective, experienced, or emotional support, referring to the emotional experience and satisfaction what individuals are respected, supported, and understood in society, closely related to the individual's subjective feelings. Studies with social support should also include individual utilization of support. The studies found that social support was positively correlated with self-care ability of patients with colostomy (Kim & Kim, 2019; Wade, 1989; Wang et al., 2021; Zhang & Guo, 2008). However, some studies found that social support did not directly affect self-care monitoring, self-care maintenance and management, it positively affected these variables through self-care self-efficacy (Chuang et al., 2019; Massouh, 2017; Riegel et al., 2004). By directly influencing health-promoting behaviors, social support is associated with better self-care (Luttik et al., 2005; Shumaker & Hill, 1991; Suksatan & Ounprasertsuk, 2020; Umberson, 1987, 1992; Wan, 2019). It was demonstrated that emotional and practical support from others could reduce the occurrence of psychological distress, thereby reducing the level of depression (Lyons et al., 2013). Studies have shown that patients' self-efficacy has a positive correlation with the social support they receive (Maddy III et al., 2015; Qian & Yuan, 2012; Wang et al., 2015; Xu, J. Gallo, et al., 2018). There was a negative correlation between social support and stigma (Jin et al., 2021; Silva et al., 2017; Wei & He, 2017; Yuan et al., 2018).

Skills. Skills mean the patients' ability acquired by patients through learning to use their knowledge effectively and readily in execution or performance in self-care (Gao & Gu, 2007). Skills in self-care for patients is essential (Dickson & Riegel, 2009; Strömberg, 2005). For example, the patients with colostomy should master the skills of colostomy pouch replacement and colostomy irrigation. Patients should accord to environmental stimuli and situations to assess the level of skills being used. Zou (2018) found that the number of colostomy complications was negatively correlated with the knowledge and skills of self-care. Because of lack of knowledge and skills in colostomy care, complications were more likely to occur. Patients who have mastered the knowledge and skills and gained more experience of self-care will improve their self-efficacy (Frei et al., 2009; Li & Zhou, 2017; Lorig & Holman, 2003; Luther et al., 2018) .

Self-efficacy. Self-care self-efficacy or self-care confidence, which has been defined as the ability of the patient to engage effectively in self-care was an important variable influencing self-care (Riegel et al., 2012; Villa et al., 2019). It has been found that in patients with colostomies self-efficacy has a significant impact on self-care decisions and actions (Dickson et al., 2008; Heo et al., 2008; Maeda et al., 2013; Peters-Klimm et al., 2013; Sahebi et al., 2015; Schnell-Hoehn et al., 2009; Schweitzer et al., 2007). Al-Amer et al. (2016) found that self-efficacy had a direct relationship with self-care, and depression was clearly shown to be negatively and indirectly associated with self-care through self-efficacy. Self-efficacy is the key ingredient for successful self-management, and social support may influence self-care indirectly through self-efficacy (Lorig & Holman, 2003). It was demonstrated that depression was negatively correlated with self-efficacy (Campbell et al., 2004; Ding et al., 2017). Self-efficacy was seen to be the most important belief which is seen to be important in the initiation and maintenance of health promoting behavior (Bandura, 1977; Bauer et al., 2014; Lin et al., 2009; Wan, 2019). It was found a negative correlation between self-efficacy and stigma (Barroso et al., 2014; Knowles et al., 2017; Liu et al., 2021;

Su et al., 2017; Yuan et al., 2018; Zhang, Kwekkeboom, et al., 2015; Zhang, Wong, et al., 2015). The level of self-care self-efficacy influenced self-care monitoring, self-care maintenance, and self-care management directly and significantly, and it played an important role in mediating the relationships between the outcome variables (self-care monitoring, self-care maintenance, and self-care management) and the factor variables (depressive, social support, skill, and knowledge) (Chuang et al., 2019; Massouh, 2017). Self-care self-efficacy had an important role in explaining self-care monitoring, self-care maintenance and management (Ausili et al., 2014; Giordano et al., 2020; Riegel et al., 2012; Vellone et al., 2017).

The study tested the relationships of eight factors and self-care in patients with colostomy. By the definition, it is essential for patients to have the ability of self-care, including maintaining, monitoring as well as managing. Self-care requires patients not only to have health promotion behaviors to maintain well-being (self-care maintenance), but also to have the ability of self-care monitoring and self-care management. Patients need the abilities to make judgment and decisions according to symptoms and signs. They should be able to evaluate and determine whether necessary actions are needed.

As we know, most of studies are limited to single or a few factors about self-care, little is known about the relationships between potential factors. Meanwhile, studies specialized in self-care in patients with colostomy in China are rare. Riegel (2012) believed that cultural beliefs and values is one of the factors affecting people's self-care. China is a big eastern country with the largest population and more than 5,000 years of history and culture. Patients' self-care is linked to Confucian and Taoism. Furthermore, the context and healthcare system in China is different from western countries which lead to difference of self-care in patients. Hence, understanding the contributes of multiple factors of self-care in patients with colostomy in China is vital and necessary.

Yancheng is a city in the north of Jiangsu Province which is located in the coastal area of eastern China. With the development of economy and the change of people's life style, the number of patients with colostomy increases year by year (Sun, 2020). According to statistics, the number of patients with colostomy in Yancheng in 2020 is over 800 cases, which is consistent with the national incidence level (Sun, 2020).

This study applied structural equation modeling (SEM) to test the relationships of contributing factors and self-care in patients with colostomy. The result of this study might give us a clear relationship between the factors and the self-care ability of patients with colostomy.

Purposes of the study

Testing the relationship model among disease stigma, health promoting behaviors, eHealth literacy, knowledge, depression, social support, skills, self-efficacy and self-care in a sample of Chinese patients with colostomy.

Hypotheses

The following hypotheses were tested in this study:

1. Disease stigma had a negative direct effect, and indirect effect through self-efficacy, depression on self-care.

2. Health-promoting behaviors had a positive direct effect, and indirect effect through disease stigma, self-efficacy, knowledge, skills on self-care.

3. EHealths literacy had a positive direct effect, and indirect effect through knowledge, skills, health-promoting behaviors on self-care.

4. Knowledge had a positive direct effect on self-care.

5. Social support had a positive direct effect, and indirect effect through health-promoting behaviors, depression, disease stigma, skills, self-efficacy on self-care.

6. Depression had a negative direct effect, and indirect effect through self-efficacy on self-care.

7. Skills had a positive direct effect on self-care.

8. Self-efficacy had a positive direct effect on self-care.

Conceptual framework

The conceptual framework guiding this study is based on Self-care in Chronic Illness (ScCI). As a middle range theory, ScCI focuses on congruency between patients' demands and their chronic condition's needs when making health decisions (Riegel et al., 2012). Self-care maintenance, self-care monitoring, and self-care management are the three core concepts of ScCI. Self-care maintenance involves behaviors that improve well-being, preserve health, or maintain stability physically and emotionally. Self-care monitoring involves observing one's own signs and symptoms for changes. In self-care management, physical and emotional signs and symptoms are evaluated to determine what needs to be done. The three concepts have a varying linear relationship. Even though these concepts are unique, they all work together to maintain health and facilitate the management of illness.

In ScCI theory, there are eight factors affecting self-care, including experience and skill, motivation, cultural beliefs and values, confidence or self-efficacy, habits, support from others or social support and access to care. However, the theory does not give a clear idea of the relationships between the factors and self-care, and the relationships among the factors. In the study, the researcher chose 5 factors--skill, health-promoting behaviors (it comes from the theory factor--habits what means individual performs certain health-promoting behaviors in the daily routine), self-efficacy, knowledge (it comes from the theory factor--functional and

cognitive abilities what is associated with knowledge) and social support from the theory. The literature review showed that psychological factors, such as depression, disease stigma, and eHealth literacy, affected self-care (Chuang et al., 2019; Ding et al., 2017; Lorig & Holman, 2003; Luttik et al., 2005; Lyons et al., 2013).

This study selected the factors (social support, self-efficacy, knowledge, skill, depression, stigma, health promoting behaviors, eHealth literacy) from theory and literature review that affect patients' self-care of colostomy to test the directly or indirectly relationships among them as shown in figure 1.

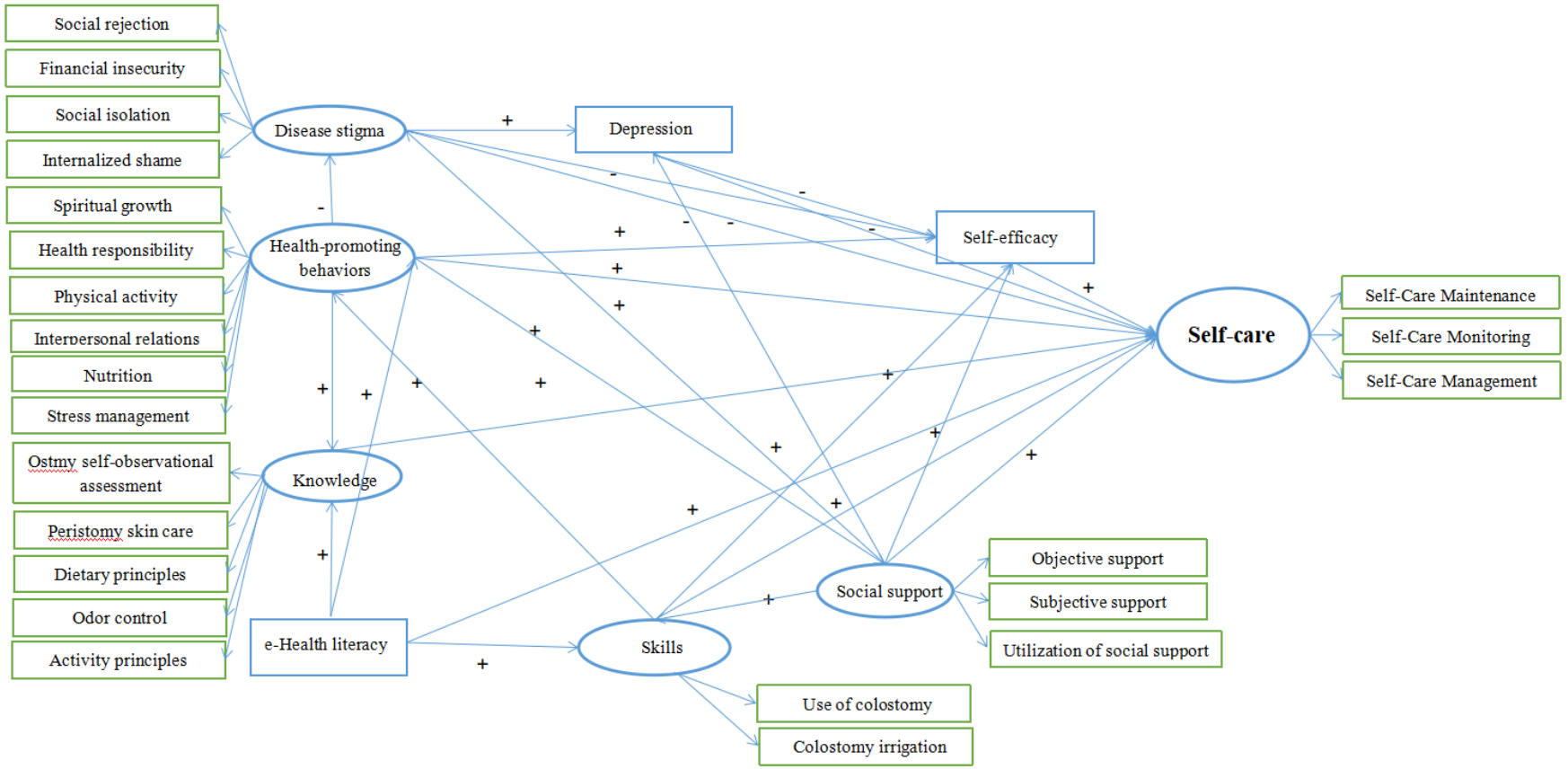


Figure 1 The hypothesized model of self-care in patients with colostomy

Scope of the research

An empirical of a cross-sectional structural model had be conducted to investigate the influence of eight predictors on self-care. The participants of this study were the patients with colostomy (aged 40 years or older) who lived in Yancheng city. Independent variables included disease stigma, health promoting behaviors, eHealth literacy, knowledge, depression, social support, skills, self-efficacy. Dependent variable was self-care in patients with colostomy.

Definition of terms

In this study, the following terms are defined:

Disease stigma is a complex phenomenon expressed both subtly and overtly, and it is subjectively experienced in a variety of ways that are partially dependent upon individuals' social circumstances and the nature of the stigmatizing condition (Fife & Wright, 2000). The disease stigma was measured by the Social Impact Scale (SIS).

Health-promoting behaviors is an expression of human actualizing tendency that is directed toward optimal well-being, personal fulfillment, and productive living (Pender, 2011). Health promoting behaviors was measured by Health-Promoting Lifestyle Profile II (HPLP II).

eHealth literacy refers to an individual's ability to search, discover, understand, and evaluate health information from electronic sources and use this knowledge to ascertain/solve health-related problems (Norman & Skinner, 2006). eHealth literacy was measured by the eHealth Literacy Scale.

Knowledge refers to the patients with colostomy should master the knowledge of colostomy self-care, including diet, cleaning activities, and peristomal skin care--factors related to everyday life (Gao & Gu, 2007). Knowledge was measured by Colostomy Self-care Knowledge Scale.

Depression refers to the presence of the following: (a) a pervasive affective disturbance manifested by the patient feeling sad, depressed, and having crying spells or feeling like it; (b) physiological disturbances manifested by diurnal variation, difficulties in sleep, decreases in appetite, weight, and libido, constipation, tachycardia, and increased fatigue; (c) psychomotor disturbances manifested by either agitation or retardation; (d) psychological disturbances manifested by confusion, feelings of emptiness, hopelessness, indecisiveness, irritability, dissatisfaction, personal devaluation, and suicidal rumination (Zung, 1986). Depression was measured by Self-rating Depression Scale (SDS) .

Social support refers to the possibility for individuals to approach and utilize other individuals, groups or larger societies, or dependence between individuals, individuals and groups (Yang, 1990). Social support was measured by Social Support Rating Scale (SSRS).

Skill refers to the patients' ability acquired by patients through learning to use their knowledge effectively and readily in execution or performance in self-care (Gao & Gu, 2007). Skill was measured by Colostomy Self-care Skill Scale.

Self-efficacy refers to the ability of the patient to engage effectively in self-care what is an important variable influencing self-care (Villa et al., 2019). Self-efficacy was measured by Ostomy self-care self-efficacy scale which was the subscale of Self-Care Index (OSCI) could be used independent.

Self-care is a naturalistic decision-making process that colostomy patients interact with others (family members, friends, and nurses) to monitor individual's behaviors, maintain physiologic and psychological stability and give the response to symptoms when they occur (management) to promote health. There are three components to self-care-maintenance, monitoring, and management (Villa et al., 2019). Self-care maintenance involves behaviors that improve well-being, preserve health, or maintain stability physically and emotionally. Self-care monitoring involves observing one's own signs and symptoms for changes. In self-care management,

physical and emotional signs and symptoms are evaluated to determine what needs to be done. Self-care was measured by Self-Care Index (OSCI).

CHAPTER II

LITERATURE REVIEWS

This chapter presents related literature review about self-care in patients with colostomy and its relevant factors. This literature review covers colorectal cancer, colostomy, colostomy effects patients' life, colostomy and self-care concept, and a discussion of factors influencing self-care in patients with colostomy.

Colorectal Cancer

Worldwide, colorectal cancer (CRC) is the second most prevalent cancer in women and the third in men. In 2012, it is reported 1.4 million cases occurring and accounts for more than 9% of all cancer incidence .There is significant regional variation in incidence across the world, with nearly 55% of the cases occurring in developed countries (Ferlay et al., 2013). These geographic differences may be attributable to different dietary and environmental exposures that are imposed upon a background of genetically determined susceptibility (Macrae, 2016). Countries with the highest incidence rates include Australia, New Zealand, Europe and Northern America. In contrast, in Africa, South-Central Asia and Central America, the incidence rates are low (Boyle & Langman, 2000; Ferlay et al., 2013; Torre et al., 2015).

Over the last two decades, CRC trends have varied in high-risk / high-income countries, declining in the United States, stabilizing in France and Australia, or gradually increasing in Finland, Norway, and Spain (Torre et al., 2015). On the other hand, CRC incidence rates have been rising in developing countries (Jemal et al., 2010). The greatest increases have been observed in Asia (Kuwait, Israel and China) and Eastern Europe (Czech Republic, Slovakia and Slovenia). This raise may reflect an increased prevalence of risk factors for CRC that are associated with

westernization such as unhealthy diet, excessive alcohol consumption, obesity and smoking prevalence (Center, Jemal, Smith, et al., 2009; Center, Jemal, & Ward, 2009; Martín et al., 2008). Additionally to these established risk factors, socioeconomic factors at the population level have increasingly been focused on (Maruthappu et al., 2016). Moreover, the global burden of CRC is expected to further increase due to growth and aging of the population (Boyle & Leon, 2002; Bray & Møller, 2006; Nowatzki et al., 2011). Sex is also believed one of the risk factors. As reported by the American Cancer Society, after the age of 50 years, the incidence of CRC in men is higher than that in women, with an incidence rate of 23.6 vs. 16.3 per 100,000 and a mortality rate of 10.8 vs. 7.2 per 100,000, respectively (Keum & Giovannucci, 2019).

CRC incidence rates rise with increasing age (Singh et al., 2014). It is uncommon among people younger than 40 to develop CRC, but the incidence begins to increase significantly between the ages of 40 and 50, and age-specific incidence rates rise further with each passing decade (Macrae, 2016). It is reported CRC incidence rate doubles with each 5-year age increasing until the age of 50 years old, then increases by 30% in subsequent groups aged 55 years and older (Siegel et al., 2020). However, the incidence of CRC among young adults is on the rise. Some data from cancer registries reported a rising incidence of large bowel cancer, particularly rectal cancer, among young adults, even under 40 years of age (Davis et al., 2011; Tawadros et al., 2015). As a result, the median age at diagnosis decreased to 66 years in 2015 - 2016 from 72 years in 2001 - 2002 (Siegel et al., 2020).

In China, CRC ranked fourth and fifth among all malignancies in terms of incidence and mortality in 2018. According to the Chinese Cancer Registration Report of 2018, which comprises population-based cancer registration data collected by the National Cancer Center, 387,600 new cases of CRC were reported in China in 2015, resulting in the fourth highest incidence and mortality rates in cancer worldwide (9.87%) and fifth highest mortality rates (8.01%), respectively (Wu et al., 2020). The

data indicated that the incidence rate of CRC increased with age, and the rate for males was higher than for females in all age groups.

Despite lower rates compared with the world average (incidence, 17.81/ 100,000 persons; mortality, 8.12/ 100,000 persons) (Chen et al., 2017; Wu et al., 2020), due to the relatively large population of China, CRC-related deaths and new cases are both the highest in the world (Feng et al., 2019). Under 25-year-olds had an incidence rate of 1/100,000 persons, a rate which climbed rapidly to 212.69/100,000 persons for males and 153.83/100,000 persons for females as they reached the 80-84-year-old group (Wu et al., 2020). A westernized lifestyle also contributes to the rise of CRC cases in the country, which poses a serious health threat and a heavy social and economic burden on the country. (Sun et al., 2020; Yin et al., 2019). Surgery is the most common treatment for colorectal cancer combined with radiotherapy and chemotherapy.

Colostomy

The colostomy procedure creates a stoma in the abdomen to drain stool from the large intestine (Raven, 2014). There are temporary and permanent colostomies. A permanent colostomy involves bringing the colon end through the abdominal wall and turning it under, like a cuff. The colon edges are then stitched to the abdominal wall skin to form an opening called a stoma. The stool drains from the stoma into an abdomen-attached bag or pouch (Tao et al., 2014). A temporary colostomy is created by cutting a hole on the colon side and stitching it to an abdominal hole. The colon can be detached from the abdominal wall and holes sealed later to reestablish stool flow (Wu, 2012).

The colostomy is a simple surgery, performed worldwide due to an obstruction, which consists of the construction of an orifice (stoma), in any segment of the colon (Engida et al., 2016; Moraes et al., 2012), being indicated for treatments of various pathologies (Pine & Stevenson, 2014). The formation of colostomy is

usually for treating colorectal cancer (CRC). Estimates suggest that there will be 910,190 newly diagnosed cases of colorectal cancer in men and 885,940 new cases in women in 2026 (Rouholiman et al., 2018). Approximately 18% to 35% of colorectal cancer survivors have received temporary or permanent intestinal ostomies as part of their cancer treatment (Sun et al., 2013).

Overall, the number of people currently living with a colostomy in the world is very large. It is estimated that there are more than 1,000 000 colostomy patients in mainland China, and there are approximately 100 000 new cases each year (Wan, 2019).

Colostomy effects on patients' life

As many researchers have suggested, colostomies have long-term physical and psychological effects, with a significant impact on social-psychological well-being. (Hu et al., 2014; Poletto & Silva, 2013; Recalla et al., 2013; Restorick Roberts et al., 2017). Individuals with colostomies must not only cope with the complications associated with surgery, but also overcome the underlying issues caused by it.

Colostomy formation generally has negative consequences on an individual's Health-Related Quality Of Life and may affect survivors' lifestyle in several ways. The colostomy surgery can cause physical and psychological problems (Brown & Randle, 2005; Simmons et al., 2007). In fact, colostomies can result in negative changes in a patient's diet, clothing, travelling, sports, sexuality, recreation, social activities, employment and intimate behaviors (Sun et al., 2013; Tao et al., 2014). Patients with colostomy may experience psychosocial problems, for example depression, anxiety, disgust, embarrassment, unacceptance, loss of personal control, low value, self-inferiority, insecurity about life, disease stigma, and isolation (Andersson et al., 2010; Boyles, 2010; Honkala & Berterö, 2009; Li, 2008; McVey et al., 2001; Simmons et al., 2007; Williams, 2008; Zung, 1965). Colostomy affects a

variety of areas, such as sexuality and body image perception, the worst cases were those that affected their psychological sphere. The literature findings showed that the colostomy clashed with patients' previous habits, leading to a difficult adapting process in managing the colostomy to the best of their capability. In a qualitative analysis by Krouse (2009), although colostomy care has improved, quality of life among those with a colostomy has not improved because of psychosocial adjustment issues. Simmons (2007) showed psychosocial adjustment in patients with a permanent colostomy was positively related to quality of life; patients who had high psychosocial adjustment scores enjoyed high quality of life. Surgery can have a profound impact on sexuality, but many patients don't openly address this issue. Patients with a colostomy may experience embarrassment and disgust regarding intimacy and may be anxious about leakage, odors, or being seen with the colostomy (Taylan & Akıl, 2019). These feelings make them reluctant to return to the sexual lives they had before surgery (Ayaz & Kubilay, 2009; Beck & Justham, 2009; Bossema et al., 2011; Burch, 2005; Eveno et al., 2010; Junkin & Beitz, 2005). A descriptive study in Turkey conducted among 56 couples showed half of the couples cannot return to their usual sexual lives after the operation, and female patients become less active in their sexual lives (Çakmak et al., 2010).

Creating colostomies can cause the patients to experience a variety of complications (Hu et al., 2014). It has been found that up to 43% of patients with colostomies experience complications (Colwell et al., 2001; Persson et al., 2005; Ratliff et al., 2005). According to research, complications can arise from colostomy formation for a lifetime; however, the risk is highest in the first five years.and the overall incidence rates of complications vary from 21% to 60% (Sun et al., 2013). 22% to 68% of patients suffer from early complications, such as stomal ischemia and necrosis, retraction, parastomal infection, and skin problems (Andivot et al., 1996; Mahjoubi et al., 2005). Up to 58% of patients suffer from late complications, including parastomal herniation, prolapse, stenosis, and dermatological complications

(Londono-Schimmer et al., 1994). There are nearly 10% of patients with multiple late complications (Londono-Schimmer et al., 1994) and up to one-third of complications need revisional surgery (Andivot et al., 1996). As a result of the symptoms of stomal or peristomal complications, ostomy adjustment is hindered by physical and psychological distress they cause (Hu et al., 2014).

In a qualitative study, published in Villa et al. (2018), 11 participants were interviewed using open-ended questions on life with an ostomy and from their data collection 6 main themes emerged. In terms of surgical impact, patients reported a lack of preparation and psychological support, resulting in little knowledge with adverse effects; As a consequence, a satisfactory preparation and adequate information were able to lead to less anxiety and a greater capability to handle the surgery and its effects. Therefore, good preparation and adequate information were able to lead to less anxiety and enhanced ability to cope with surgery and its aftermath. In respect of body image, the interviewees referred physical consequences as well as psychological ones. It emerged from the interviewees that some patients were confident enough to handle colostomy management independently, while others were unsure due to physical limitations. Lastly, all interviewees emphasized that family and friends were extremely important during the time when they were adjusting to the new state of health, and indicated that they received a lot of support from them. There have been quite a few advancements over the years in stoma appliance technology and the number of colostomy therapists, but levels of maladjustment have not changed much over time (Simmons et al., 2007).

Nowdays, there are still many challenges and adaptations specific to ostomies that are not clearly defined in current research. In order to develop comprehensive supportive care strategies for colorectal cancer survivors, it is crucial to understand the long-term and persistent ostomy-specific concerns and adaptations (Sun et al., 2013).

There is growing interest in promoting colostomy self-care efficiency to fight common challenges associated with colostomy creation (Hardiman et al., 2016). Optimal ostomy adjustment and outcomes require effective self-care in patients with colostomies.

Colostomy and self-care

Patients' new life condition needs to be handled by behaving what literature defines as adjustment, a psychological process that evolves when people, and the ones belonging to their social group, learn how to adapt to the various challenges following a new diagnosis (Chen et al., 2013; Riemenschneider, 2015; Simmons et al., 2007). Therefore, adjustment to a colostomy can be defined as the reaction to the psychological, social and sexual impact of it as it is perceived from the patient (Simmons et al., 2007; Zhang, Wong, et al., 2015). Several factors, including age, unemployment, low income, retirement, inability to take care of the colostomy, not participating in support groups, shame feelings and worries about smells are associated with a low level of adjustment.(Hu et al., 2014; Jensen et al., 2013). Regional or cultural factors may affect the level of adjustment to a colostomy as well (Hu et al., 2014).

Furthermore, those who believe they can manage more tasks independently show better adjustment to colostomy care and perceive quality of life (QOL) better as a result, which makes colostomy care more efficient (Bekkers et al., 1996; Recalla et al., 2013; Riemenschneider, 2015; Simmons et al., 2007; van Houtum et al., 2015). Findings from Liu and colleagues' (2021) study indicated that participants who could self-care their colostomy reported have higher QOL. Self- care of one's colostomy is a crucial factor in determining QOL. (Lopes & Decesaro, 2014; Villa et al., 2018; Xian et al., 2018). Therefore, in both research and clinical practice, self-care plays an important role in chronic illness care.

In the 1970s, the term “self-care” first appeared in healthcare literature (Levin, 1976). Various sociopolitical factors have contributed to the evolution of the concept over time with varying degrees of attention (Wilkinson & Whitehead, 2009). Due to the shift in disease patterns from acute to chronic, chronic disease management was taken to a new level (Plews, 2005). Self-care has been viewed as a hidden healthcare resource and a way to bridge the gap between supply and demand for health care services (Chapple & Rogers, 1999). The evolution of self-care has been impacted by social reforms such as increased patient autonomy, better access to information, civil rights, and informed consent (Wilkinson & Whitehead, 2009).

Self-care has been described as a “movement, concept, framework, model, theory, process, or phenomenon” (Gantz, 1990). The development of self-care has been affected by a variety of social movements, which have directly and indirectly influenced the disciplines of medicine, psychology, public health, as well as nursing (Gantz, 1990; McCormack, 2003). Various disciplines embrace different perspectives on self-care, and these differences have contributed to the variety of perspectives that exist today. Nursing, medicine, public health, psychology, anthropology, and economics have all contributed to the development of self-care knowledge and subsequently influenced its use and evolution in nursing. Various definitions have resulted both within and outside the nursing profession (McCormack, 2003).

Self-care has been defined by the WHO as “the activities individuals, families and communities undertake with the intention of enhancing health, preventing disease, limiting illness and restoring health” (Elissen et al., 2013; Jaarsma et al., 2017). The concept of self-care is defined differently by different disciplines. For nursing, self-care is based upon defining the patient's treatment goals and assessing the ability of the patient to perform those activities in order to attain those goals (Deek et al., 2016). Self-care has been identified as having many benefits in terms of patient and economic outcomes and consequently features as a key element of the United Kingdom (UK) government’s recent health reforms, favouring a

proactive model of care targeting the management of long-term conditions (Department of Health, 2000, 2005, 2006; Scottish Executive, 2003, 2005a, 2005b). If health care professionals understood how patients self-care, they could identify patients' struggles and assist them accordingly. Therefore, effectual interventions could be developed to improve the outcomes of patients with chronic illness based on this knowledge (Riegel et al., 2012). Published analyses of the historical evolution of the concept of self-care showed a lack of consensus on definitions and terminologies. Terms such as self-care, self-management, self-regulation, self-monitoring, self-efficacy, adherence, are often used interchangeably and a clear definition of this terms are not completely provided.

Dorothea Orem et al. (1995) built a nursing theory based on the concept of "self-care" defined as "the practice of activities that individuals initiate and perform on their own behalf in maintaining life, health and well-being" . Levin and Idler (1983) referred to "self-care" as those activities undertaken in promoting health, preventing disease, limiting illness and restoring health. Even if these terms have been used for several years within the health care literature, a low level of agreement has been found about their meaning and implication for practice. Some authors suggest interpreting "self-care" as a preventive strategy performed by healthy people, while "self-management" should indicate one's ability to manage specific problems due to chronic condition. More recently, other authors focused on the concepts of "self-help", "activation" and "patient engagement" to highlight the active role of the patient into the health care team. Grey in 2006 was the first author to write about "self- and family-management" (Ausili et al., 2014); Self-care maintenance, self-care monitoring, and self-care management are three key dimensions of the middle range theory 'self-care in chronic illness (ScCI)' (Riegel et al., 2012).

According to the theory of ScCI (Riegel et al., 2012), colostomy self-care is 'a naturalistic decision-making process that influences actions related to maintaining the physiological stability of the stoma and peristomal skin (self-care maintenance),

facilitates the perception of problems and complications (self-care monitoring) and directs the management of these problems and complications (self-care management)'. Self-care ability refers to the complex ability that individuals learned to maintain and promote health and physical and mental development. In colostomy patients, better self-care has been found to be associated with better quality of life (Zhang et al., 2019), better adjustment (Xian et al., 2018), and reduced rehospitalizations (Hardiman et al., 2016). There is a positive correlation between self-care and general health status and quality of life, but a negative correlation between self-care and pain, disability, and cost (Ausili et al., 2014). In previous studies, self-care was found to play a critical role in the management and care of colostomies (Tao et al., 2014). The ability of self-care in colostomy patients was identified as an important adjustment factor (Cheng et al., 2013). Metcalf (1999) found patients who mastered self-care skills make better social adjustments and psychosocial adjustment. The results of the studies suggested that patients should handle colostomy care independently and preferably before being discharged from the hospital..

Considering colostomy patients' self-care behaviors within a cultural context is consistent with an anthropological understanding of disease perceptions (Moser et al., 2012). The Chinese cultural background determines self-care specific to colostomy patients. In contrast to Western perspectives on self-care, which believe that it is the individual's responsibility to care themselves (Richard & Shea, 2011). According to Confucian family ethical principles, the responsibility to provide care to the sick belongs to the family, and violating this duty will lead to moral failure (Wong & Pang, 2000). Despite self-care being considered the basis of fulfilling filial piety (Lin et al., 2009), the predominant role played by family caregivers may result in unique self-care behaviors in Chinese patients with permanent colostomies.

Moreover, in mainland China, there are several issues in the field of colostomy nursing care. (a) Some are similar to other countries, for example

insufficient discharge preparedness to perform colostomy care at home among patients and their caregivers due to shortened hospital stays (Richbourg et al., 2007). At present, China has limited medical resources, in the absence of special circumstances, a colostomy patient's hospitalization is usually only one week after operation what limits the time for education (Wu et al., 2007; Zheng et al., 2017) and patients are not likely to receive the physical and emotional support needed to adjust to the new reality of having a colostomy. (b) The continuity of nursing care for colostomy patients after discharge is lack (Beaver et al., 2010). At discharge, many patients have been unable to master the necessary knowledge and skills needed for colostomy self-care (H. K. M. Wu et al., 2007; Zheng et al., 2017). The sudden loss of nursing care and expertise for a patient who has neither adapted psychologically to having a colostomy nor learned how to self-care colostomy has a decidedly negative impact on the patients' health and quality of life (Couwenberg et al., 2018; Hüser et al., 2008; Mahalingam et al., 2017). Nurses still have to do a good job of follow-up care after the patients are discharged. (c) There are very few enterostomal therapists (ET) in China, and most of them work in big urban hospitals, so patients rarely see ETs after they discharge (Cheng et al., 2013). Because of lack of routine colostomy home visits in the community, and a limited number of ET nurses (Xu et al., 2010), the post-discharge needs of colostomy patients are paucity of attention (Zhang et al., 2013).

Factors affecting self-care in patients with colostomy

From the theory and literature review, the researcher selected eight factors influencing self-care in patients with colostomy to study, including disease stigma, health promoting behaviors, eHealth literacy, knowledge, depression, social support, skills, self-efficacy.

Disease stigma

Stigma refers to an attribute that is deeply discreditable and could be characterized as a "mark" of social disgrace; it arises within social relationships and disqualifies those who bear it from full social acceptance (Goffman, 1963). In 1963, Goffman introduced the concept of stigma to psychology and suggested that stigma causes a normal and integrated person to become discounted and tainted; consequently, other people in society label these people as undesirable. There are three different types of stigma, including (a) "abominations of the body", such as physical deformities; (b) "blemishes of individual character", such as addiction or unemployment; and (c) "tribal identities", such as religion or ethnicity (Goffman, 1963). People who possess such characteristics acquire a "spoiled identity" associated with various forms of social devaluation. Stigma not only increases the potential harm of the disease but also leads to unhealthy psychological and social statuses among patients. Because of stigma, some people avoid social interactions and even isolate themselves completely, thereby negatively affecting their clinical encounters, the effects of therapy, their marriages and other aspects of their life (Carter-Harris et al., 2014; Meacham et al., 2016). Stigmatized patients might blame and criticize themselves along with facing discriminated against by others; as a result, these patients might feel ashamed, and their mental states might worsen, thereby reinforcing a vicious cycle (Phelan et al., 2013; Quinn & Chaudoir, 2009). The source of stigma differs according to the disease. Research on stigma has mainly been carried out among patients with mental illnesses, HIV, and cancer (Catalano et al., 2021; Ernst et al., 2017; Logie et al., 2021).

Evidence suggests that both colorectal cancer and the presence of a colostomy influence experiences of privacy, resulting in stigma (Palomero-Rubio et al., 2018; Xu et al., 2016). Patients with colostomy may have a strong sense of stigma due to perceptions of effluent odor, sound, and other changes in body shape associated with a fecal stoma (Danielsen et al., 2013). The stigma can lead to negative

consequences for the individual and the society (Ernst et al., 2017; Yılmaz et al., 2017). Geng et al. (2022) found that the degree of stigma was associated with the course of the disease; that is, the longer the course of disease, the worse the social function.

Stigma is associated with cultural backgrounds (Jin et al., 2021). Confucianism is the backbone of Chinese culture. In the time of Confucius and Mencius, a classical work, later called *Xiao Ching*, was written that elucidates Confucian filial piety. According to this book, "the body, hair, and skin given by the parents must not be ruined; this is the beginning of filial piety". In addition, the standpoint of unity among humans and the universe was an important principle of Taoism and traditional Chinese medicine (TCM); Thus, the Chinese have difficulty in accepting a colostomy because it disrupts harmony with nature (Zhang, Kwekkeboom, et al., 2015). Furthermore, many Chinese people, even those who are not Buddhist, have been influenced by Buddhism. Patients often use *yin* and *guo* ("cause" and "effect") to attribute their illness to previous faults and subsequently experience self-blame reactions and stigmatized responses (Shih, 1996). The visibility of the colostomy was an important predictor of stigmatization, which can affect interpersonal interactions and psychosocial well-being (Knapp et al., 2014). Stool leakage embarrassed both the patients and the people around them, especially during formal social occasions (Bulkley et al., 2013; Mrak et al., 2011; Williams, 2008). Younger patients are most likely the breadwinners of the family; their careers might show upward mobility or be at their pinnacle, and they often must interact with society. After surgery, the colostomy damages these young patients‟ lives and careers (Zhang et al., 2017).

Du et al. (2016a) tested the relationship of quality of life with stigma and self-care ability of Chinese patients with permanent colostomy using structural equation modeling [SEM] and found that stigma could negatively affect patients' self-care ability (β=-0.21, p<0.05), and their quality of life directly (β=-0.28, p<0.05).

Patients' QOL might be directly affected by their self-care abilities (β=0.57, p<0.05) but patients' ability to self-care could be indirectly affected by stigma. Kato and colleagues (2016) conducted an examination of the relationship between stigma and self-care behaviors in patients with type 2 diabetes by a cross-sectional study. Patients' activation levels of their self-care behaviors was negatively significant associated with stigma. Thus, results suggested that stigma strongly predicted patients' activation levels for self-care behaviors.

Studies found that stigma affects patients' depression. One study directly explored the relationship between depression severity and stigma (Raguram et al., 1996). Psychiatric outpatients diagnosed with depression and somatoform disorders were interviewed in this study conducted in South India. Based on qualitative data, the stigma score was calculated, with greater perceived stigma being associated with more severe depression. Stigma is strongly associated with depression, and increasing individualized support may reduce stigma (Hu et al., 2020). A vicious cycle of depression severity and psychosocial impairment may result from the relationship between stigma and self-esteem (Link et al., 2001; Searle, 1999). In cognitive behavioral models of depression, those suffering from more severe depression may exhibit cognitive distortions that accentuate all-or-nothing thinking (Beck, 1967). Stigma detrimentally affected cancer patients' psychosocial well-being, such as depression, anxiety and distress and quality of life (Cataldo et al., 2012).

Health-promoting behaviors

Health behavior was first proposed by Kasl et al. in 1966 that health behavior was behavior taken by individuals to prevent disease or early detection of disease (Sun et al., 2015). Rice, Duff and other scholars have also put forward the relevant concepts of health behavior (Zhang & Guo, 2008). In 1982, American nursing scientist Pender referred to the framework of expectation-value theory and social perception theory, and proposed the Pender's health promotion model for the first time in a nursing article. The definitions of health behaviors has been in a variety

of ways (Pender, 1996). Conner and Norman (1996) define them as any activity intend to prevent, detect, or improve health or well-being. Gochman (*Handbook of health behavior research II: Provider determinants*, 1997) defines as "behavior patterns, actions and habits that relate to health maintenance, to health restoration and to health improvement" (Vol. 1, p. 3). Health promoting behavior refers to a social behavior and social strategy that uses administrative or organizational means to mobilize and coordinate various sectors of society, communities, families, and individuals, fulfill their respective responsibilities for health, and jointly maintain and promote health (Orem, 2000). Health Behavior attainments in planning and changing unhealthy behavior, to achieve a higher level of health (Khodaveisi et al., 2017).

Nola Pender defined "Health-promoting behavior was an expression of human actualizing tendency that is directed toward optimal well-being, personal fulfillment, and productive living" (Pender, 2011). According to Pender et al. (2006), healthy behaviors are composed of six components: (1) self-care responsibility; (2) physical activity; (3) food consumption; (4) spiritual growth; (5) interpersonal attachment; and (6) stress management Therefore, if patients have appropriate health-promoting behaviors, the patients can take good health care for themselves. Zhu and colleagues' (2020) study showed that improving health promotion behavior of elderly hypertensive patients in the community was beneficial to improving the self-care ability of patients. Health-promoting behavior in the elderly was positively correlated with self-care ability. This result was consistent with the study of Lu et al. (2018) who believed that the self-care ability of the patients with hypertensive emergency could be improved by promoting their health-promoting lifestyle. In Connelly's self-care model, health promoting behaviors is one of the factors affecting self-care. Li (2006) found that the occurrence and development of colostomy complications were closely related to the patient's health promoting behavior, which was an important factor affecting the patient's self-care ability, and good health behaviors could promote the self-care ability of patients with colostomy. Patients with good health behaviors will

pay more attention to their health and enhance the responsibility for self-care (Li & Zhang, 2015).

Knowledge and skills about behavior–health links were important factors in an informed choice concerning health behaviors (Conner, 2011). Interpersonal factors such as knowledge and skills have been shown to influence health-promoting behavior (Chamroonsawasdi et al., 2010; Shin et al., 2006; Thanavaro et al., 2006). The patients master the health knowledge and skill of colostomy care, which can help them solve practical problems and improves their health behaviors (Ma et al., 2013; Yi et al., 2017). The research indicated that health-promoting behaviors were more likely to be engaged by individuals who perceive they had some control over health (Becker & Arnold, 2004). Generally, these people are more autonomous and self-determined in their behaviors and possess the necessary lifestyle self-care skills. The better health-promoting behavior of colostomy patients will help them learn more colostomy self-care knowledge and skills to enhance the ability to self-care (Stavropoulou et al., 2021).

As a negative factor, disease stigma affects the patient's physiology, psychology, and social interaction, disrupting the patient's normal life, affecting the patient's ability to perform, and making it difficult for the patient to maintain healthy behaviors. Fei (2020) found that there was a negative correlation between health-promoting behaviors and disease stigma by means of correlation analysis in stroke rehospitalized patients (r = -1.30, $p < 0.05$). Chen et al. (2023) found a significant correlation between high scores on health-promoting behaviors and low scores on stigma in hemorrhoid patients ($p < 0.05$). He et al. (2023) came to the same conclusion in their study of the relationship between health-promoting behaviors and stigma in patients with colostomy finding a correlation between the two variables.

eHealth literacy

Norman and Skinner (2006) stated that searching for, understanding, and evaluating health-related information on the internet, as well as applying knowledge

to address and solve health problems, is the essence of eHealth literacy Information and communication have rapidly developed during the Fourth Industrial Revolution, which has sparked a growing interest in using various digital sources to acquire and use health information. With the increasing number of people actively searching for and using health information on the internet, the concept of "e-health" has emerged. (Koch-Weser et al., 2010). In 2016, electronic health (e-health) is a term used by the World Health Organization (WHO) to describe people checking their health information online through technology. People who are interested in health and are open to learning about preventative measures usually seek online health information..

Nowadays, ehealth has been greatly expanded to service contents, health care providers, health consumers, and systems (WHO, 2018). Thus, the role of ehealth information is becoming more important (Watkins & Xie, 2014). Health information can be accessed via smartphones and tablets, increasing the accessibility of the Internet for elderly. Though older adults began using the Internet later than younger generations, their usage is growing rapidly (Oh, 2018). Elderly are more likely to suffer from health issues than young adults, so searching health information on the Internet can provide them more valuable information (Chuang et al., 2019). Older adult can use the Internet to gain more health knowledge and skills, communicate with medical professionals, seek health services, and take part in health programs (Watkins & Xie, 2014).

More than a few lines of evidence converge to conclude that ehealth literacy is key to successful self-care (Macabasco-O'Connell et al., 2011; Moser & Watkins, 2008). Low ehealth literacy may create a barrier to performance of self-care (Evangelista et al., 2010). Chuang et al. (2019) found eHealth literacy had a direct and positive effect on heart failure knowledge, skills and self-care management, but not on self-care maintenance, indicating that patients with heart failure with better eHealth literacy exhibit better self-care management and greater failure knowledge and skills. Macabasco-O' Connell et al. (2011) demonstrated that patients with adequate literacy

had higher heart failure knowledge (mean 6.6 versus 5.5, $p<0.01$), higher self-efficacy (5.0 versus 4.1, $p<0.01$), and higher prevalence of key self-care behaviors ($p<0.001$) than those with low literacy. Low ehealth literacy may create a barrier to heart failure knowledge and skills acquisition (Chen et al., 2013; Gazmararian et al., 2003). Some studies revealed ehealth literacy was significantly associated with higher specific knowledge, skills and self-care self-efficacy. Participants with inadequate ehealth literacy had less heart failure knowledge than participants with adequate (Chen et al., 2013; Dennison et al., 2011).

Kim and Oh (2021) conducted the study to explore possible multistep and indirect pathways of association between ehealth literacy and health-promoting behaviors among nursing students and they found that ehealth literacy showed statistically significant positive correlations with health-promoting behaviors ($r = 0.37$, $p < 0.001$). It is showed that there was a significant positive correlation between self-care and e-health literacy as well as health-promoting behaviors. A study by Lee et al. (2020) also reported ehealth literacy enhanced self-care ability and self-care ability was associated with ehealth literacy and health-promoting behaviors.

Specific Knowledge

For the duration of patients with permanent colostomies' lives, they need to wear feces collection appliances. In order for patients to return to their previous lives, they must learn the ways to care for colostomies, identify problems, and treat potential complications. The current studies revealed colostomy patients who frequently communicated with medical staff, had a higher level of understanding / knowledge/ skill of colostomy self-care, and significantly better self-care ability (Xian et al., 2018). Previous studies have shown a significant improvement in self-care, quality of life and medication persistence among colostomy patients after receiving education of knowledge and skill about colostomy self-care compared with colostomy patients who did not receive such education (Blevins, 2019). Knowledge is necessary to effectively accomplish self-care (van Der Wal et al., 2006). A descriptive study

investigated the correlation between colostomy knowledge, self-care ability, and psychosocial adjustment in Chinese outpatients with permanent colostomies (Cheng et al., 2013). The findings showed that self-care ability was higher in patients with high levels of knowledge..It was helpful to provide information and emphasizing/teaching self-care to patients with colostomies so they could adjust to their daily lives and social life. Wang and colleagues (2010) believed as time went by patients would slowly adapt to the physiological and psychological changes caused by colostomy, and accumulated colostomy care knowledge continuously would improve the patients' self-care ability. According to the survey, 94% of Chinese patients lacked colostomy care knowledge and skills after surgery (Meng et al., 2011), and 60% of patients cannot self-care colostomy during hospitalization (J. Q. Xu et al., 2016). The patients with colostomy need most is the knowledge and skills about colostomy self-care (Du, 2019). Therefore, with the more knowledge and skills, the patients can do self-care well and knowledge was shown to be directly associated to self-care. Riegel (2012) emphasized that lack of knowledge, misunderstandings, and misconceptions contributed to inadequate self-care.

Chuang's (2019) study revealed that improved knowledge of heart failure enhanced patients' self-care self-efficacy, resulting in improved self-care monitoring, maintenance and management. Liou and colleagues (2015) performed a recent quasi-experimental design to investigate the effectiveness of a self-care program in patients with heart failure and it was found that self-care maintenance, management, and self-efficacy significantly improved after the self-care education program was completed indicating that the self-care knowledge had significantly positive effects on self-care maintenance, management, and self-efficacy. Massouh (2017) believed that there was a positive and moderate correlation between specific knowledge and self-care maintenance and self-efficacy, and there was a weak positive correlation between specific knowledge and self-care management. Self-care self-efficacy mediates knowledge and maintenance.

Depression

Depression is a serious mental health condition which causes extreme sadness and can have a negative effect on individual's motivation, behavior, health and quality of life. Patients with chronic conditions often develop mental health problems, most commonly depression, stress and anxiety, that may worsen the disease and these may also affect the patient's ability to self-care that disease (Anjomshoa et al., 2014; Turner & Kelly, 2000). Jerant et al. (2005) identified depression was one of barriers to self-management. Riegel et al. (2007) found poor self-care was associated with higher depression scores in patients with chronic illness. van der Wal and colleagues (2007) found that depression was significantly associated with lower self-care. Dekker (2014) concluded that patients with heart failure suffer from depression symptoms for a variety of reasons, including factors vaguely associated with their disease, and grave consequences that affected their ability of self-care. In the study of Al-Amer (2016), a negative correlation was found between depression and self-efficacy ($r = 0.242$; $p < 0.001$), in adult Jordanians with type 2 diabetes, self-efficacy positively correlates with self-care activities ($r = 0.405$; $p < 0.001$) by SEM. The finding of Chan et al. (2012) reported that a direct correlation was found between self-care and depression in people with diabetes. Consistently, in a systematic review and meta-analysis, researchers concluded that depression ($r= -0.19$, $p < .001$), self-efficacy ($r = 0.37$, $p < .001$) were weakly but significantly associated with self-care (D. Kessing et al., 2016)

Depression in patients with heart failure were found to directly and negatively affect self-care maintenance, highlighting their potential in decreasing patients' ability to perform self-care maintenance (Chang et al., 2017; Chung et al., 2011; Lee et al., 2017; Riegel, Lee, et al., 2009; Siabani et al., 2013). Lee et al. (2017) showed that depression correlated negatively with self-care maintenance ($r = −0.171$, $p < .05$) and self-care self-efficacy ($r = −0.151$, $p < .05$), but not with self-care management. Schnell -Hoehn et al. (2009) concerned that self-care maintenance

behaviors were influenced by enabling characteristics precisely psychological status (r= 0.269, p = 0.03).

Depression has been found to associate with self-efficacy in patients with colostomy. A Structure Equation Modelling (SEM) was performed to test the association of self-efficacy, depression and self-care activities in adult Jordanians with Type 2 Diabetes. The SEM showed depression was indirectly related to self-care activities through self-efficacy (β = -0.20; p = 0.003) (Al-Amer et al., 2016). A correlation analysis showed that depression was negatively correlated with self-efficacy. Multiple linear regression analysis demonstrated that self-efficacy was one of the main influential factors for depression among residents (Ding et al., 2017). It is known that the higher the self-efficacy, the higher the self-evaluation and the ability to evaluate, the self-confidence in the process of handling and the strong sense of control, depression will be reduced. According to the latest study of Damush (2016) after a 12-month-long self-management program for patients with chronic arthritis and depression, it was found that the sense of self-efficacy could significantly improve the pain of depression and demonstrated self-efficacy in depression. Depression played an important role in the self-management of pain (Ding et al., 2017). Campbell (2004) tested the relationship between patient and partner ratings of self-efficacy for symptom control and quality of life (QOL) among 40 African American prostate cancer survivors and their intimate partners. The findings showed that higher patient and caregiver self-efficacy to better adjustment to cancer and less depression.

Social Support

Social support refers to a social network providing psychological and material resources to help people cope with stress. A social support network is made up of friends, family and peers. It is an individual's cognitive perception of establishing reliable bonds with others. Sek (1986) defines social support as a form of social interaction involving exchange of information (information support), instruments of action (instrumental support), material resources (material support), and emotional exchanges (emotional support).

In a qualitative descriptive study conducted on Lebanese cardiac patients, social support was demonstrated to play a significant role in self-care (Dumit et al., 2016). The health care costs, family responsibilities, psychological factors, political climate, and psychological factors were the barriers to self-care practices, while social support assisted them. Wade (1989) found that support from husband or wife could be more conducive to the improvement of self-care ability of patients during rehabilitation after colostomy. Zhang and colleagues (2008) found that social support was positively correlated with self-care ability of early patients with colostomy. According to the direct effect model of perceived stress, lower perceived stress can directly contribute to post-traumatic adaptation and lead to less impaired self-care ability, and perceived social support can reduce the individual's perceived stress (Wang et al., 2021). The perception of social support has been demonstrated to correlate positively with self-care compliance in hemodialysis and heart failure patients (Graven & Grant, 2014; Kim & Kim, 2019). In the study of Hanucharurnkul (1989), social support was correlated with self-care ability for the cancer patients receiving radiotherapy. Another study of Wang et al. (2021) assessed the association of social support, stress and self-care in 410 Chinese colostomy patients aged 59.68±12.95 years old by three regression models. The result showed that 31.7% of variance on self-care ability was explained by social support and according to the results of structural equation modeling, the higher level of social support patients

perceived, the lower level of stress they would perceive. In a study combining quantitative and qualitative methods, convenience sample of adults (n=388) diagnosed with type 2 diabetes mellitus, Alsomali (2019) found that social support was one of the factors influencing adult diabetes adherence to self-care activities in Saudi Arabia. Social support acts a positive stimulus that can alleviate the challenges to self-image created by an ostomy, and enhance patients' social adjustment and self-care (Karabulut et al., 2014).

Massouh's (2017) study found that the relationship between social support and self-care maintenance was mediated by self-care self-efficacy. Self-care maintenance and self-efficacy were positively and moderately associated with social support. Additionally, a positive relationship between social support and self-care self-efficacy was observed through self-care self-efficacy. It is known that treatment adherence is part of self-care maintenance (Riegel & Dickson, 2008). Likewise, Hammash (2017) reported that social support tended to influence treatment adherence to heart failure regimens directly, significantly, and positively after controlling for marital status and hospital location (p =0 .03). Riegel & Carlson (2004) conducted an interventional study examining the effectiveness of peer support in patients with heart failure in the hospital. In comparison with usual care, peer support significantly improved self-care management and self-efficacy in the peer support group.

The study of Li (2019) demonstrated that family social support could reduce the level of depression in the elderly. The researcher investigated the direct effect of family social support on elderly depression. People with diabetes and depressive symptoms were 2- or 3-fold more likely to have lower adherence to medication and self-care activities than those without depressive symptoms (Egede & Ellis, 2010; Park et al., 1999). People with other chronic diseases who received social support were less likely to suffer from depression (Holahan et al., 1995). Lyons (2013) demonstrated that emotional and practical support from family members could reduce the occurrence of psychological distress, thereby reducing the level of depression. Al-

Amer (2016) studied the association between social support, depression, and self-care activities in adult Jordanians with type 2 diabetes proved that social support had a negative correlation with depression levels ($r = -0.248$; $p < 0.001$).

Self-care is positively influenced by social support due to its direct influence over health-promoting behaviors, and its generalized positive effects that override neuroendocrine regulation (Luttik et al., 2005). In a rural Thai community, researchers studied health-promoting behavior and related factors among chronic disease patients. The study indicated that there was a positive correlation between social support and health-promoting behavior (Suksatan & Ounprasertsuk, 2020). Health promotion behavior in patients is influenced by interpersonal factors such as family members, neighbors, colleagues, and health professionals (Arras et al., 2006). Several researcher teams reported that social support was strongly correlated with health-promoting behavior in patients with hypertension (Hu et al., 2015; Spikes et al., 2019; Zhang, 2020). In addition, some researchers also found that health-promoting behavior had a positive relationship with social support in diabetes patients (p <0.05) (Mohebi et al., 2018; Schiøtz et al., 2012; Strom & Egede, 2012). Wan (2019) had done a correlation analysis of health behaviors and social support among Chinese patients with colostomy and it was found that there was also a significant positive correlation between health promoting behavior and social support, with a correlation coefficient of 0.32. Self-care could be impacted by social support through practical assistance (Shumaker & Hill, 1991) or direct attempts of family members to influence health promoting behaviors (Umberson, 1987, 1992).

Individual's self-efficacy has a positive correlation with their social support, as studies show that it's an important aspect of enhancing self-efficacy; that is, a person's self-efficacy increases with social support (Maddy III et al., 2015). Study findings showed a significant correlation between social support and self-efficacy in 140 women psychiatrists.($p < 0.01$) (Wang et al., 2015). Xu's (2018) study found that patients undergoing colostomies may be able to maintain good health behaviors and

improve quality of life by improving self-efficacy nursing interventions. A Cross-sectional survey was organized to examine self-efficacy and its association with health-related quality of life and social support in patients with temporary ostomies (Su et al., 2016). The multivariate analysis revealed that psychological well-being, social well-being, friend support, and significant other support were associated with colostomy care self-efficacy. It has been found that the self-care self-efficacy of individuals is associated with social support, higher educational level and ostomy type. Qian and Yuan (2012) suggested that colostomy care self-efficacy was associated with social support in Chinese mainland patients with colorectal cancer and patients with colostomy who have better social support had higher levels of self-care self-efficacy. A previous study reported that social support from friends and others could improve colostomy care self-efficacy in Chinese mainland patients with permanent colostomies (Cheng et al., 2012). These results illustrated that if we could make good use of social support, then self-efficacy could be significantly enhanced.

Patients with colostomy have a strong disease stigma, and the higher the social support level, the lower the disease stigma (Silva et al., 2017). Yuan and colleagues (2018) found a negative correlation between spouses and other family members' acceptance of colostomy and stigma. After surgery, family members are the people who have the most frequent contact with patients. Spouses and other family members can help patients with much of the necessary daily colostomy care work, address unexpected and awkward events, and provide psychosocial support to the patients (Leyk et al., 2014). When patients feel love and acceptance from their spouses and family members, their stigma decreases. Jin et al. (2021) believed that spousal support was a major factor influencing breast cancer survivors' stigma. This finding accorded with that of Hamid et al. (2021), indicating that a spouse's love and support encourage a survivor to accept her condition, motivating her to fight the disease courageously. A survivor's stigma is directly affected by whether the spouse and family can accept and adapt to her/his illness and body changes. The results of

Wei and He's (2017) study showed that the scores of stigma of patients with permanent colostomy of colorectal cancer were negatively correlated with the scores of subjective support, objective support, and social utilization in social support. For permanent colostomy patients, due to changes in physical appearance and function, patients are often vulnerable and sensitive, unwilling to communicate with family and friends, and adopt more evasive attitudes and methods. Therefore, patients gradually deviate from normal social life and work and are in self-isolated state (Smith et al., 2007). Improving the level of social support is beneficial to decrease the patient's disease stigma.

Good social support helps to improve the self-care skills of individuals. Through social support, individuals can obtain information and economic support, have more social interactions, and have more positive emotions, which can make them feel happy and help to improve their self-care skills. It was found that there was a positive correlation between objective support and self-care skills in patients with ostomies, which might be related to the fact that patients rich in objective support receive more financial support and information about the disease (Shen et al., 2008). There was a positive correlation between subjective support and self-care skills in patients with colostomy. Self-care skills is mainly about the implementation of care behaviors, which mainly influences the change because of colostomy. Zhu (2006) demonstrated that patients with rich subjective support may get more respect and support from family and society, and under the care and supervision of family members and friends, it is easier for patients with colostomy to master the self-care skills. In addition, the study of Huo and Zou (2005) concerned that the support utilization of colostomy patients was correlated with self-care skills in chronic illness. This suggests that both subjective and objective support must be utilized by individuals in order to have an impact on themselves.

Skills

Skill in self-care is basic and patients need to be able to plan, set goals, and make decisions (Strömberg, 2005). Health care professionals need to help patients to develop necessary skills for self-care (Riegel et al., 2012). In addition to knowledge, patients with colostomies need to develop both tactical and situational skills for self-care.(Dickson & Riegel, 2009; Zhang et al., 2021). The colostomy skills contain cleaning skin, changing dressings, replacing bags / adapters, placing properly, etc.. The quality of life and the ability to self-care are higher for autonomous patients (Cheng et al., 2013; Collado-Boira et al., 2021).

A positive correlation has been found between acquired skill and better self-care outcomes in patients with colostomies. There is a strong connection between skills and experience, as skills are acquired through experience The study by Metcalf (1999) found social adjustment was improved among patients who mastered self-care skills. Studies have shown that the self-care ability of ostomy patients gradually enhances over postoperative time, due to the gradual knowledge and skills of ostomy care over time (Zhang et al., 2010). Hu et al (2010) found that patients who mastered self-care skills could make better social adjustments and observed that there was a positive correlation between self-care and psychosocial adjustment. If the patients lacked of knowledge and skills related to colostomy care, it would cause more complications, increased patient suffering and affected patients' self-care ability (Zhang, 2007). Chuang and colleagues (2019) found that better skills enhanced self-care self-efficacy of patients with heart failure, thereby improving self-care monitoring, self-care maintenance and management. This result is consistent with Massouh's (2017) study.

Self-efficacy

According to Bandura, the American psychologist, self-efficacy is defined as the ability to perform a specific action on one's own and accomplish the expected results with confidence in one's abilities in1977 (Danielsen et al., 2013). It is through

psychological adjustment and control mechanisms that an individual achieves his/her goal, and self-efficacy plays an essential role in this (Bandura, 1977; Pajares, 1996). Self-efficacy focuses on the one's perceptions of his own skills and abilities in accomplishment of respectable performances successfully (Grant et al., 2013). Additionally, it has been demonstrated that individuals who lack sufficient personal effectiveness in particular contexts (school, communication, work, etc.) can be taught to believe in their capacity for success, bolster their sense of value, and increase their chances of success. (Bruke, 2008). Self-efficacy, as a source of personal coping, could facilitate this process and made it easier to accept colostomy and increases compatibility with it in patients with colostomy.

As a result of the significant change in body image once a colostomy has been performed, patients with colostomies often lack confidence and experience anxiety and depression, which negatively impacts their overall quality of life (Xu, J. Gallo, et al., 2018). In addition, regional or cultural factors may influence colostomy self-efficacy (Su et al., 2016). The present study showed that colostomy patients have a low self-efficacy level (Cheng, 2010; Shen, 2013).

It is found that in patients with colostomies, self-efficacy influences their decisions and behavior in self-care (Heo et al., 2008). The result is improved self-care for patients with higher levels of self-efficacy (Dickson et al., 2008; Heo et al., 2008; Maeda et al., 2013; Peters-Klimm et al., 2013; Sahebi et al., 2015; Schweitzer et al., 2007; Seto et al., 2011; Tovar et al., 2016). Self-efficacy has been considered as a factor associated with positive health outcomes after an colostomy (Su et al., 2016; Su et al., 2017). The result of multivariate regression analyses showed that self-efficacy, perceived control over heart failure and symptoms, and knowledge of how to manage heart failure were related to better self-care ($F [3, 116] = 13.16$, $R^2 = 0.25$, $p \leq .001$) (Heo et al., 2008). Perceived high levels of self-efficacy were associated with better adherence to a health plan (Sacco & Bykowski, 2010; H. K. M. Wu et al., 2007). There is a positive correlation between self-care ability and self-efficacy, the better

the colostomy care ability of colostomy, the more successful experience shared in colostomy self-care, the self-efficacy associated with colostomy can also increase, thus forming a virtuous cycle (Wan et al., 2010). Colostomy patients' self-efficacy plays an important role in their self-care behaviors. Indeed, belief in one's self-efficacy was found to increase when patients could independently perform self-care, including stoma management (Gautam et al., 2016). Studies to date suggested that, in patients with cancer, higher self-efficacy was associated with increased self-care ability and decreased negative affect behavioral dysfunction (Beckham et al., 1997; Campbell et al., 2004; Chang, 2006; Lev et al., 1992). It is believed that self-care self-efficacy played a significant role in determining the effectiveness of self-care maintenance and monitoring (Giordano et al., 2020).

Riegel (2012, 2019) illustrated that the relationship between self-care and clinical outcomes was moderated by self-efficacy in self-care performance, and it was important in each stage of the self-care process, and self-efficacy mediate/regulate the self-care monitoring, self-care maintenance and management. Chuang et al. (2019) found that self-care maintenance directly affected self-care management and the self-care monitoring, self-care maintenance and management abilities of patients with heart failure could be enhanced by increasing self-care self-efficacy, what meant self-care self-efficacy directly and positively affected self-care monitoring, maintenance and management.

In initiating and maintaining health-promoting behaviors, self-efficacy is seen as the most important belief. Self-efficacy was a strong predictor of health behaviors, and also initiation and maintenance of exercise during pregnancy (Ghahremani et al., 2017). Tobeek and colleagues (2016) believed self-efficacy had profound positive effects on health- promoting behavior, compliance to medication, self-care, patients' outcomes and quality of life and it has also been found to be critical to the process of colostomy adaptation. A cross-sectional research design was used to analyze and predict Nepalese migrant workers' health-promoting behaviors.

The results of this study showed that physical activity is the least practiced health-promoting behavior, while spiritual activity was the most commonly reported. Health-promoting behaviors are significantly associated with self-efficacy as well as the strength of behaviors (Bandura, 1977; Bhandari & Kim, 2016). Bauer (2014) indicated a positive correlation between self-efficacy and physical activity. Lin et al. (2009) also reported a significantly positive relationship between self-efficacy and health promoting lifestyles. Wan (2019) had done a correlation analysis of health behaviors and self-efficacy among Chinese patients with colostomy and it was found that there was a significant positive correlation between health behavior and self-efficacy among patients with a correlation coefficient of 0.42. Self-efficacy has been found to improve mental state, health-promoting behavior and quality of life among patients with cancer , as well as their adaptation to the disease (Xu, Z. Zhang, et al., 2018). Self-efficacy is associated with stronger intentions to act, strengthening efforts to achieve goals, and more persistence in the face of barriers.

Among patients living with an ostomy, self-efficacy refers to the ability to manage one's ostomy; these skills have been long viewed as an important means of achieving positive health outcomes after an ostomy (H. K. M. Wu et al., 2007). Yuan et al. (2018) and colleagues found a negative correlation between self-efficacy and stigma. In comparison to patients with low self-efficacy levels, those with high self-efficacy levels are more confident, suffer from lower stigma, and have better prognoses (Zhang, Wong, et al., 2015). Evidence has also linked low levels of self-efficacy with stigma perceptions (Knowles et al., 2017; Su et al., 2017). Barroso (2014) found a negative relationship between coping self-efficacy and stigma. When people use positive coping strategies, such as being active in finding solutions and feeling confident in their coping skills, stigma decreases. Pasmatzi (2016) found that greater stigma was associated with lower self-efficacy. People who have lower levels of efficacy always demonstrate a strong response when they suffer from discrimination or exclusion. The level of stigma and factors associated with stigma in

patients with lung cancer in China were examined in a study (Liu et al., 2021). The results of correlation analyses showed that stigma was significantly and negatively associated with state self-esteem ($r = -0.607$, $p < 0.001$) and coping self-efficacy ($r = -0.424$, $p < 0.001$).

There is, as reflected in this review.

Conclusion

This review presents a substantial amount of nursing research on colostomy self-care. The enhancement of self-care practices is at the core of healthcare globally, yet there are likely to be several disparities between cultures, continents, and countries (Ditewig et al., 2010; Riegel, Driscoll, et al., 2009; Yuan et al., 2018). Different health care systems, patient education approaches, and nurse roles in colostomy care, as well as limited availability of colostomy management programs, are the reasons for this. consequence (Jaarsma et al., 2006). The increasing complexity of self-care for individuals may be caused by cultural differences and migration (voluntary and forced) (Davidson et al., 2007).

Self-care is essential in chronic illness management (Riegel et al., 2012) and may help patients with colostomies achieve positive outcomes in terms of psychological adjustment (Cheng et al., 2013). The patient's ability of self-care is more likely to contribute to a successful colostomy adjustment (Piwonka & Merino, 1999). Self-care in patients with colostomy is found important to improve the quality of life. According to the theory and previous studies, factors contributing self-care included social support, self-efficacy, knowledge, skill, depression, stigma, health promoting behaviors and ehealth literacy and patients with colostomy could improve self-care by prompting HPB, eHealths literacy, knowledge, social support, skills and self-efficacy, decreasing stigma and depression.

CHAPTER III

RESEARCH METHODOLOGY

The aim of this study is to determine factors influencing self-care in patients with colostomy, including disease stigma, health promoting behaviors, eHealth literacy, knowledge, depression, social support, skills, self-efficacy. This chapter includes eight parts--research design, population and sample, research instruments, setting of the study, research instruments, protection of human subjects, data collection procedures, and data analysis.

Research Design

The causal model is suitable to assess the predicted causal model's accuracy since it can be used to test the direct, indirect, and mediating effects among the variables. It is always used to assist us understand complex phenomena (Burns, 2005). In this study, using descriptive model test and cross-sectional design to test the hypothesized model of self-care in patients with colostomy in Yancheng city of China.

Population and sample

The target population was the patients with colostomy (aged 40 years or older) who live in Yancheng, China. Samples were drawn from the target population using a multi-stage random sampling. Samples were 400 patients with colostomy recruited from general hospitals in Yancheng city.

Sample size

From the hypothesized model of self-care in patients with colostomy, there were 9 variances and 23 paths, so there were 72 parameters in total. For the Structure

Equation Modeling (SEM), a ratio of 5 respondents for each parameter was considered (Hair et al., 2010), and added up to the number of estimated 10% abnormal and missing data, 400 samples were collected. The inclusion criteria were as follows:

1. Aged 40 years or older.
2. Can read, write and understand Chinese.
3. Live in Yancheng.
4. Be diagnosed colorectal cancer and have permanent colostomy after surgical treatment at least one month after discharge.

Setting of the study

This research study took place inYancheng, a city of Jiangsu province in the eastern coastal area of China. The natural land area of Yancheng is 16,931 square kilometers. According to the results of the seventh national census in Jiangsu Province (The Seventh National Census Bulletin of Jiangsu Province (No.2), 2021), as of November 1, 2020, the permanent inhabitants population of Yancheng was 6,709,629 million. In 2020, Yancheng's regional GDP was 93.76 billion dollars, which ranked 37th out of 331 cities in China. In Chinese, the meaning of Yancheng is a city rich in salt. Because of rich salt, local residents are used to pickling food with salt. Pickled food is common in people's lives.

According to statistics, the eastern part of China has the highest incidence of colorectal cancer in the country, about 33.37%. The incidence of colorectal cancer in Jiangsu Province has increased rapidly and exceeded that of western countries. Due to the high pressure of work and life, high-fat diet, less exercise and genetic factor, the incidence of colorectal cancer has increased. Besides, another important factor of the high incidence in Yancheng may be the love of local people eating pickled food (Sun, 2020). In Yancheng, approximately 300 new patients with permanent colostomy are added each year.

This study was conducted at general hospitals. There are 9 sub-districts inYancheng city, and each sub-district has one general hospital which is at least level 2 or higher. In total, there are two general hospitals of level 3 with about 1600 beds respectively and seven general hospitals of level 2 with about 1000 beds respectively in Yancheng city. There are 23 Enterostomal Therapist (ET) or Wound Ostomy Continence Nurses (WOCN) working in the 9 district general hospitals. The number of ET or WOCN is different at each district hospital based on its size and population in the area. Patients with colostomy need to go to the general hospitals for regular review and purchase colostomy supplies. Also, ET or WOCN of the hospitals follow up the postoperative colostomy patients.

Sampling

Multi-stage random sampling technique was employed to recruit the sample. Sampling procedures were done as follows:

1. There were 9 district general hospitals in Yancheng city, and each general hospital had more than 1,000 beds and Ostomy Wound Clinic.

2. This study selected the out-patients who had colostomy after surgery for more than one month and come to the follow-up visit or to buy colostomy products at Ostomy Wound Clinic from the general hospitals of Yancheng.

3. The researcher wrote down the name of the 9 district general hospitals and number them on the paper. A simple random sampling technique was employed to randomly select 4 general hospitals out of the 9 district general hospitals from a numerical list of districts general hospitals.

4. A total of 400 patients with colostomy were randomly recruited from 4 general hospitals. When the target patients came to the clinic of the general hospital, the research assistant who worked in Ostomy Wound Clinic of hospital communicated with them introducing the purpose of the study, their right to withdraw or participate, confidentiality, risks, and benefit of the study for the patients with colostomy who met the inclusion criteria every day, and then prepared a list of these

patients. If patients were willing to participate in the study, their names were written down on a new name list, and number them in turn until reached 400 colostomy patients. The researcher distributed questionnaires and instructed the patients to fill in the questionnaire.

5. Participants from each general hospital had the same inclusion criteria. The completed questionnaires were then prepared for further statistical analyses.

Research instruments

A structured questionnaire was used to collect all data. Demographic information sheet contained items of patients with colostomy characteristics (age, gender, marital status, educational level, living status, monthly family income, occupational status, complications, postoperative time) and the other 8 instruments were adapted.

Disease stigma: The disease stigma was measured by the Social Impact Scale (SIS) which is developed to assess the level of stigmatization for clients with HIV/AIDS or cancer (Fife & Wright, 2000). The SIS is translated into Chinese by Pan (2007) and has been used in patients with colostomy, depression, schizophrenia, and HIV/AIDS. The scale has 24 items in total, including four dimensions: social exclusion, economic insecurity, internal shame and social isolation. Each item is scored by 4 grade, with a total score of 96. The higher score is considered the stronger perceived disease stigma. The Cronbach's α of the scale is 0.85, and each dimension's correlation coefficient of is 0.85.

Health promoting behaviors: The Chinese version of the Health-Promoting Lifestyle Profile II (HPLP II) (Walker et al., 1987) was used to measure patients' Health promoting behaviors. The scale provides a multidimensional assessment of health-promoting behaviors to measure the degree of engagement in a health-promoting lifestyle in six dimensions: spiritual growth, health responsibility, physical activity, interpersonal relations, nutrition, stress management. HPLPII

measures how often one engages in health-promoting behavior. This behavior is viewed as a multifaceted pattern of self-initiated behaviors and attitudes that maintain or enhance the individual's degree of fulfillment, self-actualization, and well-being. The Chinese version instrument contains 52 items using a 4-point.The responses to the instrument's items range from 1 (never) to 4 (routinely), with the possible scores ranging from 52 to 208. The higher scores indicate more frequent practice of health behaviors. It was reported the Cronbach's α of the scale is 0.94, and the validity is 0.84.

eHealth Literacy: The Chinese version of the eHealth Literacy Scale (eHEALS) (Koo et al., 2012) was used to measure the patients' eHealth Literacy. It evaluates patients' knowledge, comfort, and skills in finding, evaluating, and applying eHealth information to solve health-related problems (Koo et al., 2012; Norman & Skinner, 2006). The scale comprises 8 items that are scored using a 5-point Likert scale (1-5), with high scores indicating high eHealth literacy. The Cronbach's α of the scale is reported as 0.94.

Knowledge: Colostomy Self-care Knowledge Scale was used to measure patients' knowledge. It is designed by Taiwan scholar named Gao Qiwen (2007). The people of Taiwan have the same cultural background as the people of the mainland, so the scale is suitable for measuring the self-care knowledge of colostomy patients in the mainland of China. 21 items of the scale are used to measure colostomy patients' self-care knowledge about diet, skin care, activity, odor control and so on. Items 1-21 is to choose in the right or wrong way. Choosing "right" will be given 1 point, and choosing "wrong" or "do not know" wasn't given point. Items 1-5 are for ostomy self-observational assessment, items 6-10 are for peristomy skin care, items 11,12,15,16 are for dietary principles, items 13-14 are for odor control, and items 17-21 are for activity principles. Items 3, 6, 8, 20, 21 are taking the reverse scoring. The total score is 21. A score greater than 13 is high, and a score below 13 is low.

Depression: The severity of depression and its changes in treatment was measured by Self-rating Depression Scale (SDS). The scale designed by William W.K.Zung (1965) has been translated in Chinese and widely accepted by clinical psychiatrists. The scale shows good reliability and validity. The SDS has 20 items covering symptoms identified in factor analysis studies of depressive syndrome. Items refer to psychological and physiological symptoms and are rated by respondents in accordance with how each applied to them in the last week, using a 4-point scale ranging from 1 representing none, or a little of the time to 4 representing most, or all of the time). The raw score of scale range from 20 to 80 points. It should be completed in 5 – 10 minutes. Mild to moderate depression ranged 50 – 59, moderate to severe depression ranged 60–69, and severe depression ranged over 70. It was reported the Cronbach's α of the scale is 0.845, and the validity is 0.837.

Social support was measured by Social Support Rating Scale (SSRS) designed by a Chinese scholar in 1986 (Xiao & Yang, 1987). There are 3 dimensions of the scale, including 3 items of objective support, 4 items of subjective support and 3 items of utilization of social support. The scale's scoring method is as follows. Items from 1 to 4, 8 to 10: selecting items 1, 2 ,3, 4 will score 1, 2, 3, 4 respectively. Item 5: the total scores are divided into 4 parts A, B, C, D, each count from none to full support will score 1 to 4 respectively. Items 6 and 7, if the answer is "no source", 0 points will be awarded, whose answer is "following sources", the one will get the score according to the amount chosen. Total score is the sum of 10 items; the sum of item 2, 6, 7 is the score of objective support; the sum of item 1, 3, 4, 5 is the score of subjective support; the sum of item 8, 9, 10 is the score of utilization of supporting. Higher score means higher level of social support. It is generally considered that the total score is less than 20 what means having less social support, 20-30 means having medium social support, 30-40 means having satisfactory social support. It was reported the Cronbach's α of the scale is 0.92.

Skills: Colostomy Self-care Skill Scale was used to measure patients' skills. It is designed by Taiwan scholar named Gao Qiwen (2007). 12 items of the scale are used to measure colostomy patients' self-care skills about methods of use of colostomy products and colostomy irrigation. Items 1-5 are for the use of colostomy products. Items 6-12 are for colostomy irrigation. Choosing "Yes" was given 1 point, and choosing "No" was not given point. The total score is 12, and a score greater than 7 is high, and a score below 7 is low.

Self-efficacy: Ostomy self-care self-efficacy scale was used to measure patients' level of self-efficacy (Villa et al., 2019) and it had be translated into Chinese version by W. Li et al. (2021). This scale is a subscale of Ostomy Self-Care Index (OSCI), but it can be used alone to measure self-care elf-efficacy in colostomy patients (W. Li et al., 2021). The scale includes 10 items. The scale uses a 5-point Likert scale (1 = nev er, 2/3/4 = sometimes, 5 = always). Based on Ostomy self-care self-efficacy scale (Villa et al., 2019), the raw score of each item should be transformed to 0-100 scores according to the following formula:

$$\frac{(Actual\ raw\ score\ —\ loweset\ possible\ raw\ score)}{(highest possible\ raw\ score—loweset\ possible\ raw\ score)} \times 100 = transformed\ scale\ score$$

Higher scores indicate better self-care self-efficacy. It was reported the Cronbach's α of the scale is 0.962.

Self-Care: Ostomy Self-Care Index (OSCI) was used to collect data about self-care in patients with colostomy (Villa et al., 2019) and it has be translated into Chinese version by W. Li et al. (2021). Ostomy Self-Care Index will be used to assessed the following dimensions: self-care maintenance; self-care monitoring; self-care management (Villa et al., 2019). The self-care maintenance scale assesses daily routine behaviors performed to maintain stable ostomy and peristomal skin. The self-care monitoring scale evaluates ostomy and peristomal skin monitoring. The self-care management scale measures the patient's ability to recognize problems and their behavior in response to those problems. The self-care management scale is only for

the patients who have experienced ostomy problems in the last month. OSCI is a 5-point Likert scale ranged from 'Never' to 'Always' which is a self-reported tool (Villa et al., 2019). Based on Ostomy Self-Care Index (Villa et al., 2019), the raw score of each item needs to be transformed to 0-100 and the calculations are consistent with Ostomy self-care self-efficacy scale. Higher scores indicate better self-care. It was reported the OSCI was shown to be a valid and reliable tool for measuring self-care in ostomy patients and it has a very high internal consistency ($\alpha = 0.975$). For the maintenance, monitoring, management scales, the Cronbach's α was 0.965, 0.953, 0.930, respectively (Villa et al., 2019).

Validity and reliability of the instrument

Validity. The content validity of all study instruments has been evaluated in previous studies and also has been evaluated in a Chinese sample for the Social Impact Scale, the Health-Promoting Lifestyle Profile II, the eHealth Literacy Scale, Colostomy Self-care Knowledge Scale, Self-rating Depression Scale, Social Support Rating Scale, Colostomy Self-care Skill Scale, Ostomy self-care self-efficacy scale and Ostomy Self-Care Index.

Reliability. The reliability of all the Chinese version instruments was tested using internal consistency which presented as Cronbach's alpha coefficients. The lowest accepted value for a well-development is Cronbach's α of .80 (Gray et al., 2017; Polit & Beck, 2017). For this study, the Cronbach's alpha of the Social Impact Scale, the Health-Promoting Lifestyle Profile II, the eHealth Literacy Scale, the Self-rating Depression Scale, the Self-Concept Scale, Social Support Rating Scale, Ostomy self-care self-efficacy scale and Ostomy Self-Care Index were 0.91, 0.94, 0.94, 0.86, 0.82, 0.91 and 0.92, respectively. Colostomy Self-care Knowledge Scale and Colostomy Self-care Skill Scale were binary scales (Yes or No) and criterion-referenced tests. However, Cronbach alpha is appropriately applied to norm-referenced tests and norm-referenced decisions, but not to criterion-referenced tests

and criterion-referenced decisions (Brown, 1997, 1999). Thus, in this study, Cronbach alpha of the two scales were not tested.

Table 1 Summarized of variables and instruments

Variable	**Instruments**	**No. of items**	**Scale and interpretation**	**Level of variable**	**Reliability (Cronbach's alpha)**
Disease stigma	The Social Impact Scale (SIS) (Fife & Wright, 2000)	24	4-point rating scale ranging from 1 (Strongly agree) to 4 (Strongly Disagree)	Interval	0.91
Health promoting behaviors	The Health-Promoting Lifestyle Profile II (HPLP II) (Walker et al., 1987)	52	4-point rating scale ranging from 1 (Never) to 4 (Routinely)	Interval	0.94
eHealth Literacy	The eHealth Literacy Scale (eHEALS) (Koo et al., 2012)	8	5-point rating scale ranging from 1 (Strongly disagree) to 5 (Strongly agree)	Interval	0.94
Depression	The Self-rating Depression Scale (SDS) (Zung, 1965)	20	4-point rating scale ranging from 1 (A litle of the time) to 4 (Most of the time)	Interval	0.86
Social Support	Social Support Rating Scale (SSRS)(Xiao & Yang, 1987)	10	4-point rating scale ranging from 1 (None) to 4 (Great)	Interval	0.82

Table 1 (Continued)

Variable	Instruments	No. of items	Scale and interpretation	Level of variable	Reliability (Cronbach's alpha)
Self-efficacy	Ostomy self-care self-efficacy scale (Villa et al., 2019)	10	5-point rating scale ranging from 1 (Never) to 5 (Always)	Interval	0.91
Self-Care	Ostomy Self-Care Index (OSCI) (Villa et al., 2019)	22	5-point rating scale ranging from 1 (Never) to 5 (Always)	Interval	0.92

Protection of human subjects

The proposal of this research was submitted for approval from the Institutional Review Board (IRB) for Graduate Study, Faculty of Nursing, Burapha University, Thailand. The study followed the rule of "respect for, and awareness of, the rights and welfare of human research participants". Permission for conducting the study was also obtained from the hospitals in Yancheng, China. For data collection, all participants were informed clearly about purposes of the study, the data collecting procedure, time spent for the study, advantages of the study, risks that might occur and their rights. The participants were informed that they could purely voluntary and no compensation will be given. During data collection if a participant would want to refuse or withdraw from the study, the researcher would respect their decisions and assure anonymity and confidentiality and no penalty for withdrawal or termination from the study. This study did not ask for the participant's name. Code numbers on the data sheets were used in data files of the computer for protection. All information would be destroyed completely after the study findings were published.

Data collection procedure

The data collection procedure was performed by the researcher as follows:

1. After the proposal and instruments were approved by the Ethical committee of Faculty of Nursing, Burapha University. The letter from the Dean of the Faculty of Nursing, Burapha University was presented to the general hospitals in Yancheng to ask for permission to collect data.

2. The researcher selected 4 general hospitals in Yancheng randomly, contacted the head of the directors and staffs of the hospitals and explained the purpose of the study and the method before collecting data.

3. Four Enterostomal Therapists (ETs) from the selected hospitals were trained as the research assistants. The training content contained human subject protection, rights, questionnaires, data collection, and unified guidance words.

4. The data collection procedures were performed by the researcher and the research assistants. The researcher and research assistants contacted with the patients who met inclusion criteria and obtained permission from the patients.

5. The researcher and research assistants provided the brief information related to self-introduction and human protection, purpose and method of this study, their rights to withdraw from the study and then asked them to sign consent form according to their will to participate in this study.

6. Patients filled the instruments which were collected by the researcher assistants, and each of them received a gift worth 5 RMB as a reward at the end of the instruments. The researcher assistants continued collecting data until the required sample size was met.

7. Completed instruments were checked and immediately kept in a secure box accessible only by the researcher.

8. The data was entered into AMOS software computer program for subsequent analyses.

Data analyses

1. A statistical computer program was used to analyze demographic data and factors by using descriptive statistics and perform data management and analysis.

2. Structural equation modeling [SEM], AMOS software application, was used to test the relationships of the study variables in the model and examine the magnitude of causal effects, both direct and indirect. The analysis of AMOS program was tested based on statistical significance level throughout the analysis at $p < 0.05$.

CHAPTER IV
RESULTS

In this chapter, the study's findings are presented. The first part describes characteristic of the participants. The second part provides the descriptive analysis of the study variables, including disease stigma, health promoting behaviors, eHealth literacy, knowledge, depression, social support, skills, self-efficacy and self-care. The third part shows the results of testing the multivariate analysis statistical assumptions by structural equation model. In the final section, hypotheses and models are tested.

Part 1 Description of the participants' demographic characteristics

A total of participants were 400 where recruited from 4 general hospitals in Yancheng city. Their demographic characteristics are shown in Table 2.

More than half of the participants were male (55.8%). The participants' ages ranged from 40 to 92 years old (M = 67.39, SD = 9.89), and somewhat more of participants (76.8%, n=307) were older than 60 years old. Nearly half of the participants (41.3%, n=165) had educational level of primary school, followed by middle school (38.3%, n=153). 42.5% of them lived with spouse, and 37.8% with spouse and children. Most (60.8%) of them had family income from 6,001 to 10,000 RMB per month. About one-thirds of them (34.8%) prior to illness were farmers, followed by workers (31.3%) and businessmen (18.0%). 39.3% of the participants had complications. 26.5% of them were 1~3 months after surgical treatment, 24.8% were more than 3 months to 6 months, 21.5% were more than 6 months to 1 year.

Table 2 Demographic characteristic of the participants (n = 400)

Participant's characteristic	n	%
Gender		
Female	177	44.3
Male	223	55.8
Age (year)(M = 67.39, SD = 9.89, Range = 40~92)		
≤60	93	23.3
61~70	149	37.3
≥71	158	39.5
Education level		
Primary school	165	41.3
Middle school	153	38.3
High school	48	12.0
College or higher	34	8.5
Living with		
Spouse	170	42.5
Children	67	16.8
Spouse and Children	151	37.8
Alone	12	3.0
Family income (Yuan/ month)		
≤2,000	3	0.8
2,001~4,000	37	9.3
4,001~6,000	85	21.3
6,001~10,000	243	60.8
≥10,000	32	8.0

Table 2 (Continued)

Participant's characteristic	n	%
Occupation (prior to illness)		
Worker	116	29.0
Farmer	139	34.8
Public officer	46	11.5
Businessman	72	18.0
Other	27	6.8
Complication		
Yes	157	39.3
No	243	60.8
After surgical treatment time		
1~3 months	106	26.5
More than 3 months to 6 months	99	24.8
More than 6 months to 1 year	86	21.5
More than 1 year to 2 years	53	13.3
More than 2 years to 5 years	39	9.8
＞5 years	17	4.3

Part 2 Testing assumptions for structural equation modeling

The data analysis was performed for all variables in the model before doing the SEM analysis. Outlier, normal distribution, multicollinearity, linearity should all be tested as general assumptions (Hair et al., 2010; Tabachnick & Fidell, 2013). In the case where the assumptions are met appropriately, potential distortions and biases affecting parameter estimates will be reduced (Hair et al., 2013; Schumacker & Lomax, 2010).

Missing data

Firstly, missing data was checked. All of the participants in this study were 400. No missing data was found in the results. Therefore, 400 samples were used for running assumption test and perform further statistical analyses.

Outliers

It is possible to detect univariate outliers when a value of variable is found to be extreme, and these findings can be tested using standardized scores, or Z-scores. (Tabachnick & Fidell, 2013). An outlier is considered to be a variable that has a standardized score greater than 3.29 or less than -3.29, which means that it is not related to the other Z scores and it is out of the norm. The results revealed that there were 11 univariate outliers (ID 17, 97,132, 145, 208, 217, 219, 222, 229, 361, 385; Appendix D - 1). Therefore, these cases were removed before further data analyses.

If the cases with unusual scores on more than one variable, they will be termed multivariate outliers. Cases with unusual combinations of scores on two or more variables are considered multivariate outliers (Tabachnick & Fidell, 2013). Multivariate outliers can be identified using the Mahalanobis distance (Tabachnick & Fidell, 2013). The results can be evaluated by using χ^2 distribution. The value of $\chi^2 \leq$ 0.001 in a case is considered as a multivariate outlier (Tabachnick & Fidell, 2013). Consequently, the test results showed that there were 8 multivariate outliers (ID 97, 208, 217, 219, 227, 361, 385, 387).

However, 6 cases were tested to repeat with the univariate outliers (ID 97, 145, 208, 217, 361, 385). Therefore, a total of 13 outliers were then deleted (Table 3). A final total of sample was 387 for subsequently data analyses.

Table 3 Univariable and multivariate outliers

ID	Univariable outliers									Multivariate outliers
	ZDS	ZHPB	ZeHL	ZK	ZD	ZSS	ZS	ZSE	ZSC	p-value of MD
17		3.61								.0061
97						-3.43		-4.32	-4.92	.0000
132								3.40		.0012
145					3.44					.0045
208						-3.43				.0000
217						-3.43		-4.32	-4.92	.0000
219						-3.43		-4.32	-4.92	.0000
222		3.61								.0254
227										.0005
229		3.61								.0157
361	3.48	3.46								.0000
385	3.48	3.61								.0000
387										.0003

Notice: ID = number of samples, DS=Disease Stigma, HPB=Health Promoting Behaviors, eH L=eHealth Literacy, K=Knowledge, D=Depression, SS=Social Support, S=Skills, SE=Self-Efficacy, SC=Self-Care, MD = Mahalanobis distance

Normality

W/S test and Kolmogorove-Smirnov test was used to examined the normality of all variables in the model. According to the W/S test, either symmetric skew or peak kurtosis was zero, and the critical ratio for both was between -1.96 and 1.96, which indicated a normal distribution. (Blunch, 2012; Hair et al., 2010; Tabachnick & Fidell, 2013). Similarly, Kolmogorove-Smirnov tests show that the data is normal if the probability is greater than .05. However, the results revealed that the probability of each variable was less than .01, as shown in table 4-3. In both tests, the normality assumption was violated.

In cases where the sample size is more than 300, however, use the histograms and absolute skewness and kurtosis values without taking into z-values. Both an value of absolute skewness larger than 2 and an absolute kurtosis (proper) larger than 7 are considered as reference values for determining substantial non-normality (Kim, 2013). Thus, according to this rule, the result indicated that the multivariate normality assumption in this study had met criteria of multivariate normality (Table 4).

Table 4 W/S and Kolmogorove-Smirnov test of the variables

	DS	HPB	eHL	K	D	SS	S	SE	SC
N	387	387	387	387	387	387	387	387	387
Mean	57.18	139.29	25.89	15.67	56.90	30.61	9.03	70.65	68.70
SD	9.43	20.38	6.92	2.07	6.04	4.67	1.71	14.67	12.11
Skewness	-1.15	0.62	-0.36	0.67	-0.15	0.05	0.29	-0.33	0.22
Kurtosis	3.40	0.95	0.21	0.77	1.56	0.20	-0.90	0.67	1.73
K-S Statistic	0.14	0.10	0.11	0.22	0.09	0.10	0.17	0.10	0.13
W/S Statistic	0.89	0.95	0.98	0.91	0.97	0.96	0.92	0.96	0.93
K-S Sig.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
W/S Sig.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Notice: DS=Disease Stigma, HPB=Health Promoting Behaviors, eHL=eHealth Literacy, K=Knowledge, D=Depression, SS=Social Support, S=Skills, SE=Self-Efficacy, SC=Self-Care

Linearity

Linearity assumption was examined by using Pearson correlation coefficients which was a measure of the strength of a linear association between two continuous variables (Hair et al., 2013; Schumacker & Lomax, 2010; Tabachnick & Fidell, 2013). In this study, all variables had a linear relationship, as shown in table 5.

In order to test the multicollinearity assumption, Pearson correlation coefficients, variance inflation factors [VIF], and tolerance values were used. When correlation ($r \geqslant 0.90$) is high, multicollinearity occurs (Tabachnick & Fidell, 2013). In the study, correlation coefficients between the predictors ranged from -.28 to .74, which meant no high correlations were detected. In multicollinearity, a correlation matrix with a tolerance value of smaller than 0.2 and a variance inflation factor of greater than 4 is used (Tabachnick & Fidell, 2013). The minimum tolerance value was 0.24, that all of the tolerance values more than 0.20. The maximum VIF value was 3.97, which was no greater than 4.0 (Table 6). Therefore, this study did not find multicollinearity among variables.

Table 5 Correlation matrix of the study variables (n = 387)

	DS	**HPB**	**eHL**	**K**	**D**	**SS**	**S**	**SE**	**SC**
DS	1								
HPB	-.51**	1							
eH L	-.51**	.48**	1						
K	-.35**	.37**	.48**	1					
D	.49**	-.42**	-.45**	-.28**	1				
SS	-.46**	.53**	.43**	.34**	-.43**	1			
S	-.41**	.44**	.39**	.34**	-.33**	.36**	1		
SE	-.50**	.56**	.36**	.29**	-.48**	.54**	.33**	1	
SC	-.61**	.74**	.57**	.45**	-.57**	.63**	.58**	.66**	1

* $P < .05$; ** $P < .01$

Table 6 Collinearity diagnosis of the study variables (n = 387)

Variable	Collinearity statistics	
	Tolerance	VIF
DS	0.55	1.84
HPB	0.43	2.32
eH L	0.56	1.78
K	0.71	1.40
D	0.61	1.64
SS	0.50	1.99
S	0.65	1.55
SE	0.51	1.95
SC	0.24	3.97

Notice: DS=Disease Stigma, HPB=Health Promoting Behaviors, eH L=eHealth Literacy, K=Knowledge, D=Depression, SS=Social Support, S=Skills, SE=Self-Efficacy, SC=Self-Care

Part 3 Descriptive statistics of the major study variables

The hypothesized model has 9 variables: disease stigma, health promoting behaviors, eHealth literacy, knowledge, depression, social support, skills, self-efficacy and self-care. The descriptive statistics for each variable were presented in the following way.

Disease stigma

The social impact scale (SIS) was used to evaluate disease stigma of participants. The result showed disease stigma had a potential score ranged from 24 to 87 (M = 57.18, SD = 9.43). For its subscales, social exclusion, economic insecurity, internalized shame and social isolation had a potential score ranged from 9 to 32 (M = 18.61, SD = 3.76), from 3 to 12 (M = 7.75, SD = 1.90), from 5 to 20 (M = 12.94, SD = 2.85), from 7 to 28 (M = 18.24, SD = 3.19) respectively. Details were as shown in Table 7.

Table 7 Descriptive statistics of disease stigma and its subscales (n = 387)

Items	Possible range	Actual range	*M*	*SD*
Social Exclusion	9~36	9~32	18.61	3.76
Economic Insecurity	3~12	3~12	7.75	1.90
Internalized Shame	5~20	5~20	12.94	2.85
Social Isolation	7~28	7~28	18.24	3.19
Disease stigma (Overall)	**24~96**	**24~87**	**57.18**	**9.43**

Health promoting behaviors

The Health-Promoting Lifestyle Profile II (HPLP II) was used to measure participants' health promoting behaviors. The total score ranged from 78 to 200 (M = 139.30, SD =20.39). There were 6 subscales. The subscale's score of interpersonal relations ranged from 15 to 36 (M = 24.62, SD =3.69), nutrition ranged from 13 to 36 (M = 23.33, SD = 3.99), health responsibility ranged from 10 to 36 (M = 24.14, SD = 3.99), physical activity ranged from 9 to 32 (M = 20.44, SD = 4.33), stress management ranged from 13 to 32 (M = 21.95, SD = 3.74), and spiritual growth ranged from 13 to 36 (M = 24.61, SD = 3.97). Details were as shown in Table 8.

Table 8 Descriptive statistics of health promoting behaviors and its subscales (n = 387)

Items	Possible range	Actual range	*M*	*SD*
Interpersonal relations	9~36	15~35	24.62	3.69
Nutrition	9~36	13~36	23.33	3.99
Health responsibility	9~36	10~36	24.14	3.99
Physical activity	8~32	9~32	20.44	4.33
Stress management	8~32	13~32	21.95	3.74
Spiritual growth	9~36	13~36	24.61	3.97
Health promoting behaviors (Overall)	**52~208**	**78~200**	**139.30**	**20.39**

eHealth Literacy

The total score of eHealth Literacy ranged from 8 to 40 (M =25.89, SD = 6.92). The score indicated the participants' level of eHealth literacy was medium. Details were as shown in Table 9.

Table 9 Descriptive statistics of eHealth Literacy (n = 387)

Items	Possible range	Actual range	*M*	*SD*
eHealth Literacy (Overall)	5~40	8~40	25.89	6.92

Colostomy Self-care Knowledge

The overall mean score on the colostomy self-care knowledge scale that measures colostomy self-care knowledge was 15.67 (SD = 2.07) with the possible range of 11 to 21. The subscales' scores of ostomy self-observational assessment ranged from 2 to 5 (M = 4.10, SD = 0.47), peristomy skin care ranged from 3 to 5 (M = 3.99, SD =0.49), dietary principles ranged from 2 to 4 (M = 3.13, SD =0.56), odor control ranged from 0 to 2 (M =1.27, SD =0.55), and activity principles ranged from 1 to 5 (M =3.17, SD =0.7). Details were as shown in Table 10.

Table 10 Descriptive statistics of colostomy self-care knowledge and its subscales (n = 387)

Items	Possible range	Actual range	*M*	*SD*
Ostomy self-observational assessment	0~5	2~5	4.10	0.47
Peristomy skin care	0~5	3~5	3.99	0.49
Dietary principles	0~4	2~4	3.13	0.56
Odor control	0~2	0~2	1.27	0.55
Activity principles	0~5	1~5	3.17	0.70
Colostomy Self-care Knowledge (Overall)	**0~21**	**11~21**	15.67	2.07

Depression

The total score for depression ranged from 33 to 75 (M = 56.90, SD = 6.04). The depression level of patients with colostomy was mild. Details were as shown in Table 11.

Table 11 Descriptive statistics of depression (n = 387)

Items	Possible range	Actual range	*M*	*SD*
Depression (Overall)	25~100	33~75	56.90	6.04

Social Support

The total score for social support ranged from 18 to 40 (M = 30.33, SD = 4.74), that included three subscale scores: objective support, subjective support, utilization of support. The actual score of objective support ranged from 4 to 12 (M = 10.00, SD = 1.53), subjective support ranged from 6 to 16 (M = 11.86, SD = 2.29), utilization of support ranged from 4 to 12 (M = 8.62, SD = 1.70). These results could be interpreted to show that the patients with colostomy had a high level of social support. Details were as shown in Table 12.

Table 12 Descriptive statistics of social support and its subscales (n = 387)

Items	Possible range	Actual range	*M*	*SD*
Objective support	3~12	4~12	10.00	1.53
Subjective support	4~16	6~16	11.86	2.29
Utilization of support	3~12	4~12	8.62	1.70
Social Support (Overall)	**10~40**	**18~40**	30.33	4.74

Colostomy Self-care Skills

The result showed colostomy self-care skills had a total score ranged from 5 to12 (M = 9.03, SD = 1.71). For its subscales, use of colostomy products and colostomy irrigation had a potential score ranged from 2 to 5 (M = 3.97, SD = 0.80), from 3 to 7 (M = 5.12, SD = 1.05) respectively. Details were as shown in Table 13.

Table 13 Descriptive statistics of colostomy self-care skills and its subscales (n = 387)

Items	Possible range	Actual range	*M*	*SD*
Use of colostomy products	0~5	2~5	3.97	0.80
Colostomy irrigation	0~7	3~7	5.12	1.05
Colostomy Self-care Skills (Overall)	**0~12**	**5~12**	9.03	1.71

Self-efficacy

The total score for self-efficacy ranged from 25 to 100 (M = 70.65, SD = 14.67). Details were as shown in Table 14.

Table 14 Descriptive statistics of self-efficacy (n = 387)

Items	Possible range	Actual range	*M*	*SD*
Self-efficacy (Overall)	0~100	25~100	70.65	14.67

Self-Care

Patients with colostomy had an self-care's total score that ranged from 25 to 100 (M = 68.70, SD = 12.11), self-care maintenance's total score ranged from 25 to 100 (M = 72.02, SD = 13.48), self-care monitoring's total score ranged from 25 to 100 (M = 68.35, SD = 14.11), self-care management's total score ranged from 10 to 100 (M = 63.17, SD = 14.31). Details were as shown in Table 15.

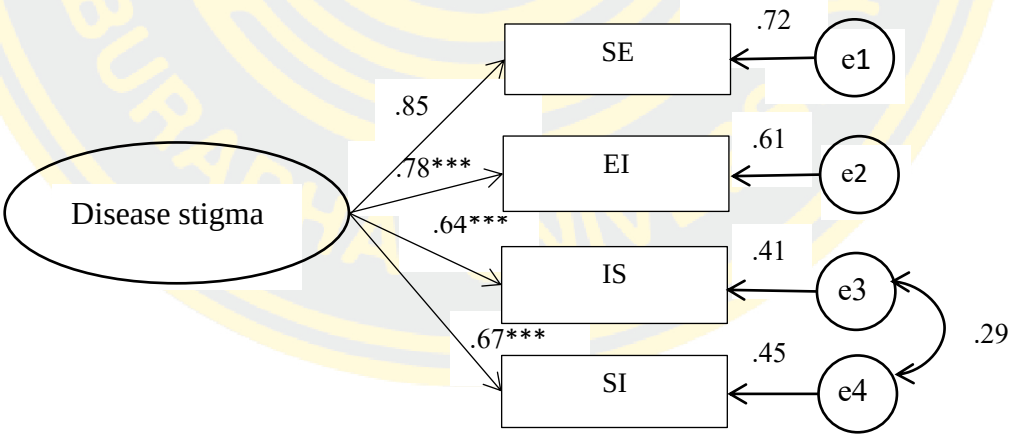
Table 15 Descriptive statistics of self-care and its subscales (n = 387)

Items	Possible range	Actual range	*M*	*SD*
Self-care maintenance	0~100	25~100	72.02	13.48
Self-care monitoring	0~100	25~100	68.35	14.11
Self-care management	0~100	10~100	63.17	14.31
Self-Care (Overall)	**0~100**	**25~100**	68.70	12.11

Part 4 Results of model testing

The measurement model assessment

The measurement model describes the relationship between latent variables and manifest indicators (Blunch, 2012). Prior to testing structural equation models, a confirmatory factor analysis was conducted in order to determine the construct validity of the measurement. Disease stigma had four indicators that compose of social exclusion (SE), economic insecurity (EI), internal shame (IS) and social isolation (SI). Neither the construct validity nor the fit to empirical data were present in the model of disease stigma ($\chi 2 = 22.72$, df = 2, CMIN/df = 11.36, $p < .000$, GFI = 0.97, CFI = 0.97, RMSEA= .16). The value of standard factor loading was from .64 to .85. A path between error 3 and error 4 was suggested by the modification indices. Therefore, model goodness of fit criteria are met by the measurement model ($\chi 2 = 1.27$, df = 1, CMIN/df = 1.27, $p = .26$, GFI = 1, CFI =1, RMSEA = .03). Based on the modified measurement model, SE as .85 was the maximum value of standard factor loading, and IS as .64 was the minimum value of standard factor loading which were significantly related to disease stigma at $p < .001$. (Figure 2)

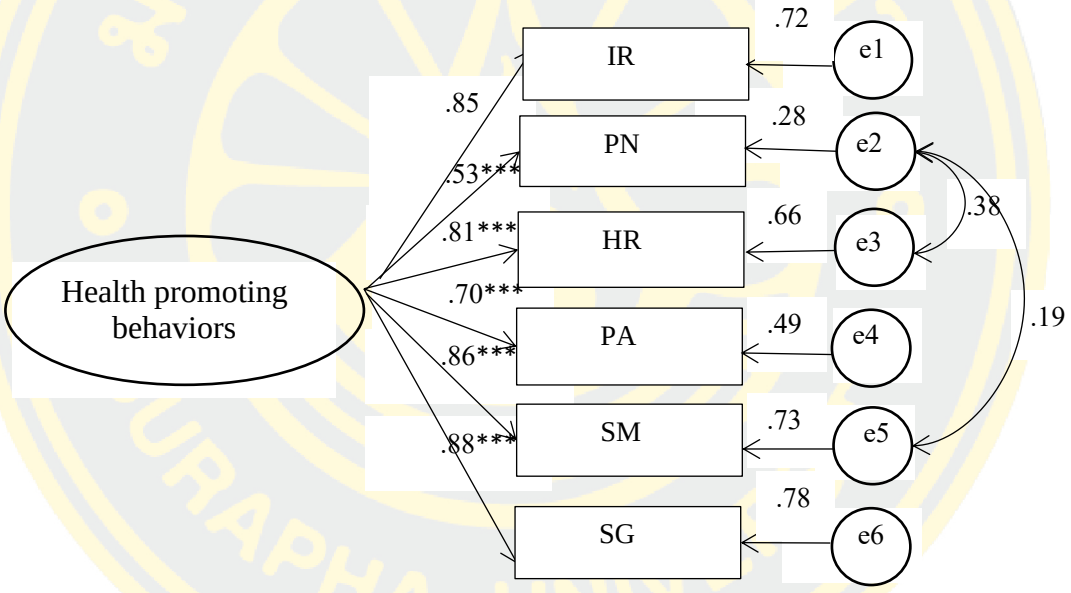


Note ***$p < .001$

Figure 2 Standardized factor loading and measurement errors for the measurement model of disease stigma

Health promoting behaviors consists of six indicators, namely spiritual growth (SG), responsibility for health (HR), physical activity (PA), interpersonal relations (IR), nutrition (N), and stress management (SM).. Neither the construct

validity nor the fit to empirical data were present in the model of health promoting behaviors ($\chi 2$ = 69.37, df = 9, CMIN/df = 7.71, p < .000, GFI = .94, CFI = .96, RMSEA = .13). The value of standard factor loading was from .60 to .87. The paths between error 2 and error 3, error 2 and error 5 were suggested by the modification indices. Therefore, the measurement model achieving the criteria for model goodness of fit ($\chi 2$ = 17.69, df = 7, CMIN/df = 2.53, p =.01, GFI = 0.98, CFI = 0.99, RMSEA = .06). In the modified measurement model, SG had a maximum value of .88 and PN had a minimum value of .53, and was significantly correlated with disease stigma at p < .001. (Figure 3)

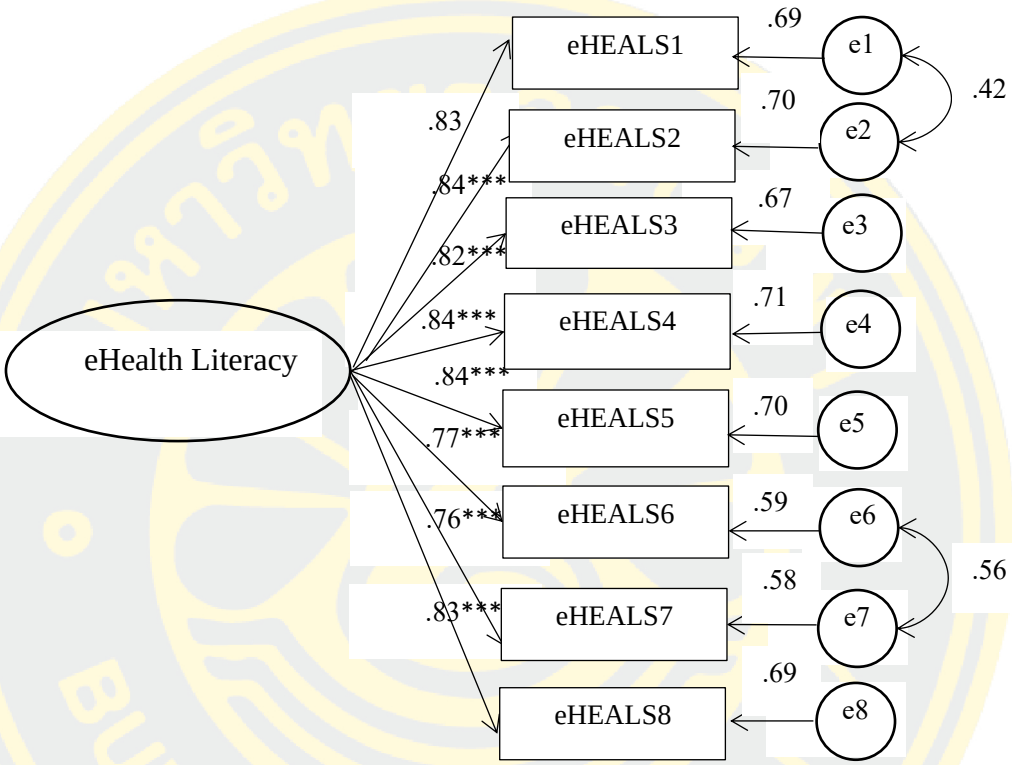


Note *** p < .001

Figure 3 Standardized factor loading and measurement errors for the measurement model of Health promoting behaviors

eHealth Literacy had eight indicators. Neither the construct validity nor the fit to empirical data were present in the model of eHealth Literacy ($\chi 2$ = 242.32, df = 20, CMIN/df = 12.12, p < .000, GFI = .87, CFI = .92, RMSEA = .17). The value of standard factor loading was from .79 to .86. The modification indices suggested adding a path between error 6 and error 7, error 1 and error 2 respectively. Therefore, the measurement model achieving the criteria for model goodness of fit ($\chi 2$ = 52.93,

df = 18, CMIN/df = 2.94, p< .000, GFI = 0.97, CFI = 0.99, RMSEA = .07). In the modified measurement model, eHealths 2, 4, 5 had a maximum value of .84 and eHealths 7 had a minimum value of .76, and was significantly correlated with ehealth literacy at p < .001. (Figure 4)

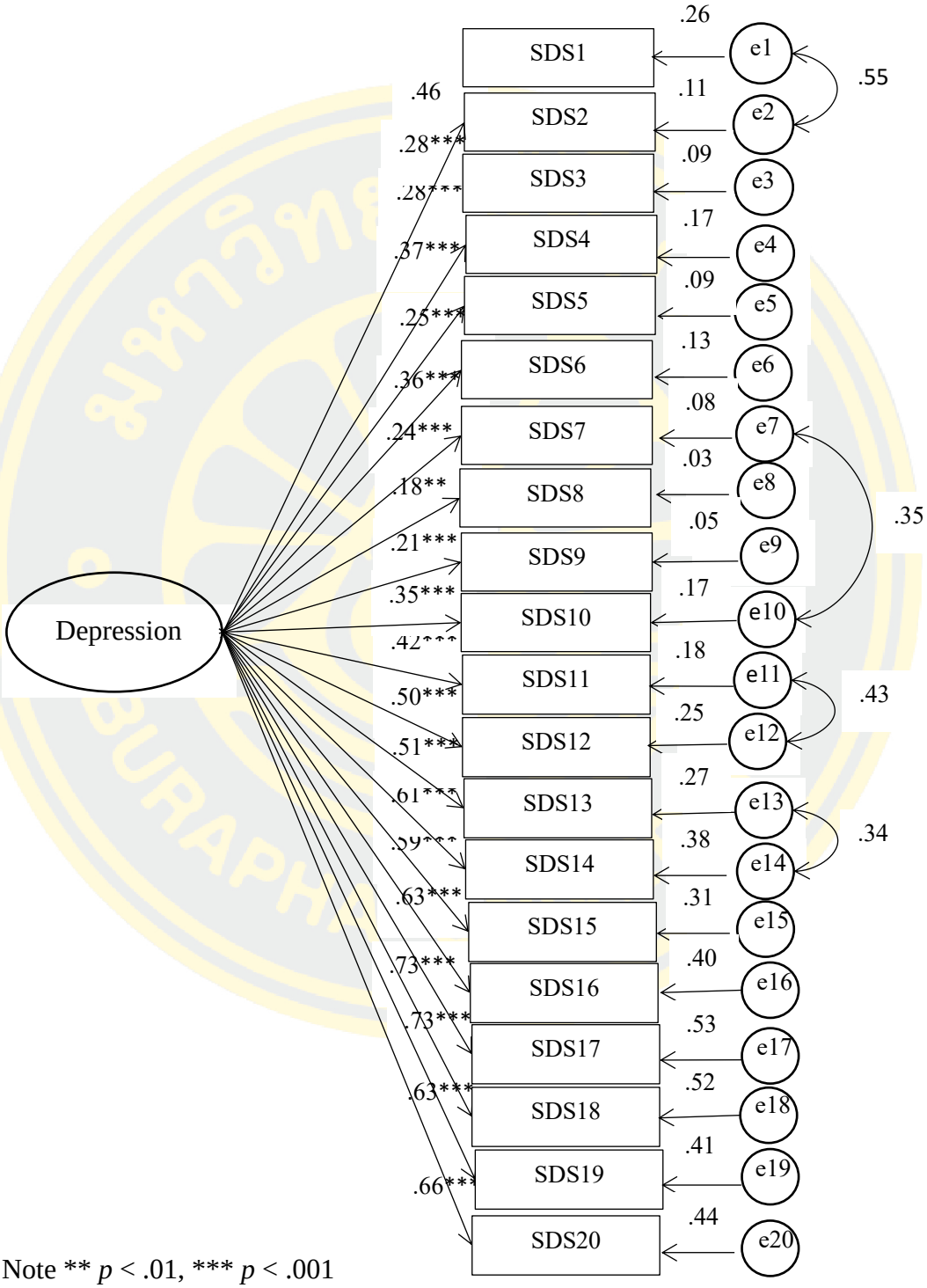


Note *** p < .001

Figure 4 Standardized factor loading and measurement errors for the measurement model of eHealth Literacy

Depression had twenty indicators. The model of depression did not have a construct validity and not fit to empirical data at (χ2 = 986.67, df = 170, CMIN/df = 5.80, p < .000, GFI = .75, CFI = .65, RMSEA = .11). The value of standard factor loading was from .70 to .22. The modification indices suggested adding paths between errors. Therefore, the measurement model achieving the criteria for model goodness of fit (χ2 = 391.62, df = 146, CMIN/df = 2.68, p<.000, GFI = 0.90, CFI = 0.90, RMSEA = .07). From the modified measurement model, the maximum value of standard factor loading was SDS 17 and 18 as .73 and the minimum value of standard

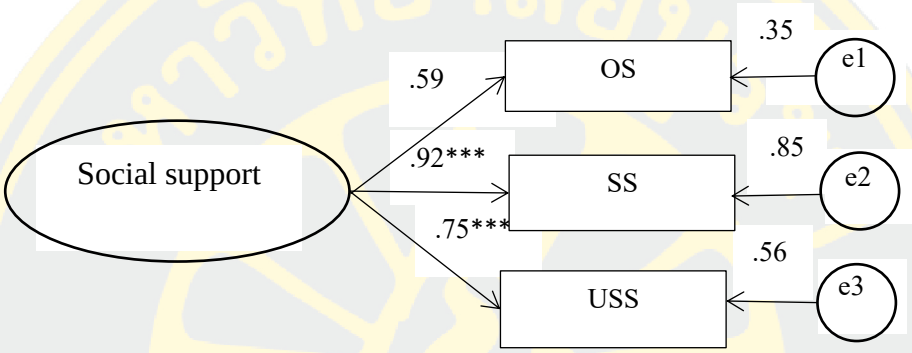
factor loading was SDS 8 as .18, and significantly associated with depression at $p < .001$. (Figure 5)



Note ** $p < .01$, *** $p < .001$

Figure 5 Standardized factor loading and measurement errors for the measurement model of depression

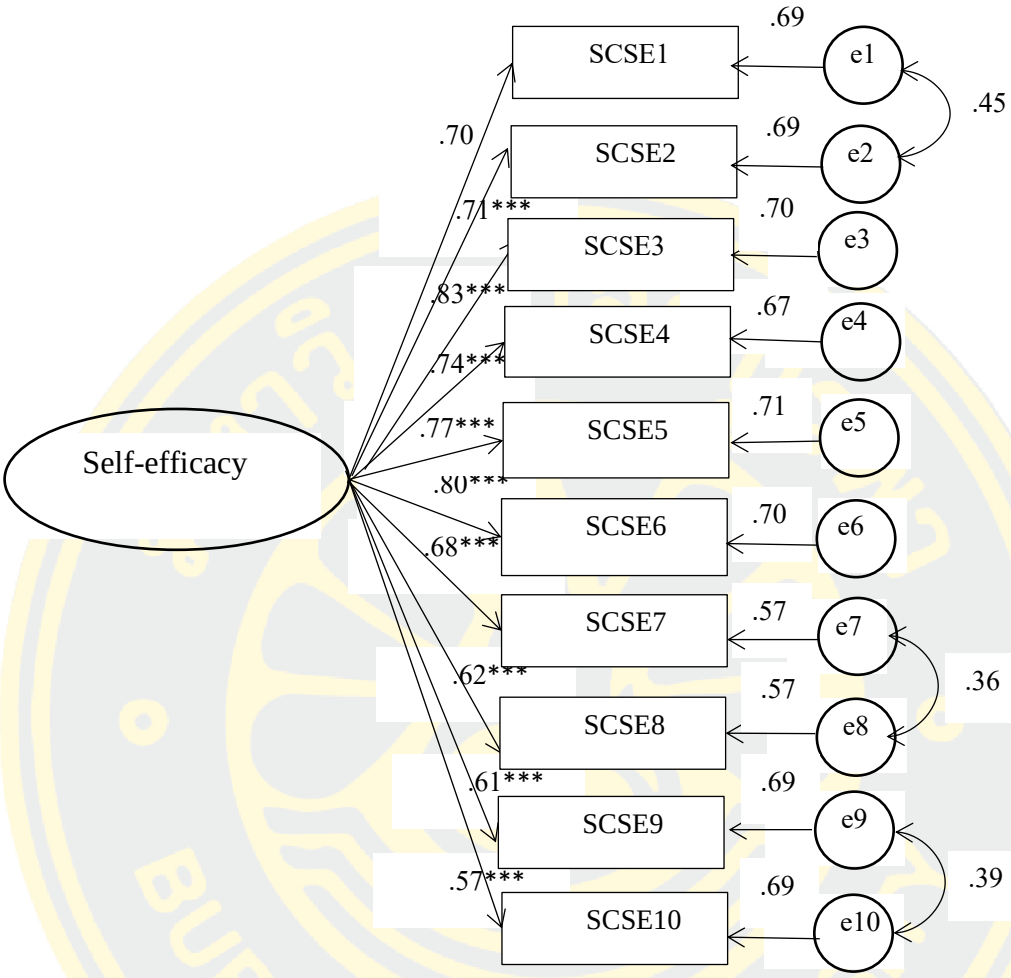
Social support comprised three indicators namely objective support (OS), subjective support (SS), and utilization of social supporting (USS). There was a significant association ($p < .001$) between the three and the social support, with standard factor loadings of .59, .92, and .75, respectively Both the construct validity and the fit to empirical data were present in the model of social support ($\chi 2 = 0$, df = 0). Therefore, social support comprised three components. (Figure 6)



Note *** $p < .001$

Figure 6 Standardized factor loading and measurement errors for the measurement model of social support

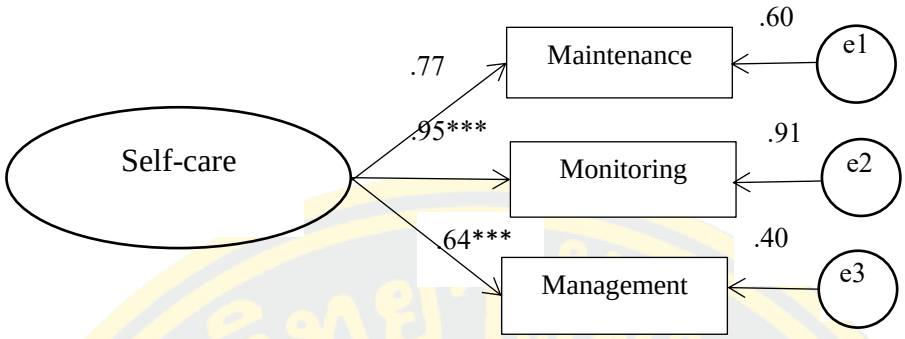
Self-efficacy had 10 indicators. The model of self-efficacy did not have a construct validity and not fit to empirical data at ($\chi 2$ =426.47, df = 35, CMIN/df = 12.19, $p < .000$, GFI = .81, CFI = .82, RMSEA = .17). The value of standard factor loading was from .77 to .62. The modification indices suggested adding paths between errors. Therefore, the measurement model achieving the criteria for model goodness of fit ($\chi 2 = 84.73$, df = 25, CMIN/df = 3.39, $p <.000$, GFI = 0.96, CFI = 0.97, RMSEA = .09). From the modified measurement model, the maximum value of standard factor loading was SCSE 3 as .83 and the minimum value of standard factor loading was SCSE 10 as .57, and significantly associated with the disease stigma at $p < .001$. (Figure 7)



Note *** $p < .001$

Figure 7 Standardized factor loading and measurement errors for the measurement model of self-efficacy

Self-Care comprised three indicators namely self-care maintenance (maintenance); self-care monitoring (monitoring); self-care management (management). The standard factor loadings of them were .77, .95, .64 respectively and significantly associated with self-care at $p < .001$. The model of self-care had validity and fit empirical data at $\chi 2 = 0$, df = 0. Therefore, self-care comprised three components. (Figure 8)



Note *** $p < .001$

Figure 8 Standardized factor loading and measurement errors for the measurement model of self-care

The structural model assessment

In this part, structural model assessment includes two steps, one is testing the hypothesized model on sample data and the other is testing a modified model using analysis of moment structure (AMOS).

Hypothesized model testing

In the hypothesized model, one exogenous latent variable was included, as well as eight endogenous variables. One exogenous latent variables is eHealth literacy. A total of eight endogenous latent variables are considered, including disease stigma, health promoting behaviors, knowledge, depression, social support, skills, self-efficacy and self-care. The purpose of the model test statistic is to analyze whether the hypothesized model fit well to the sample covariance matrix (Little & Kline, 2016). In this study, there were 6 approximate fit indexes used to evaluate the model fit, and it contained the minimum chi-square value (CMIN), CMIN/ degrees of freedom (df), the goodness-of-fit Index (GFI), adjusted goodness of fit index (AGFI), comparative fit index (CFI), and root mean square error of approximation (RMSEA) (Hair et al., 2010; Little & Kline, 2016).

Criteria for evaluating model fit and interpretations of acceptable models: CMIN compares obtained chi-square value with tabled value for given df was non-significant ($p > .05$); The acceptable value of CMIN/ df $<$ 2, and the reasonable value $<$ 5.0; The goodness of GFI, AGFI and CFI value near to .90 or .95 means a good fit; The value of RMSEA of .05 to .08 shows fair fit (Schumacker & Lomax, 2010).

Based on the overall model fit index, the hypothesized model showed as follow: CMIN = 1195.78 (p =.000, df = 279), CMIN/df = 4.29, GFI = .80, AGFI = .75, CFI = .85, and RMSEA = .09. 89.6% of the variance was explained by the model. Consequently, there was no fit between the hypothesized model and the empirical data.

The relationships between exogenous factors and mediators have been found the following: The positive direction was a path from ehealths literacy (β = .31, p < .001) to health-promoting behaviors. The path from ehealths literacy (β = .46, p < .001) to knowledge and the path from ehealths literacy (β = .18, p < .001) to skill were also significant.

The relationships between exogenous and endogenous variables: The positive direction was a path from ehealths literacy (β = .09, p < .05) to self-care.

The relationships between mediators and endogenous variables: The path from disease stigma to self-care was not significant (β = -.06, p > .05). The other 6 paths, including the path from depression to self-care (β = -.15, p < .001), the path from self-efficacy to self-care (β = .21, p < .001), the path from health-promoting behaviors to self-care (β = .38, p < .001), the path from social support to self-care (β = .18, p < .001), the path from knowledge to self-care (β = .09, p< .05), the path from skill to self-care (β = .24, p < .001) were all significant.

The relationships between mediators: The 11 paths, such as the path from disease stigma to depression (β = .36, p < .001), the path from disease stigma to self-efficacy (β = - .15, p < .05), the path from health-promoting behaviors to disease stigma (β = -.33, p < .001), the path from social support to disease stigma (β = -.33, p < .001), the path from social support to depression (β = -.29, p < .001), the path from social support to self-efficacy (β = .28, p < .001), the path from social support to health-promoting behaviors (β = .50, p < .001), the path from depression to self-efficacy (β = -.16, p < .001), the path from social support to skill (β = .25, p < .001), the path from health-promoting behaviors to self-efficacy (β = .27, p < .001), the path from health-promoting behaviors to knowledge (β = .13, p < .05), and the path from health-promoting behaviors to skill (β = .23, p < .001) were all significant.

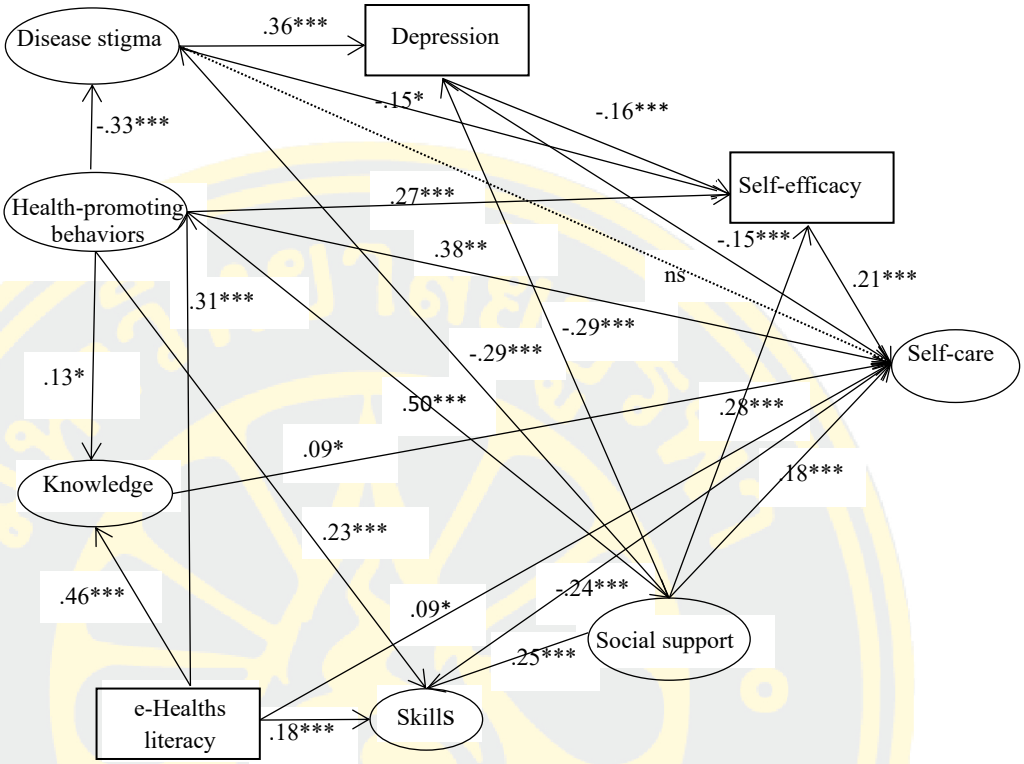


Figure 9 The hypothesized model of factors affecting self-care in patients with colostomy

Note ns = non-significant, *$p < .05$, **$p < .01$, ***$p < .001$

→ significant

⇢ non-significant

The model modification

The result showed the hypothesized model did not fit the empirical data. Model modification is necessary to improve model-to-data fit with a specified model with poor model-fit indices until better fit is achieved (Schumacker & Lomax, 2010). The modification was continued until the goodness of fit indices were acceptable (Little & Kline, 2016).

Based on the modified model, it was found that CMIN = 578.85 (p <.001, df = 254), CMIN/ df = 2.28, GFI = .90, AGFI =.86, CFI = .95 and RMSEA = .06. The model explained 83.2% of the total variance. Hence, the modified model's validation indices of adequacy were acceptable. Table 16 compares the fit indices of the hypothesized and modified model.

There were 1 non-significant paths from the hypothesized model, the path from disease stigma to self-care was not significant (β = -.06, p > .05). The significant parameter estimates in the modified model can be seen in figure 4-9. All variables showed the following relationships.

The relationships between exogenous and mediators: The path from eHealths literacy (β = .18, p < .001) to health-promoting behaviors, the path from eHealths literacy (β = .11, p < .001) to skill and the path from eHealths literacy (β = .27, p < .05) to knowledge were all significant.

The relationships between exogenous and endogenous variables: The positive direction was a path from eHealths literacy (β = .05, p < .05) to self-care.

The relationships between mediators and endogenous variables: The path from disease stigma to self-care was significant (β = -.10, p < .05), the path from depression to self-care was significant (β = -.12, p < .05), the path from self-efficacy to self-care was significant (β = .33, p < .001), the path from health-promoting behaviors to self-care was significant (β = .30, p < .001), the path from social support to self-care was significant (β = .11, p < .01), the path from knowledge to self-care was significant (β = .06, p < .05), the path from skill to self-care was significant (β = .19, p < .001).

The relationships between mediators: The path from disease stigma to depression was significant (β = .38, p < .001), the path from disease stigma to self-efficacy was non-significant (β = -.10, p > .05), the path from health-promoting

behaviors to disease stigma was significant (β = -.32, $p < .001$), the path from social support to disease stigma was significant (β = -.33, $p < .001$), the path from social support to depression was significant (β = -.30, $p < .001$), the path from social support to self-efficacy was significant (β = .27, $p < .001$), the path from social support to skill was significant (β = .28, $p < .001$), the path from social support to health-promoting behaviors (β = .65, $p < .001$). The path from health-promoting behaviors to knowledge was significant (β = .29, $p < .001$), and the path from health-promoting behaviors to skill was significant (β = .28, $p < .001$), the path from health-promoting behaviors to self-efficacy was significant (β = .30, $p < .001$), the path from depression to self-efficacy was significant (β = -.17, $p < .001$).

A summary of the direct, indirect, and total effects of modified model of self-care in patients with colostomy from the parameter estimates was presented in Table 17.

Table 16 Statistics of model fit indices of the hypothesized and modified models (n = 387)

Model fit criterion	**Acceptable score**	**Hypothesized model**	**Modified model**
CMIN	$p > .05$	$\chi2$=1195.78 (p =.000) df = 279	$\chi2$=578.85 (p <.001) df = 254
CMIN/ df	< 2.00	4.29	2.28
GFI	.90-1.00	.80	.90
AGFI	.90-1.00	.75	.86
CFI	.90-1.00	.85	.95
RMSEA	.05 - .08	.09	.06

Note CMIN = Minimum Chi-square, GFI = Goodness of fit index, AGFI = Adjusted GFI, CFI = Comparative fit index, RMSEA = Root-mean-square error of approximation

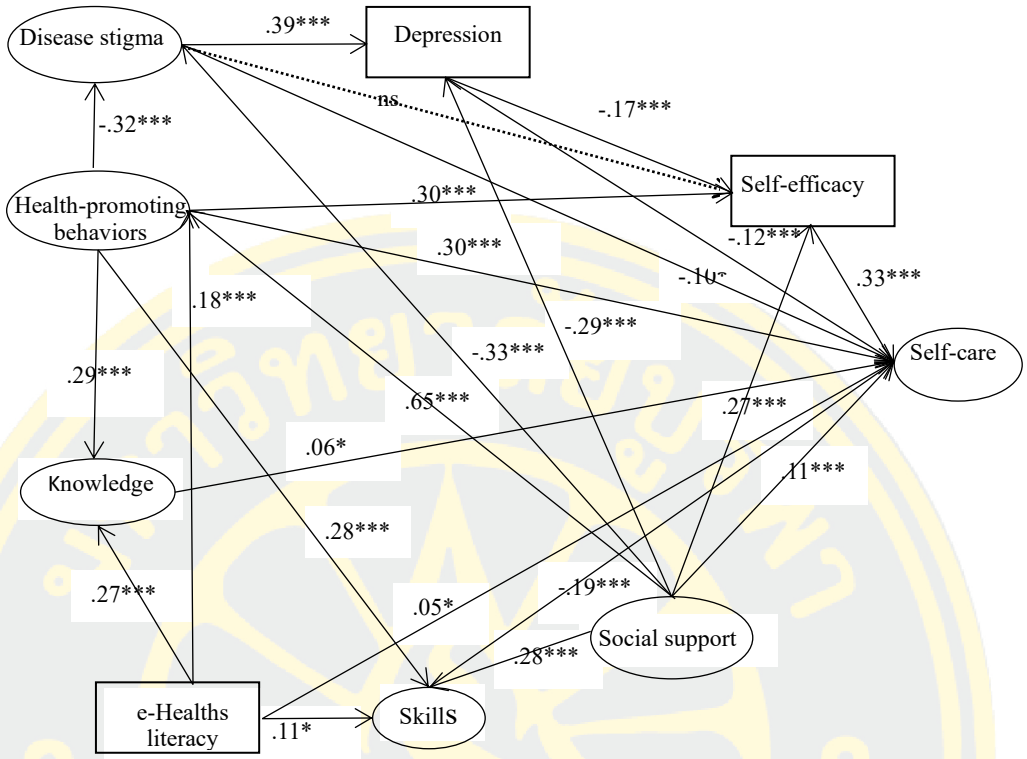


Figure 10 The modified model of factors affecting self-care in patients with colostomy

Note ns = non-significant, *$p < .05$, **$p < .01$, ***$p < .001$

→ significant

⇢ non-significant

Table 17 Direct, indirect, and total effects of parameter estimates in the modified model of self-care in patients with colostomy (n = 387)

Variable	Self-care		
	Direct effect	**Indirect effect**	**Total effect**
Disease stigma	-.10*	-.09*	-.19*
Health-promoting behaviors	.30***	.23***	.53***
eHealth literacy	.05*	.13***	.18***
Knowledge	.06*	-	.06*
Depression	-.17***	-.06*	-.23***
Social support	.11***	.54***	.65***
Skills	.19***	-	.19***
Self-efficacy	.33***	-	.33***

*p < .05, **p < .01, ***p < .001

Hypotheses testing

In this study, eight hypotheses were tested.

Hypothesis # 1: Disease stigma had a negative direct effect, and indirect effect through self-efficacy, depression on self-care.

The path coefficient between disease stigma and self-care was not significant in the hypothesized model (β = -.06, p > .05), but in the modified model the path coefficient (β = -.12, p < .05) was significant. The path coefficient between disease stigma and self-efficacy was of significance in the hypothesized model (β = -.15, p < .05), but in the modified model it was not significant (β = -.10, p > .05). The path coefficient between disease and depression was significant both in the hypothesized model (β = .36, p < .001) and in the modified model (β =.39, p < .001). Therefore, the study findings supported this hypothesis partly.

Hypothesis # 2: Health-promoting behaviors had a positive direct effect, and indirect effect through disease stigma, self-efficacy, knowledge, skills on self-care.

The path coefficient between health-promoting behaviors and self-care was significant both in the hypothesized model (β = .38, $p < .001$) and in the modified model (β = .30, $p < .001$). The path coefficient between health-promoting behaviors and disease stigma was significant both in the hypothesized model (β = -.33, $p < .001$) and in the modified model (β =-.32, $p < .001$). The path coefficient between health promoting behaviors and self-efficacy was significant both in the hypothesized model (β =.27, $p < .001$) and in the modified model (β = .30, $p < .001$). The path coefficient between health-promoting behaviors and knowledge was significant both in the hypothesized model (β = .13, $p < .05$) and in the modified model (β =.29, $p < .001$). The path coefficient between health-promoting behaviors and skills was significant both in the hypothesized model (β = .23, $p < .001$) and in the modified model (β =.28, $p < .001$). Therefore, the study findings supported this hypothesis.

Hypothesis # 3: EHealths literacy had a positive direct effect, and indirect effects through knowledge, skills, health-promoting behaviors on self-care.

In the hypothesized model, the path coefficient between eHealths literacy (β = .09, $p < .05$) and self-care was significant, and in the modified model, the path coefficient between eHealths literacy (β = .05, $p < .05$) and self-care was significant. The path coefficient between eHealth literacy and knowledge was significant in the hypothesized model (β = .46, $p < .001$) and the modified model (β =.27, $p < .001$). The path coefficient between eHealth literacy and skills was significant in the hypothesized model (β = .18, $p < .001$) and the modified model (β = .11, $p < .001$). The path coefficient between eHealth literacy and health-promoting behaviors was significant in the hypothesized model (β = .31, $p < .001$) and the modified model (β =.18, $p < .001$). Therefore, the study findings supported this hypothesis.

Hypothesis # 4: Knowledge had a positive direct effect on self-care.

The path coefficient between health-promoting behaviors and self-care was significant in the hypothesized model (β = .09, $p < .05$) and the modified model (β = .06, $p < .05$). Therefore, the study findings supported this hypothesis.

Hypothesis # 5: Social support had a positive direct effect, and indirect effect through health-promoting behaviors, depression, disease stigma, skills, self-efficacy on self-care.

The path coefficient between social support and self-care was significant in the hypothesized model (β = .18, $p < .001$) and the modified model (β = .11, $p < .01$). The path coefficient between social support and health-promoting behaviors was significant in the hypothesized model (β = .50, $p < .001$) and the modified model (β =.65, $p < .001$). The path coefficient between social support and depression was significant in the hypothesized model (β = -.29, $p < .001$) and the modified model (β =.-.29, $p < .001$). The path coefficient between social support and disease stigma significant in the hypothesized model (β = -.29, $p < .001$) and the modified model (β = -.33, $p < .001$). The path coefficient between social support and skills was significant in the hypothesized model (β = -.25, $p < .001$) and the modified model (β =.-.28, $p < .001$). The path coefficient between social support and self-efficacy was significant in the hypothesized model (β = .28, $p < .001$) and the modified model (β =.27, $p < .001$). Therefore, the study findings supported this hypothesis.

Hypothesis # 6: Depression had a negative direct effect, and indirect effect through self-efficacy on self-care.

The path coefficient between depression and self-care was significant in the hypothesized model (β = -.15, $p < .001$) and the modified model (β = -.12, $p < .001$). The path coefficient between depression and self-efficacy was significant in the hypothesized model (β = -.16, $p < .001$) and the modified model (β = -.17, $p < .001$). Therefore, the study findings supported this hypothesis.

Hypothesis # 7: Skills had a positive direct effect on self-care.

The path coefficient between skills and self-care was significant in the hypothesized model (β = .24, $p < .001$) and the modified model (β = .19, $p < .001$). Therefore, the study findings supported this hypothesis.

Hypothesis #8: Self-efficacy had a positive direct effect on self-care.

The path coefficient between self-efficacy and self-care was significant in the hypothesized model (β = .21, $p < .001$) and the modified model (β = .33, $p < .001$). Therefore, the study findings supported this hypothesis.

Summary

The relationships between disease stigma, health promoting behaviors, eHealth literacy, knowledge, depression, social support, skills, self-efficacy and self-care were analyzed in patients with colostomy. Description statistics have revealed the characteristics of patients with colostomies. The effects of nine major variables: disease stigma, health promoting behaviors, eHealth literacy, knowledge, depression, social support, skills, self-efficacy and self-care, were as indicated. In the preliminary analyses, all variables were tested for outliers, normality, linearity, and multicollinearity It was found that the hypothesized model was not consistent with the empirical data. Therefore, the model had to be modified until good fit indices were acceptable and a satisfactory model fit index was demonstrated in the final modification mode ($\chi 2$ =578.*85*, p <.001, df = 140, CMIN/ df = 2.28, GFI = .90, AGFI =.86, CFI = .95 and RMSEA=.06).

CHAPTER V
CONCLUSION AND DISCUSSION

This chapter consists of three sections. The first section presents a summary of the study. The second section discusses the study findings responding to research hypotheses. The third section discusses the limitations, implication, and recommendations of this study.

Summary of the study

The purposes of this study were to examine the causal relationships among predictive variables such as disease stigma, health-promoting behaviors, eHealths literacy, knowledge, depression, social support, skills, self-efficacy and one dependent variable as self-care in patients with colostomy. A descriptive model-testing, cross-sectional design was used in this study. A multi-stage sampling technique was used to recruit participants. Based on the inclusion criteria set out, 387 patients with colostomy were recruited from 4 general hospitals out of the 9 district general hospitals in Yancheng, Jiangsu province, China. Ten questionnaires were used, including the demographic questionnaire, the Social Impact Scale, the Health-Promoting Lifestyle Profile II, the eHealth Literacy Scale, Colostomy Self-care Knowledge Scale, Self-rating Depression Scale, Social Support Rating Scale, Colostomy Self-care Skill Scale, Ostomy self-care self-efficacy scale and Ostomy Self-Care Index. The Cronbach's alpha ranged from .82 to .94.

The age of the participants was between 40 to 92 years. Their mean age was 67.39 (SD =9.89) years. The majority of participants were older than 60 years (76.8%, n = 307), nearly two-fifths (41.3%, n=165) had educational level of primary school, 42.5% of them lived with spouse. Most (60.8%) of them had family income from 6,001 to 10,000 RMB per month. About one-thirds of them (34.8%) prior to illness were farmers, followed by workers (31.3%). 39.3% of the participants had complications. 26.5% of them were 1~3 months after surgical treatment. The hypothesized model of self-care in patients with colostomy did not fit the empirical data well. According to the conceptual constructs and analysis indices, modifying the

model was conducted to improve the model fit. The final model met the goodness of fit criterion. The final model contained nine variables: disease stigma, health promoting behaviors, eHealths literacy, knowledge, depression, social support, skills, self-efficacy and self-care. The model explained 83.2% of the variance of self-care in patients with colostomy. EHealths literacy had a positive direct effect on self-care (β = .05, $p < .05$), eHealths literacy has positive indirect effects on self-care through knowledge (β =.27, $p < .001$), skills (β = .11, $p < .001$) and health-promoting behaviors (β =.18, $p < .001$). Disease stigma had a negative direct effect on self-care (β = -.10, $p < .05$), disease stigma didn't have effects on self-efficacy (β = -.10, $p > .05$), disease stigma had negative indirect effects on self-care by providing positively direct effects on depression (β =.39, $p < .001$). Depression had a negative direct effect on self-care (β = -.12, $p < .05$), and had negative indirect effects on self-care through self-efficacy (β = -.17, $p < .001$). Self-efficacy had a positive direct effect on self-care (β = .33, $p < .001$). Health-promoting behaviors had a positive direct effect on self-care (β = .30, $p < .001$), health promoting behaviors had a positive indirect effects on self-care through self-efficacy (β = .30, $p < .001$), knowledge (β =.29, $p < .001$) and skills (β =.28, $p < .001$) and had a negative indirect effects on self-care through disease stigma (β = -.32, $p < .001$). Social support had a positive direct effect on self-care (β = .11, $p < .01$), Social support had a positive indirect effect on self-care through health-promoting behaviors (β =.65, $p < .001$), skills (β = .28, $p < .001$), self-efficacy (β =.27, $p < .001$) and had a negative indirect effect on self-care through depression (β =-.29, $p < .001$) and disease stigma (β =-.33, $p < .001$). Knowledge had a positive direct effect on self-care (β = .06, $p < .05$). Skills had a positive direct effect on self-care (β = .19, $p < .001$).

Discussion of the findings

The purpose of this study was to concern actors.influencing self-care in patients with colostomy. The finding revealed a total score of self-care from 25 to 100 with a mean of 68.70 (SD = 12.11), which was at a medium level and it was consistent with the study results of other scholars (Luo et al., 2015). It is known that the effects caused by colostomy including not only exert physical and physiological influence, but also patients' emotional and social sphere. The level of self-care for

colostomy in China is lower than that in Western countries. Therefore, improving patients' self-care level is a topic of nursing concern.

In addition, the discussion in this chapter is follow the study hypotheses:

Hypothesis # 1: Disease stigma had a negative direct effect, and indirect effect through self-efficacy, depression on self-care.

The parameter estimates for disease stigma had a significant direct effect on self-care ($\beta = -.12$, $p < .05$). Thus, this part of hypothesis was supported. It was interpreted that disease stigma meant that patients with colostomy devalued themselves and had negative feelings about their disease (Seo & Song, 2019). In chronic diseases, disease stigma can decrease adherence to treatment or lead to avoidance of treatment, affecting self-care (Kamaradova et al., 2016; Turan et al., 2017; Yan et al., 2021). Consistently, previous studies had shown that stigma was found to be both significant and negatively associated with their self-care behaviors (Kato et al., (2016). The study of Du et al. (2016b) indicated stigma could negatively affect patients' self-care ability using SEM in patients with permanent colostomy ($\beta = -0.21$, $p < .05$). Therefore, disease stigma was the predicted factor of self-care.

The parameter estimates for disease stigma was not significant associated with self-efficacy ($\beta = -.10$, $p > .05$). Thus, this part of hypothesis wasn't supported. This could be interpreted that self-efficacy in patients with colostomy was not directly affected by disease stigma. One reason might be that most of the patients with colostomy were older than 60 years, they didn't have an intense response to the colostomy comparing to the younger, and most of them were retired at home, they had less contact with other people, all of these may lead the level of stigma was low. The other reason might be that patients with colostomy usually had a longer course before and after surgery. Yan (2010) found that stigma among veteran patients could gradually decrease because of their acceptance of and adjustment to the disease and the gradual increase in understanding and sympathy from others. The longer the time, the better the patient's adaptability to the colostomy, the weaker the stigma. Additionally, colostomy was a cure, patients need to prepare mentally to cope with the disease for life. Therefore, the present situation of patients with colostomy should be understood (Yuting Wang et al., 2022). In this study, patients with colostomy had a low level disease stigma and their level of self-efficacy was low to moderate. The

result consisted with Muñoz et al. (2011) who found that self-efficacy was not significantly associated with disease stigma.

The parameter estimates for disease stigma was significant associated with depression (β = .39, $p < .001$). Thus, this part of hypothesis was supported. Disease stigma is associated with negative psychosocial outcomes, including depression (Gaebel et al., 2017; Tosangwarn et al., 2017). It was interpreted that patients with colostomies had to deal with involuntary defecation and exposed mucosa, stool leakage, and bad odor, which result in a feeling of shame among most patients (Ayaz-Alkaya, 2019; Phelan et al., 2013; Yuan et al., 2018). Thus, after surgery, they usually must face psychological pressures directly and that is related to depression (Ayaz-Alkaya, 2019; Chuang et al., 2019). The previous study showed that there was a positive correlation between disease stigma and depressive symptoms (Al-Dwaikat et al., 2022; Conner et al., 2010; Yilmaz & Dedeli, 2016). Therefore, patients with higher levels of disease stigma tended to have higher depression.

Hypothesis # 2: Health-promoting behaviors had a positive direct effect, and indirect effect through disease stigma, self-efficacy, knowledge, skills on self-care.

The parameter estimates for health-promoting behaviors (HPB) was significant associated with self-care (β = .29, $p < .001$). Thus, this part of hypothesis was supported. This could be interpreted that patients with better adhering to HBP could be know the importance and benefits of engagement in HPB, and they would do the changes in lifestyle such as weight reduction, smoking cessation, physical activity, and stress management to keep healthy (Kara & İşcan, 2016). Adopting HPB is associated with improved quality of life, increased life expectancy, and decreased morbidity and mortality rates (Rababa et al., 2021). For patients with colostomy, who had good health behaviors would promote the self-care ability to improve quality of life, reduce the incidence of complications and prolong life-span. The previous study showed that there was a positive correlation between health-promoting behaviors and self-care (Lu et al., 2018; Zhu et al., 2020).

The parameter estimates for health-promoting behaviors (HPB) was significant negatively associated with disease stigma (β = -.33, $p < .001$) and positively associated with self-efficacy (β = .30, $p < .001$). Thus, this part of

hypothesis was supported. This could be interpreted that patients who had high level of health-promoting behaviors were considered to improve and maintain healthy and prevent disease actively, and that help them autonomously strengthen self-efficacy and decrease disease stigma (Hong et al., 2007; Mo & Winnie, 2010). When patients encountered healthy problems, they would adjust themselves physically and mentally to increase personal resiliency and improve health (Pender, 2011). If patients have a negative psychological condition, they would take the initiative to overcome it and encourage them to build self-efficacy. Therefore, patients with high level of health-promoting behaviors had low level of disease stigma and high self-efficacy what meant that there was a negative correlation between health-promoting behaviors and disease stigma, a positive correlation between health-promoting behaviors and self-efficacy (Jeon, 2017).

The parameter estimates for health-promoting behaviors (HPB) was significant positively associated with knowledge ($\beta = .29$, $p < .001$) and skills ($\beta = .28$, $p < .001$). Thus, this part of hypothesis was supported. This could be interpreted that the better health-promoting behavior of patients with colostomy would be beneficial to them to learn more colostomy care knowledge and skills to improve the ability to self-care (Stavropoulou et al., 2021). These patients have good self-discipline and self-control and have a willing to learn knowledge and skills to self-care the colostomy to maintain and improve the individual's level of wellbeing and self-fulfillment. The previous study showed that there was a positive correlation between health-promoting behaviors and knowledge and skills (Han et al., 2004; Lee & Kim, 2022; Zambrano Bermeo et al., 2023) .

Hypothesis # 3: EHealths literacy had a positive direct effect, and indirect effects through knowledge, skills, health-promoting behaviors on self-care.

The parameter estimates for eHealths literacy was significant positively associated with self-care ($\beta = .05$, $p < .05$), knowledge ($\beta = .27$, $p < .001$) and skills ($\beta = .11$, $p < .05$). Thus, this part of hypothesis was supported. This could be interpreted that the more eHealth literacy patients had, the more likely they were to access health information online, thus having a greater knowledge and skill of self-care (Yinuo Wang et al., 2022). There were text, pictures, videos, animation, virtual simulation on the website on colostomy self-care (Lo et al., 2011; Pouresmail et al., 2019). In recent

years, especially during the time of COVID-19, the convenience and low cost of the internet have enabled eHealth literacy to be an important way for patients to export health knowledge and skills. Colostomy patients with extensive internet experience are more likely to take proactive measures to maintain their health after the surgery. Most hospitals have health websites where patients can login and learn the knowledge and skills of colostomy self-care on it. Previous research indicates that self-care, knowledge, and skills are positively correlated with eHealth literacy (Chen et al., 2013; Chuang et al., 2019; Dennison et al., 2011; Macabasco-O'Connell et al., 2011; Perazzo et al., 2017) .

The parameter estimates for eHealths literacy was significant positively associated with health-promoting behaviors ($\beta = .18$, $p < .001$). Thus, this part of hypothesis was supported. This could be interpreted that higher levels of eHealth literacy were associated with higher levels of health-promoting behaviors. High levels of eHealth literacy have been found to facilitate patient to understand disease severity, adopt disease prevention behaviors, and implement health-promoting behaviors (Baccolini et al., 2022; McCaffery et al., 2020). The findings aligned with previous studies of patients with chronic illness which reported that eHealth literacy helped them gain knowledge about the illness management, increased health awareness (Choi et al., 2021; Guo et al., 2021; Yinuo Wang et al., 2022). Results of the study indicated that eHealth literacy influences health promotion behavior in a direct manner (An et al., 2021; S. Li et al., 2021).

Hypothesis # 4: Knowledge had a positive direct effect on self-care.

The parameter estimates for knowledge was significant positively associated with self-care ($\beta = .06$, $p < .05$). Thus, this hypothesis was supported. This could be interpreted that an individual's ability to carry out self-care was directly related to his or her knowledge (Cameron et al., 2010; Costa et al., 2017; Khan et al., 2020; Ludman et al., 2013; McCaleb & Cull, 2000). Knowledge is associated with patients' behaviors (Schwartz, 1976) since its correct and useful application leads to the high level of self-care (Vicerra, 2021). For example, the patients master the more knowledge about colostomy care, such as the way to replace the colostomy bag, eat less stimulating diet and they would implement to improve the level of self-care. Patients with colostomy typically gain disease-specific knowledge and then apply the

knowledge to specific colostomy situations , as successful self-care utilizes knowledge of individuals (Artinian et al., 2002; Katherine Renpenning & Taylor, 2003). Knowledge is essential to self-care. Therefore, the knowledge and expertise of patients are crucial for the implementation and understanding of chronic self-care programs (Chen et al., 2014; Storni, 2015).

Hypothesis # 5: Social support had a positive direct effect, and indirect effect through health-promoting behaviors, depression, disease stigma, skill, self-efficacy on self-care.

The parameter estimates for social support was significant positively associated with self-care ($\beta = .11$, $p < .001$). Thus, this part of hypothesis was supported. This could be interpreted that social support was an important driver of self-care for patients with colostomy (Mohebi et al., 2018). It can be either emotional support, or instrumental support, which may take the form of financial, physical, or psychological support from family, friends as well as community members (Bruhn, 2014). For patients with colostomy, social support has been demonstrated to build resilience and increase confidence to perform or sustain self-care practices (Kennedy et al., 2007). Strengthening and scaling social support to the group for patients with colostomy could decrease pressure on families, increase access to essential medicines and supplies, facilitate effective self-care, and improve adherence (Tusubira et al., 2021). The previous study showed that colostomy patients' self-care was known to be improved by social support (Jiang et al., 2002; Prazeres & Santiago, 2016; Sayers et al., 2008).

The parameter estimates for social support was significant positively associated with health-promoting behaviors ($\beta = .65$, $p < .001$). Thus, this part of hypothesis was supported. This could be interpreted that social support due to buffering the effects of stressful events on the quality of life as well as its assistance in reaching the patients' physical and emotional needs had been viewed as integral to health promotion (Bomar, 2003). In this study, social support was significantly related to health-promoting behaviors. Social support is directly positive related to health and well-being (Taechaboonsermsak et al., 2005). Previous studies had also indicated the positive influence of social support on health promoting behaviors (Adams et al., 2000; Ballard, 2009; C. Chen et al., 2007; M. Chen et al., 2007; Taechaboonsermsak

et al., 2005; Tang & Chen, 2002). It was concluded that social support was a strong predictor of health-promoting behaviors, strong social support would help to enhance the health promotion level of patients and implement health promoting behaviors.

The parameter estimates for social support was significant negatively associated with depression (β = -.29, $p < .001$). Thus, this part of hypothesis was supported. This could be interpreted that social support was an important protective factor against depression, and both directly through the benefits of social relationships and indirectly as a buffer against stressful circumstances (Gariepy et al., 2016). Social support reduced the likelihood of depression by buffering the negative effects and maintaining a good emotional experience (Ridings et al., 2021). The theory of social support suggested that the people had stronger social support network, they could handle problems better. For example, emotional and material support from friends or family members could improve patients' ability to cope with stressful events, and in turn, lower levels of depression would be experienced. Previous studies demonstrated that if people had high social support scores, their depression scores would be low (Lakey et al., 2010; Liang et al., 2001; Mohr et al., 2004; Mura & Carta, 2013; Son et al., 2008; Uchino, 2009).

The parameter estimates for social support was significant negatively associated with disease stigma (β = -.33, $p < .001$). Thus, this part of hypothesis was supported. This could be interpreted that social support could mitigate some of the detrimental effects of disease stigma which was associated with negative psychosocial outcomes including low self-esteem, anxiety, and depression by reducing feelings of isolation, increasing feelings of belonging, and bolstering social networks (Gaebel et al., 2017; Ilic et al., 2012; Link et al., 2002; Tosangwarn et al., 2017). Those patients with poor social support may feel isolated and alienated, with manifestations such as being denied living together by family members and being considered unable to work, which can lead to job loss and at last may cause disease stigma (Rajeswari et al., 2005; Tadesse, 2016). In addition to promoting life satisfaction and social confidence, social support enabled patients to adapt to crisis situations, then reduced the psychological burden of colostomy surgery (Qiu et al., 2018). Therefore, social support predicted disease stigma in a significant way (Chen et al., 2021). Previous studies had demonstrated that social support was associated with disease stigma in

patients with colostomy (Hamid et al., 2021; Masumoto et al., 2014; Yuan et al., 2018).

The parameter estimates for social support was significant positively associated with skills (β = .28, $p < .001$). Thus, this part of hypothesis was supported. This could be interpreted that active self-care in patients with colostomy should consist of the skills of changing the colostomy bag, irrigation colostomy, skin care to meet actual needs and regular exercise (Toljamo & Hentinen, 2001). It is inevitable that successful self-care and optimal balance require motivation, support and encouragement by family, friends and health professionals (Day et al., 1996; Paterson et al., 1998). Therefore, the patients with good social support would get more emotional, instrumental, informational and appraisal support from others to encourage them to improve the skills of colostomy care and enhance the quality of life. In this study, it was demonstrated the positive relationship between social support and skills.

The parameter estimates for social support was significant positively associated with self-efficacy (β = .33, $p < .001$). Thus, this part of hypothesis was supported. This could be interpreted that social support could provide spiritual or material assistance for patients when they were facing difficulties or threats and it was an important aspect to enhance self-efficacy. The patients with colostomy who had better social support had higher levels of self-care self-efficacy, that was, the more social support the patients received, the higher their self-efficacy was (Qian & Yuan, 2012). In China, where Confucian culture emphasizes the importance of familial ties, familial support from parents, children and spouse is a critical factor that influences the self-efficacy of colostomy patients. Thus, strengthening the education of family members of patients with colostomy so that they can give more support to patients what will help to increase the self-confidence of patients in China. The previous studies had shown that patients' self-efficacy had a positive correlation with the social support they receive (Cheng et al., 2012; Su et al., 2016; Wang et al., 2015; Xu, J. Gallo, et al., 2018).

Hypothesis # 6: Depression had a negative direct effect, and indirect effect through self-efficacy on self-care.

The parameter estimates for depression was significant negatively associated with self-care (β = -.12, $p < .001$). Thus, this part of hypothesis was

supported. This could be interpreted that depression was associated with self-care probably because of the core symptoms of depression; fatigue, lack of energy, and hopelessness combined with lower motivation what led to a loss of interest and pleasure in activities and health behaviors (Bryant et al., 2017; Buyukdura et al., 2011; Kasch et al., 2002). However, some scholars found that depression was more likely to be associated with self-care maintenance than the other self-care dimensions, including self-care monitoring, self-care management (Chang et al., 2017; Chung et al., 2011; Lee et al., 2017; Riegel, Driscoll, et al., 2009; Siabani et al., 2013). It was concluded that depression was one of the most prevalent psychological manifestations of chronic conditions that could affect self-care behaviors. In this study, the depression levels of most of patients with colostomy were from mild to moderate. The finding emphasized the importance of identifying patients with depression because even mild symptoms could be relationship with poor self-care behaviors (Iovino et al., 2020).

The parameter estimates for depression was significant negatively associated with self-efficacy ($\beta = -.17$, $p < .001$). Thus, this part of hypothesis was supported. This could be interpreted that strong self-efficacy helped the patients with colostomy enhance human accomplishment and personal well-being what reduced stress and lowered vulnerability to depression. Patients who experienced depressive symptoms lacked self-efficacy to cope with physical and mental stressors and to solve the interpersonal problems. Self-efficacy was a proactive stance that drove patients to perform actions in one's own favor to cope with difficulties and keep well-being. Thus, greater self-efficacy in one's ability to perform a specific behavior had a positive effect on coping with depression (Litt, 1988; Perraud, 2000). The previous studies had shown that the depression of patients had a negative correlation with self-efficacy, that was, the higher depression, the lower self-efficacy (Albal & Kutlu, 2010; D. Kessing et al., 2016; Rosas et al., 2019; J. Xu et al., 2018).

Hypothesis # 7: Skills had a positive direct effect on self-care.

The parameter estimates for skill was significant positively associated with self-care ($\beta = .19$, $p < .001$). Thus, this hypothesis was supported. This could be interpreted that the patients with colostomy who would like have higher level of self-care must master the basic skills such as skin care, replacement of colostomy bags,

disposal of used appliances and common complication of colostomy demonstrating a reasonable degree of proficiency (Metcalf, 1999). The patient who is deemed to have the ability to self-care for colostomy, it is best to wait until the patient has learnt the skills him/herself and perform the skills independently for colostomy care (O'Connor, 2005). To some extent, colostomy self-care may be defined as the patient's ability to carry out colostomy care skills. In the Middle-Range Theory of Self-Care of Chronic Illness, skills was a factor affecting self-care (Riegel et al., 2012). The previous studies had shown that skill had a positive correlation with self-care, that was, the more skills the patients mastered, the higher level of self-care (Hu et al., 2010; Zhang et al., 2010).

Hypothesis #8: Self-efficacy had a positive direct effect on self-care.

The parameter estimates for self-efficacy was significant positively associated with self-care ($\beta = .33$, $p < .001$). Thus, this hypothesis was supported. This could be interpreted that the colostomy self-efficacy referred to the patients' confidence in their ability to establish and change motivations, cognitive resources, and action plans, that can be used to adequately self-care the colostomies. It was concluded that if self-efficacy was low, confidence in self-care practices decreased, resulting in poor self-care performance (Devarajooh & Chinna, 2017), and prior studies had found that self-efficacy has a direct impact on changing and continuing self-care behaviors (Peyman et al., 2020; Qin et al., 2020; Tan et al., 2021). Self-efficacy was one of the factors influencing self-care in Middle-Range Theory of Self-Care of Chronic Illness (Riegel et al., 2012). The finding of the study supported the theory.

Conclusion

The level of self-care in patients with colostomy in China was medium. From the literature review and the Middle-Range Theory of Self-Care of Chronic Illness, eight factors were complete into the self-care model in patients with colostomy in China. However, the hypothesized model was not fit the data well. According to the modified induces and the theoretical, the final model remained eight factors, but the path coefficient between disease stigma and self-efficacy was non-significant in the modified model and the total variance explained 83.2%. Health-

promoting behaviors, eHealths literacy, knowledge, social support, skills and self-efficacy had positive direct effects on self-care. Disease stigma and depression had negative effects on self-care. Health-promoting behaviors, social support had positively indirect effects and depression had negatively indirect effect through self-efficacy on self-care. Disease stigma had a negatively and social support had a positively indirect effect through depression on self-care. Health-promoting behaviors and social support had positively indirect effects through skills, and had negatively indirect effects through disease stigma on self-care. Both Health-promoting behaviors and eHealths literacy had positively indirect effects through knowledge on self-care. EHealths literacy and social support had positively indirect effects through health-promoting behaviors on self-care.

These findings suggested that nurses could help to improve self-care in patients with colostomy by prompting their levels of health-promoting behaviors, eHealths literacy, knowledge, social support, skills and self-efficacy, decreasing the levels of disease stigma and depression. In recent years, although it still lags behind advancements in other developed nations, China has made significant strides to improve and develop specialized ostomy care and train nurses in this area. In the future, there will been a significant decrease in colostomy complications and an improvement in self-care in patients with colostomy (Yang et al., 2016).

Implications of the study findings

Nursing research improves clinical expertise and personal knowledge, helps to implement changes to provide excellence in nursing care, and helps to locate additional resources (Titler, 2008). The results of the present study provide an understanding of the factors that influence self-care in patients with colostomy in China. As we know, this is the first study concerning the eight factors of self-care in patients with colostomy in the mainland of China. The study's conclusions have significant ramifications for nursing, practice, policy, and education.

1. Nurses and health care can focus on perceived depression, social support, knowledge, skills, self-efficacy, health promoting behaviors, eHealth literacy and self-care in Chinese patients with colostomy which can guide their nursing practice. Firstly, it is beneficial for nurses to enrich the contents of health education and

follow-up for the patients with colostomy. Secondly, nurses may change traditional practices to enable patients to learn self-care as early as possible during hospitalization and help them improve the level of adjustment. Thirdly, nurses aware of the factors will facilitate self-care in patients, it will guide nurses to implement effective and feasible interventions to help patients to improve their self-care ability.

2. Researchers may apply perceived depression, social support, knowledge, skills, self-efficacy, health promoting behaviors, eHealth literacy and perceived health status into future research; It should be repeatedly study this topic in other different communities and areas in China so that the samples together more representative and generalization of the results is more acceptable into future research. Meanwhile, researchers can spread the study to other chronic disease populations and it is helpful to further develop the theory.

3. It can give the policy makers some suggestions. Constructing more reasonable health system for patients with chronic diseases and cancer rehabilitation. It is necessary to accelerate the development of community care and primary health care systems, and provide more medical resources for patients and promote self-care level. Prevention and control of chronic diseases is mainly at the grass-roots and community levels. Training more professional nurses to improve quality of care and patients' satisfaction. The patients with colostomy need to be given care and guidance by professionals, like Enterostomal Therapist (ET) or wound ostomy continence nurses (WOCN).

4. Nursing teachers can apply predictive factors of self-care in Chinese patients with colostomy into their teaching that leads nursing students to better understanding about factors related to self-care.

Limitation of the study

Several limitations of this study should be acknowledged and concerned.

Firstly, the enrollment was in Yancheng City in China, and the findings may be not generalized to the parents with colostomy in other cities in China.

Secondly, this study was a cross-sectional study. Regarding the causative linkages, we were unable to reach firm conclusions. A longitudinal study strategy would be required in the future.

Thirdly, there were nearly 200 questions in this study. The large number of entries and the time taken to fill them out reduced the patience of the participants and may affect the authenticity of the data.

Fourthly, although demographic information of colostomy patients such as age, monthly family income, genders and presence of colostomy complications were investigated in this study, they were not included in the structural equations. However, previous scholarly studies had suggested that these factors were associated with patient self-care (Callaghan, 2006; Maydick-Youngberg, 2017; Steinhagen et al., 2017; Taneja et al., 2017). The latter study was needed to be further explored in depth.

Recommendation for future research

There are recommendations for future research as follows.

Firstly, this study tests the causal relationships between eight factors of self-care in patients with colostomy, and don't concern demographic factors affecting self-care. Therefore, the future research should add demographic variables into model such as age, monthly family income, genders and presence of colostomy complications. Including these variables may provide a great level of specificity.

Secondly, a longitudinal design and more setting and cultures should be carried out for further understanding self-care in patients with colostomy. Moreover, experimental intervention should target of disease stigma, health promoting behaviors, eHealth literacy, knowledge, depression, social support, skills, self-efficacy to self-care.

Thirdly, choosing scales with the right number of items avoid fatigue caused by the number of items to be filled out by the participants.

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APPENDICES

APPENDIX A

The institutional review board and permission letter for data collection

สำเนา

ที่ IRB3-097/2565

เอกสารรับรองผลการพิจารณาจริยธรรมการวิจัยในมนุษย์

มหาวิทยาลัยบูรพา

คณะกรรมการพิจารณาจริยธรรมการวิจัยในมนุษย์ มหาวิทยาลัยบูรพา ได้พิจารณาโครงการวิจัย

รหัสโครงการวิจัย : G-HS058/2565

โครงการวิจัยเรื่อง : SELF-CARE IN PATIENTS WITH COLOSTOMY: A STRUCTURAL EQUATION MODELING

หัวหน้าโครงการวิจัย : MRS.LONGYAN BIAN

หน่วยงานที่สังกัด : คณะพยาบาลศาสตร์

BUU Ethics Committee for Human Research has considered the following research protocol according to the ethical principles of human research in which the researchers respect human's right and honor, do not violate right and safety, and do no harms to the research participants.

Therefore, the research protocol is approved (See attached)

1. Form of Human Research Protocol Submission Version 2 : 20 September 2022
2. Research Protocol Version 2 : 30 July 2022
3. Participant Information Sheet Version 2 : 20 September 2022
4. Informed Consent Form Version 2 : 30 July 2022
5. Research Instruments Version 1 : 18 August 2022
6. Others (if any) Version - : -

วันที่รับรอง : วันที่ 10 เดือน ตุลาคม พ.ศ. 2565

วันที่หมดอายุ : วันที่ 10 เดือน ตุลาคม พ.ศ. 2566

ลงนาม *Assistant. Professor Ramorn Yampratoom*

(Assistant. Professor Ramorn Yampratoom)

Chair of The Burapha University Institutional Review Board

Panel 3 (Clinic / Health Science / Science and Technology)

APPENDIX B

Participant's information sheet and consent form

Participant Information Sheet

Research Project Code: G-HS 058/2565

Research Project Name: SELF-CARE IN PATIENTS WITH COLOSTOMY: A STRUCTURAL EQUATION MODELING

I am a PhD student at the faculty of Nursing, Burapha University, Thailand. Now I would like to invite you to participate in my research project. Before you agree to participate in this study, I will give you the details of the next project. This study will investigate patients with colostomy.

This study will be carried out after the consent of the Ethics Committee of Burapha University. Before collecting data, the researcher or assistant will provide the brief information related to self-introduction and human protection, purpose, and method of this study, participants' right to withdraw from the study and then ask participants to sign consent form according to their will to participate in this study.

Data collection will be conducted by the researcher after obtaining consent from the participants and signing an informed consent form. The participants will be asked to complete a paper questionnaire which will take the participants 45 minutes. The questionnaire contains 9 instruments which have 179 items in total. Please answer the questions in the questionnaire. In the process of filling in the questionnaire, the participants can ask the researcher to explain if there is something they cannot understand. If the participants have trouble in seeing clearly, the researcher can read it to them. Participants need to read the instructions carefully before filling in each instrument and follow them. For each question, participants choose which response best reflects their opinion and experience. There are no other commitments or lifestyle restrictions associated with participating.

The results of this study will help healthcare professionals to understand the factors affecting the self-care of patients with colostomy in China, and it is beneficial for them to take effective interventions to improve patients' self-care ability.

All the participants in this study followed the principle of voluntary participation. Participants have the right to refuse to participate in the research project and to

withdraw from the study at any time, and the rights of participants who refuse or withdraw from the study will not be affected in any way. In order to protect the rights of participants, the researcher will keep all information provided by participants confidential and the researcher will not disclose personal information of participants in any way. If the researcher wishes to disclose participant information to the institution, they must obtain the participant's permission.

If you would like to participate in this study or have any questions about this study, you can contact for further information.

Ms Bian Longyan, School of nursing, Jiangsu vocational college of Medicine, China. Tel: +08615189303306, Email: 673228246@qq.com

Dr. Pornchai Jullamate, Faculty of Nursing, Burapha University, Thailand. Tel: +66 38102808, Email: pornchai@buu.ac.th.

If the contact fails to comply with the provisions in the statement, you may file a complaint with t the Ethics Committee of Faculty of Nursing, Burapha University. The complainant is requested to detail the violation of the statement by phone (038-102-620) or email (buuethics@buu.ac.th).

Researcher: Bian Longyan

参与者信息表

研究项目代码：G-HS 058/2565

研究项目名称：结肠造口患者自我护理结构方程模型的构建

我是泰国布拉法大学护理学院的在读博士生。现在我想邀请您参加我的研究项目。在您同意参与本研究之前，我先向您详细介绍下项目的内容。本研究将调查对象是结肠造口患者 。

本研究经过泰国东方大学伦理委员会的同意后开展。收集数据前，研究者或助理会向参与者说明研究的目的、参与者的权益、研究的方法以及参与者的权利等。

研究者在取得参与者的同意并签署知情同意书后进行数据收集。参与者填写一份纸质的调查问卷，大约需要花费 45 分钟。该问卷包含 9 个调查表 179 个条目。在填写问卷的过程中，如果参与者有不理解的地方可以向研究者提问。如果参与者看不清楚，研究者可以读给他听。参加者在填写每一份调查表前，必须仔细阅读说明，并按照说明填写。对于每个问题，参与者选择一个最能反映自己真实情况的选项。请逐一回答问卷中的问题。没有其他承诺或生活方式限制。

本研究的结果将帮助医护人员了解我国结肠造口患者自我护理的影响因素，有助于医护人员采取有效地干预措施提高患者的自我护理能力。

本研究的所有参与者都遵循自愿参与原则。研究参与者有权拒绝参与研究项目，并且可以随时退出研究，拒绝或退出研究的参与者的权利不会任何影响。为了保障参与者的权益，研究者将对参与者提供的所有信息进行保密，并且研究者不会以任何的方式透露参与者的个人信息。如果研究者要向机构披露参与者的信息，他们必须获得参与者的许可。

如果您想参加本次研究或者对本次研究有任何的疑问，您可以联系我们。

卞龙艳老师，江苏医药职业学院护理学院，电话：+08615189303306；电子邮箱：673228246@qq.com。

Pornchai Jullamate 博士，泰国东方大学护理学院，电话：+66 38102808
电子邮箱：pornchai@buu.ac.th

如果研究者未能遵守声明中的规定，您可以向泰国东方大学人类研究伦理委员会进行投诉。请投诉者在电话（038-102-620）或电子邮件（buuethics@buu.ac.th）中详细违反声明的内容。

研究者：卞龙艳

Consent Form

Research Project Code: G-HS058/2565

Research Project Name: SELF-CARE IN PATIENTS WITH COLOSTOMY: A STRUCTURAL EQUATION MODELING

Prior to signing the informed consent form for participants in this research project, I have been informed by the researcher of the purpose of the study, the methodology and other details of the study. This was also explained to me by the researcher on the participant information sheet, which I fully understood. In addition, I have asked the investigator a number of questions about this study, all of which have been answered to my satisfaction. I will be willing to participate in this study without reservation.

In this study, I learned the following points. First, I can withdraw from the study at any time without any discrimination or retaliation, and my medical treatment and rights will not be affected in any way. Second, all information I provide will be kept confidential and my personally identifiable information will not be disclosed when the results of the study are published. If researchers want to disclose my information to institutions, they must obtain my permission to do so. Third, I may ask the researcher for more information at any time, and I will be given a signed and dated copy of the consent form.

I have read the above statement and have a good understanding of all the contents. I agree to sign the document certifying my willingness to participate in this study.

Signed by the consenting party: ....

Signature of witness: ....

Time: ....

AF 06-03.1

知情同意书

研究项目代码: G-HS058/2565

研究项目名称：结肠造口患者自我护理结构方程模型的构建

在签署本研究项目参与者的知情同意书之前，我已被研究者告知了研究目的、研究方法和其他细节。研究者在参与者信息表上也已向我解释了这一点，我完全能够理解。另外，我还向研究者咨询了有关本研究的一些疑问，均已得到满意答案。我将愿意毫无保留地参与这项研究。

在这项研究中，我得知了以下几点。首先，我可以随时退出研究，不会受任何歧视或报复，医疗和权利也不会受到任何影响。第二，我提供的所有信息都将被保密，并且研究结果公布时也不会披露我的个人身份信息。如果研究者要向各个机构披露我的信息，他们必须获得我的许可。第三，我可以随时向研究人员询问更多的信息，而且我将得到一份签字并注明日期的同意书副本。

我已阅读上述声明，并且对所有内容都有了很好的理解。我同意签署证明自己愿意参加本项研究的文件。

同意人签名：.....

证人签名：.....

时间：.....

APPENDIX C

Instruments

1. the Social Impact Scale (SIS)

English version

The scale aimed to assess the level of stigmatization for patients with colostomy. The scale includes four dimensions: social rejection, financial insecurity, internal shame, and social isolation, with a total of 24 items. Items are rated on a 4-point likert scale ranging from strong disagreement to strong agreement.

Item	Strong disagreement	Disagreement	Agreement	Strong agreement
Social Rejection				
1.My employer/co-workers have discriminated against me				
2.Some people act as though I am less competent than usual				
3.I feel I have been treated with less respect than usual by others				
4.I feel others are concerned they could "catch" my illness through contact like a handshake or creating food I prepare				
5.I feel others avoid me because of my illness.				
6.Some family members have rejected me because of my illness				
7.I feel some friends have rejected me because of my illness				
8.I encounter embarrassing situations as a result of my illness				
9.Due to my illness others seem to feel awkward and tense when they are around me				
Financial Insecurity				
10.I have experienced financial hardship that has affected how I feel about myself				
11.My job security has been affected by my illness				
12.I have experienced financial hardship that has affected my relationship with others				
Internalized Shame				
13.I feel others think I am to blame for my illness				
14.I do not feel I can be open with others about my illness				
15.I fear someone telling others about my illness without my permission				
16.I feel I need to keep my illness a secret.				
17.I feel I am at least partially to blame for my				

illness				
Social Isolation				
18.I feel set apart from others who are well				
19.I have a greater need than usual for reassurance that others care about me				
20.I feel lonely more often than usual.				
21.Due to my illness, I have a sense of being unequal in my relationships with others				
22.I feel less competent than I did before my illness				
23.Due to my illness, I sometimes feel useless				
24.Changes in my appearance have affected my social relationships				

Chinese version

社会影响量表

该量表是评估结肠造口患者病耻感的程度。量表包含了 4 个维度，即社会排斥、经济歧视、内在羞耻感和社会隔离，共 24 题。量表采用 4 分制评分，从极不同意到极为同意。

条目	极不同意	不同意	同意	极为同意
社会排斥				
1.我的上级或同事因为我的病而歧视我				
2.有些人认为我的工作能为不如从前了				
3.我感觉我不如从前那样受人尊敬了				
4.我感觉别人因担心和我接触（如与我握手或吃我准备的食物）会受到感染				
5.我感觉别人因为我的病而回避我				
6.我感觉有亲属因为我的病而排斥我				
7.我感觉有些朋友因为我的病而回避我				
8.因为我的病，我遇到过-些令我尴尬的事情				
9.因为我的病，在我旁边的人似乎感到紧张和不舒服				
经济歧视				
10.这个病带来的经济困难影响了我的自我感受				
11.这个病已经影响了我的工作 12.这个病带来的经济困难影响了我的人际关系				
内在羞耻感				
13.我觉得别人认为我生这病应该怪我自己				
14.我不想让周困的人知道我有这个病				
15.我担心有人会未经我的允许告知他人我的病				
16.我觉得我需要为自己的病保密				
17.我觉得我会得病至少有部分该怪我自己				

社会隔离				
18.我觉得自己不是一个健康人了				
19.与从前相比，我更需要确定别人是否关心我				
20.我感觉自己比从前更孤单了				
21.因为我的病，在与他人的交往中，我感受到了不平等				
22.与从前相比，我感觉我的能力下降了				
23.因为我的病，我有时候觉得自己很没用				
24.我外表上的改变影了我与他人的交往				

2.the Health-Promoting Lifestyle Profile II (HPLP II)

English version

This scale contains statements about the present way of life or personal habits of patients with colostomy. It contains 52 items. Indicate the frequency with which the patients engage in each behavior by circling: N for never, S for sometimes, O for often, or R for routinely. For each statement, choose which response best reflects patients' opinion and experience.

Item	N-never	S-sometimes	O-often	R- routinely
1.Discuss my problems and concerns with people close to me				
2.Choose a diet low in fat, saturated fat, and cholesterol				
3.Report any unusual signs or symptoms to a physician or other health professional				
4.Follow a planned exercise program				
5.Get enough sleep				
6.Feel I am growing and changing in positive ways				
7.Praise other people easily for their achievements				
8.Limit use of sugars and food containing sugar (sweets)				
9.Read or watch TV programs about improving health				
10.Exercise vigorously for 20 or more minutes at least three times a week (such as brisk walking, bicycling, aerobic dancing, using a stair climber)				
11.Take some time for relaxation each day				
12.Believe that my life has purpose				
13.Maintain meaningful and fulfilling relationships with others				
14.Eat 6-11 servings of bread, cereal, rice and pasta each day				
15.Question health professionals in order to understand their instructions				

16.Take part in light to moderate physical activity (such as sustained walking 30-40 minutes 5 or more times a week)				
17.Accept those things in my life which I can not change				
18.Look forward to the future				
19.Spend time with close friends				
20.Eat 2-4 servings of fruit each day				
21.Get a second opinion when I question my health care provider's advice				
22.Take part in leisure-time (recreational) physical activities (such as swimming, dancing, bicycling)				
23.Concentrate on pleasant thoughts at bedtime				
24.Feel content and at peace with myself				
25.Find it easy to show concern, love and warmth to others				
26.Eat 3-5 servings of vegetables each day				
27.Discuss my health concerns with health professionals				
28.Do stretching exercises at least 3 times per week				
29.Use specific methods to control my stress				
30.Work toward long-term goals in my life				
31.Touch and am touched by people I care about				
32.Eat 2-3 servings of milk, yogurt or cheese each day				
33.Inspect my body at least monthly for physical changes/danger signs				
34.Get exercise during usual daily activities (such as walking during lunch, using stairs instead of elevators, parking car				

away from destination and walking)				
35.Balance time between work and play				
36.Find each day interesting and challenging				
37.Find ways to meet my needs for intimacy				
38.Eat only 2-3 servings from the meat, poultry, fish, dried beans, eggs, and nuts group each day				
39.Ask for information from health professionals about how to take good care of myself				
40.Check my pulse rate when exercising				
41.Practice relaxation or meditation for 15-20 minutes daily				
42.Am aware of what is important to me in life				
43.Get support from a network of caring people				
44.Read labels to identify nutrients, fats, and sodium content in packaged food				
45.Attend educational programs on personal health care				
46.Reach my target heart rate when exercising				
47.Pace myself to prevent tiredness				
48.Feel connected with some force greater than myself				
49.Settle conflicts with others through discussion and compromise				
50.Eat breakfast				
51.Seek guidance or counseling when necessary				
52.Expose myself to new experiences and challenges				

Chinese version

健康促进量表

该问卷评估结肠造口术患者目前的生活方式或个人习惯。它包含 52 个项目。“从不”代表从未做到此项行为；“有时”代表偶尔做到此项行为；“经常”代表印象中大多数时候能做到；“常规进行”代表印象中几乎都做到。选择一个最能反映患者真实情况的选项。

项目	从不	有时	经常	常规进行
1. 与亲朋好友- -起讨论我的困难和顾虑				
2. 选用低脂、低油及低胆固醇的食物				
3. 向医生或卫生保健人员报告不正常的症状体质				
4. 按照计划的程序做锻炼				
5. 有充足的睡眠				
6. 感觉自己正以积极的方式成长变化				
7. 对于别人取得的成绩容易进行表扬				
8. 限制进食糖或含糖食物(如糖果)				
9. 阅读关于增进健康的书报或观看相关的电视节目				
10. 每星期至少做 3 次 20 或 20 分钟以上有一定强度的锻炼(如快走、骑自行车、跳有氧健身舞、爬楼梯)				
11. 每天抽空放松自己				
12. 相信我的生活是有目标的				
13. 与他人维持有意义、有满足感的关系				
14. 每天吃 5-8 两的谷类食物(面粉、大米、玉米粉、小麦、高粱等)				
15. 对卫生保健人员所提出的建议理解有困难时能提出疑问				
16. 参加轻度或中等强度的体力活动(如每周进行 5 次或以上的每次持续 30-40 分钟的散步)				
17. 接受生命中那些我无法改变的事情				
18. 渴望未来会更美好				
19. 与好朋友相聚				
20. 每天吃 4-8 两水果				
21. 当询问卫生保健人员时能得到更多的建议				
22. 在业余时间参加(娱乐性的)体力活动(如游泳、跳舞、骑单车等)				
23. 睡觉前能想--些愉快的事情				
24. 感到满足并能使自己心态平和				
25. 容易对他人表示关心、爱和温暖				
26. 每天吃 6 两至 1 斤蔬菜				
27. 与卫生保健人员讨论我的健康问题				
28. 每周全少做三次伸展运动				
29. 运用一些技巧来应对自己的压力				
30. 为生命中的长远目标进行工作				
31. 感动我所关心的人或被他们所感动				
32. 每天吃 300 克奶类和 30-50 克的大豆或豆制品				

33. 至少每月进行一次身体检查了解身体健康变化或有无危险征兆				
34. 在日常生活中得到锻炼(如午间散步、用楼梯取代电梯、在稍远的地方停车后再步行至				
35. 平衡工作与娱乐时间				
36. 觉得每天都是有趣有挑战的				
37. 想办法满足自己的隐私需求				
38. 每天吃 2.5-4 两的鱼、禽类、肉或蛋类				
39. 向卫生保健人员咨询如何照顾自己				
40. 在运动时测量我的脉搏				
41. 每天放松或沉思 15-20 分钟				
42. 知道在生活中什么对自己是重要的				
43. 从一群关心我的人当中获得支持				
44. 通过阅读食物包装上标签确认营养、脂肪和钠(盐)含量				
45. 参加关于如何做好自我保健的健康教育课程				
46. 进行身体锻炼时达到预期的心率				
47. 感到自己与一-些比自己强大的力量联系在一起				
48. 通过讨论或协商解决与他人的冲突				
49. 吃早餐				
50. 在需要是能寻求他人的知道或咨询服务				
51. 使自己接受新的经历和挑战				
52. 能控制自己的步行速度以防疲劳				

3. the eHealth Literacy Scale (eHEALS)

English version

The scale is an eight-item one used to evaluate patients' ease and skills to use the internet in order to obtain health related information. The eHEALS uses a 5-point likert scale (1-strongly disagree, 5-strongly agree). For each statement, choose which response best reflects patients' opinion and experience.

Item	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
1.I know how to find helpful health resources on the Internet					
2.I know how to use the Internet to answer my health questions					
3. I know what health resources are available on the Internet					
4.I know where to find helpful health resources on the Internet					
5. I know how to use the health information I find on the Internet to help me					
6. I have the skills I need to evaluate the health resources I find on the Internet					
7. I can tell high quality from low quality health resources on the Internet					
8. I feel confident in using information from the Internet to make health decisions					

Chinese version

网络健康信息查阅量表

该量表包含八个条目，用于评估患者使用互联网以获取健康相关信息的程度和技能。量表使用 5 分制评分（1-非常不相符，5-非常相符）。选择一个最能反映患者真实情况的选项。

项目	非常不相符	有些不相符	说不清	有些相符	非常相符
1. 我知道如何上网查找有用的卫生资源信息					
2. 我知道如何利用网络来解答自己的健康问题					

3. 我知道从网上可以获取的卫生资源信息有哪些					
4. 我知道从网络上哪里可以获取有用的卫生资源信息					
5. 我知道如何利用获取的网络卫生资源信息帮助自己					
6. 我具备评价网络卫生资源信息好坏的技能					
7. 我能够区分网络上高质量和低质量的卫生资源信息					
8. 我对应用网络信息作出健康相关决定充满自信					

4.Colostomy Self-care Knowledge Scale

English version

This scale is to evaluate the self-care knowledge about ostomy self-observational assessment, peristomy skin care, dietary principles, odor control and activity principles of patients with colostomy. The scale contains 21 items. Choose in a right or wrong way. For each statement, choose which response best reflects patients' opinion and experience.

Item	Right	Wrong
1. After the operation, the colostomy appears enlarged due to intestinal edema, and will slowly shrink to a certain degree		
2. The colostomy should be pink or red, if other colors such as: dark red, black is abnormal, you should immediately return to the hospital for examination		
3. The colostomy appearance should be dry		
4. There should be no pain when you touch the colostomy		
5. The bleeding in the colostomy is abnormal, but it is ok to cause small bleeding on the mucosa		
6. Alcohol or iodine should be used to maintain the cleanliness of the qualified skin.		
7. Clean your skin every time when your pocket is replaced		
8. Cream can be applied to the skin around the colostomy to protect the skin		
9. If the skin is not smooth, the skin glue can be applied around the colostomy, so that the skin pad can be more closely combined with the skin		
10. If the skin around the stoma is red, swollen, hot, painful what means that the skin has problems		
11. Try new foods in a small amount, and try one type at a time, and pay attention to gastrointestinal reactions after eating		
12. Drink at least 6-8 large glasses of water a day to replenish the water lost from the colostomy		
13. Try to avoid eating food easy to flatulence, such as: beans, radish, soda, beer, etc		
14. Try to avoid eating food easy to produce odor, such as: onion, sweet potato, etc		
15. Try to avoid eating stimulating food that is not easy to digest, such as glutinous rice, chili and pepper, etc		
16. Obesity may cause stoma retraction		
17. It can still restore the previous work after the colostomy surgery		

18. Try to avoid doing exercise which is easy to increase abdominal pressure to prevent stoma prolapse, such as lifting heavy objects		
19. You can still participate in sports such as swimming or playing ball after the colostomy surgery		
20. It may be necessary to reduce the opportunities to travel after colostomy surgery.		
21 After having a colostomy, you can not have a normal sexual life		

Chinese version

造口患者自我护理知识量表

该量表旨在评价结肠造口术患者在造口的自我评估、皮肤护理、活动、气味控制等方面的自我护理知识。量表包含 21 个条目。以对错方式选择。选择一个最能反映患者真实情况的选项。

项目	对	错
1.手术后由于肠道水肿造口显得较肿大，之后会慢慢缩小到一定程度		
2.造口应呈粉红色或红色，若呈其他颜色如:暗红色，黑色是不正常的，应立即回医院检查		
3.造口外表应是干燥的		
4.碰触造口时应不会有疼痛的感觉		
5.造口如有出血情形是不正常的，但如仅是碰触而造成粘膜上的小量出血则无妨		
6.为了维持造[门]周闱皮肤的清洁应使用酒精或碘酒		
7.每次更换造口袋时都应做一次皮肤的清洁		
8.可于造口周围皮肤上涂敷油膏以保护皮)状		
9.如皮肤不其平整可用皮肤粘胶在造口周围涂敷，使皮肤护垫能与皮肤结合更紧密		
10.造口周围皮肤如有红，肿，热，痛的现象表示皮肤己发生问题		
11.刚开始尝试新的食物应从少量开始，且一次尝试一种，并于吃后注意肠胃反应		
12.每天至少要喝 6-8 大杯的水以补充由造口流失的水分		
13.应尽量避免食用易胀气的食物，如：豆类，萝卜，汽水，啤酒等		
14.应尽量避免食用易产生臭气的食物，如：洋葱，地瓜等		
15.应尽量避免食用不易消化具有刺激性的食物，如：糯米类食物，辣椒等		
16.肥胖可能会引起造口回缩的现象		
17.造口手术后仍能恢复过去的上作		
18.应避免易使腹压增高的运动，如提重物，以防造口脱出		

19.造口手术后仍可以参与游泳或打球等运动		
20.造口手术后可能必须减少外出旅游或出差的机会		
21.做了造口手术后就无法有正常的性生活		

5.Self-rating Depression Scale (SDS)

English version

The sacle is a 20-item, self-rated scale that assesses the severity of depressive symptoms that a patient has experienced during the past week. For each item below, the patients need to check the column which best describes how often they felt or behaved this way during the past several days. Each question is scored on a scale of 1-4 (1-a little of the time, 2-some of the time, 3-good part of the time, 4-most of the time).

Item	A little of the time	Some of the time	Good part of the time	Most of the time
1. I feel down hearted and blue				
2. Morning is when I feel the best				
3. I have crying spells or feel like it				
4. I have trouble sleeping at night				
5.I eat as much as I used to				
6. I still enjoy sex				
7. I notice that I am losing weight				
8. I have trouble with constipation	.			
9. My heart beats faster than usual				
10. I get tired for no reaso				
11. My mind is as clear as it used to be				
12. I find it easy to do the things I used to				
13. I am restless and can't keep stil				
14. I feel hopeful about the future				
15. I am more irritable than usual				
16. I find it easy to make decisions				
17. I feel that I am useful and needed				
18. My life is pretty full				
19. I feel that others would be better off if I were dead				
20. I still enjoy the things I used to do				

Chinese version

抑郁自评量表(SDS)

该量表是含有 20 个条目的自我评估量表，用来评估患者在过去一周中抑郁症状的严重程度。对于下面的每一个条目，患者都需要选出最能描述他们在过去几天中有这种感觉或行为的频率的选项。每题的分数为 1-4（1-没有或很少时间，2-小部分时间，3-相当多时间，4-绝大部分或全部时间）

项目	没有或很少时间	小部分时间	相当多时间	绝大部分或全部时间
1. 我觉得闷闷不乐，情绪低沉				
2. 我觉得不安而平静不下来				

3. 我一阵阵地哭出来或是想哭				
4. 我晚上睡眠不好				
5. 我比平常容易激动				
6. 我认为如果我死了别人会生活的更好些				
7. 我发觉我的体重在下降				
8. 我有便秘的苦恼				
9. 我心跳比平时快				
10.我无缘无故感到疲乏				
11.我的头脑和平时一样清楚				
12.我觉得经常做的事情并没有困难				
13.我觉得一天之中早晨最好				
14.我对将来抱有希望				
15.我吃的和平时一样多				
16.我觉得做出决定是容易的				
17.我觉得自己是个有用的人，有人需要我				
18.我的生活过得很有意思				
19.我与异性接触时和以往一样感到愉快				
20.平常感兴趣的事我仍然照样感兴趣				

6.Social Support Rating Scale (SSRS)

English version

The scale contains 10 items, measuring three dimensions of social support: subjective support, objective support, and support-seeking behavior. For each statement, choose which response best reflects the support the patients has received in society. Each item is scored on a 4-point likert scale (1- none, 2- slight, 3- moderate, 4-great). The total scores of all these ten items are used to assess the current social support status of individuals.

Item	None	Slight	Moderate	Great
1.I often live with my family members				
2.I often get economic assistance from family members, relatives, friends, neighbors or others when faced with some economic difficulties				
3.I often get consolation from family members, relatives, friends, neighbors or others when faced with some trouble				
4.I can turn to my friends for help when things go wrong				
5.I often communicate with my neighbors				
6.I often communicate with my colleagues				
7.My family will try their best to help me when things go wrong				
8.I often seek assistance proactively when I have some difficulties				
9.I often communicate with others about my distress.				
10.I often participate in societal activity				

Chinese version

社会支持量表

该量表包含 10 个条目，评估患者获得社会支持的三个方面：主观支持、客观支持和寻求支持的行为。对于每一个条目，选择最能反映患者的在社会中所获得的支持选项。每个项目得分为 1-4 分（1-没有，2-偶尔，3-有时，4-大多数）。10 个条目的总分来评估个体当前的社会支持状况。

条目	没有	偶尔	有时	大多数
1.我经常和我的家人住在一起				
2.当遇到经济困难时，我经常从家庭成员、亲戚、朋友、邻居或其他人那里得到经济援助				
3.当遇到一些麻烦时，我经常从家人、亲戚、				

朋友、邻居或其他人那里得到安慰				
4.当事情出现问题时，我可以向我的朋友们寻求帮助				
5.我经常和我的邻居交流				
6.我经常和我的同事们交流				
7.如果事情出了问题，我的家人一定会尽力帮助我的				
8.当我遇到烦恼时，我经常主动寻求帮助				
9.我经常和别人交流我的烦恼				
10.我经常参加社会团体活动				

7.Colostomy Self-care Skill Scale

English version

This scale is to evaluate the self-care skill about use of colostomy products, colostomy irrigation of patients with colostomy. The scale contains 12 items. Choose in a yes or no way. For each statement, choose which response best reflects patients' opinion and experience.

Item	Yes	No
1.Will you take off your colostomy pocket?		
2.Will you pay attention to cut the maker pocket, appropriate membrane ring or appropriate diaphragm hole slightly 0.15-0. 30 cm larger than the stoma, about a grain of rice?		
3. Will you pay attention to stick the appropriate membrane ring or appropriate diaphragm, will inhale to drum up the abdomen, so that it fits to the skin without wrinkles?		
4. Will you buckle the pocket on a suitable film ring?		
5. Will you use the plastic pocket clips?		
6. Will you prepare moderate temperature water for stoma lavage? (About less than 38 degrees)		
7. Will you lubricate, shampoo and stoma?		
8. Will you discharge the air in the tube first during the stoma lavage?		
9. Will you use a flow controller to mediate the speed of the water flow?		
10. When the stoma lavage, will you insert the cone irrigation shampoo slowly into the stoma about 2-3 cm?		
11. When you perform the stoma lavage, will you place the lavage bag at the bottom of the bag 45-60 cm apart from the stoma?		
12. Will you gradually adjust the amount of lavage fluid during the stoma lavage?		

Chinese version

自我护理技能

该量表旨在评价结肠造口术患者正确使用造口产品、造口灌洗等方面自我护理技能。量表包含 12 个条目。以对错方式选择。选择一个最能反映患者真实情况的选项。

项目	会	不会
1.您会不会取下造口袋？		
2.您会不会注意将造口袋，合适膜环或合适膜片洞口剪得比造口稍大 0.15-0. 30 公分，约一粒米粒？		
3.您会不会注意贴上合适膜环或合适膜片时，会吸气将腹部鼓起，使其贴合在皮肤上不产生皱褶？		
4.您会不会将造口袋扣合在合适膜环上？		
5.您会不会使用造口袋夹？		

6.造口灌洗时，您会不会准备温度适中的用水？（约小于 38 度）		
7.造口灌洗时，您会不会润滑灌洗头及造口？		
8.造口灌洗时，您会不会先将管中空气排出？		
9.造口灌洗时，您会不会使用流量控制器，调解水流的速度？		
10.造口灌洗时，您会不会将锥状灌洗头缓缓插入造口约 2- 3 公分？		
11.造口灌洗时，您会不会将灌洗袋置于袋底与造口相距 45-60 公分的高度？		
12.造口灌洗时，您会不会逐渐调整灌洗液的量？		

8.Ostomy self-care self-efficacy scale

English version

The scale is used to measure colostomy patients' level of self-efficacy. It includes 10 items and uses a 5-point Likert scale (1-never, 2- seldom, 3-sometimes, 4-most of the time, 5-always). For each statement, choose which response best reflects patients' opinion and experience.

Item	Never	Seldom	Sometimes	Most of the time	Always
1.Maintain the stoma and the skin around the stoma in good conditions without problem?					
2.Follow the treatment advice you have been given for stoma management					
3.Persist to follow the treatment advice you have been given for stoma management even if it is hard					
4.Monitoring the stoma and the skin around the stoma condition					
5.Persist to monitor the stoma and the skin around the stoma condition					
6.When they happen, recognize changes in your stoma and the skin around the stoma?					
7.Evaluate the importance of stoma and the skin around the stoma problems					
8.Do something that will relieve your stoma and the skin around the stoma problems					
9.Persist to find a remedy for a stoma and the skin around the stoma problems even if it is difficult/hard					
10.Evaluate how well a					

remedy works for stoma and the skin around the stoma problems					

Chinese version

造口患者自我照护效能量表

该量表用于评估结肠造口患者的自我照护效能的水平。它包含 10 个条目，采用 5 分制评分（1-从来没有，2-很少，3-有时，4-多数时候，5 -总是），选择一个最能反映患者真实情况的选项。

项目	从来没有	很少	有时	多数时候	总是
1. 保持造口及造口周围皮肤处于良好状态，无任何问题					
2. 遵循专家给您的造口管理建议					
3. 即使在造口护理很难的情况下，您依然能坚持专家所建议的治疗方案					
4. 监测造口和造口周围的皮肤状况					
5. 即使在监测造口及造口周围皮肤状况很难的情况下，您仍能坚持监测					
6. 在造口情况发生变化时及时识别出造口及周围皮肤的改变					
7. 评估造口和造口周围皮肤问题的严重程度					
8. 采取措施减轻造口和造口周围皮肤出现的问题					
9. 即使寻找解决造口和造口周围皮肤问题的方法很难，您仍能检查寻找					
10. 评估一种对造口和造口周围皮肤问题治疗方法的效果					

9. Ostomy Self-Care Index (OSCI)

English version

The scale is used to measure colostomy patients' level of self-care. The scale includes three dimensions: self-care maintenance, self-care maintenance, self-care management, with a total of 22 items. It uses a 5-point Likert scale (1-never, 2-seldom, 3-sometimes, 4- most of the time, 5-always). For each statement, choose which response best reflects patients' opinion and experience.

Item	Never	Seldom	Sometimes	Most of the time	Always
Self-care maintenance					
1.Check that the stoma appliance and the collecting bags are appropriate to your needs					
2.Check that the stoma appliance and the collecting bags are in good conditions before use					
3.During substitution, remove the stoma appliance and the collecting bags from up to down					
4.Clean the skin around the stoma and stoma					
5.Dry dabbing the skin around the stoma					
6.Adjust the size of the stoma in a new stoma appliance					
7.Fit a new stoma appliance from down to up by joining the lower edge of the stoma appliance to the loweredge of the stoma					
8.Change the stoma appliance according to information received					
9.Eating and drinking according to information received					
Self-care monitoring					
10.Monitor for leaks (faeces or urine) from the stoma appliance					
11.Monitor the condition of filling of the collecting bag					
12.Monitor the stoma state					

13.Monitor the skin around the stoma					
14.Monitor the amount and the changes in faeces and urine					
15.Monitor the effects of eat and drinking on the faeces and urine (faeces too liquid/solid, concentred urine)					
16.Monitor your weight					
17.Monitor your stoma appliance provision					
Self-care management					
18.If you had stoma and/or the skin around the stoma problems during the last month, how quickly did you recognize it as a stoma problem?					
19.Change your diet or fluid intake to decrease or to stop the problem					
20.Change the way you manage the stoma and the skin around the stoma					
21.Call your stomatherapist / nurse/ doctor for guidance					
22.Talk about the problem to your stomatherapist /nurse/doctor to the next visit					

Chinese version

造口患者自我照护指数量表

该量表用于评估结肠造口患者的自我照护的水平。它包含三个维度，即自我照护维持、自我照护监测和自我照护管理，共 22 个条目，采用 5 分制评分（1-从来没有，2-很少，3-有时，4-多数时候，5 -总是），选择一个最能反映患者真实情况的选项。

项目	从来没有	很少	有时	多数时候	总是
自我照护维持					
1.检查造口袋装置和引流袋是否符合您的需求					
2.使用前检查造口袋装置和引流袋是否完好					
3.更换时，将造口袋装置和引流袋自上而下取下					
4.使用中性肥皂和清水清洗造口及造口周围的皮肤					

5.将造口周围的皮肤轻拭擦干					
6.根据您的造口大小剪裁新的造口袋					
7.将造口底盘(或造口袋)下边缘连接到造口下边缘，自下向上安装新的造口袋					
8.根据所获信息更换造口袋装置					
9.根据所获信息进食和饮水					
自我照护监测					
10.监测造口袋装置是否泄漏(粪便或尿液)					
11.监测造口袋和引流袋的充满情况					
12.监测造口情况					
13.监测造口周围皮肤情况					
14.监测粪便、尿液的量和变化的情况					
15.监测饮食对粪便和尿液的影响(粪便稀薄或干硬，尿液浓缩)					
16.监测您的体重					
17.监测您家中储存的造口袋装置在下次购买前是否够用					
自我照护管理；					
18.请回想一下，上一次您的造口和（或）造口周围的皮肤出现问题时：您有多快意识到这些是造口问题?					
19.改变食物或液体摄人来减轻或避免这个问题					
20.改变管理造口及造口周围皮肤的方式					
21.打电话向造口治疗师/护士/医生寻求指导					
22.下次就诊时与造口治疗师/护士/医生讨论这个问题					

APPENDIX D

Permission instruments

Permission of Using Social Support Rating Scale (SSRS) (Chinese Version)

回复：申请使用量表《社会支持量表SSRS》

发件人：xiaosy <xiaosy@csu.edu.cn>
时　间：2022年9月18日（星期一）下午10：14
收件人：一棵开花的树 <rose-1102@qq.com>

好的

xiaosy
xiaosy@csu.edu.cn

---- 回复的原邮件 ----

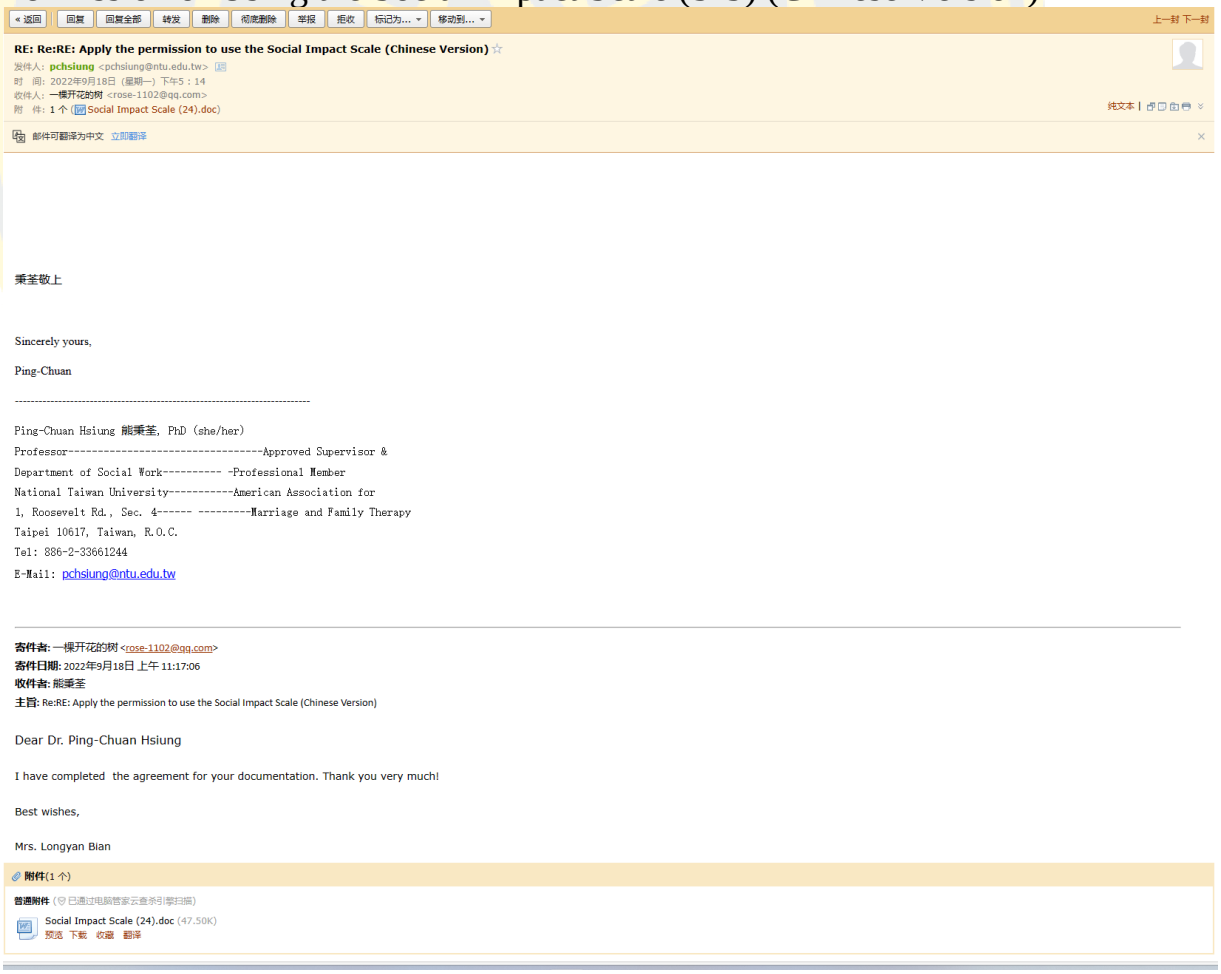
发件人　一棵开花的树<rose-1102@qq.com>
发送日期　2022年9月17日 15:29
收件人　xiaosy<xiaosy@csu.edu.cn>
主题　申请使用量表《社会支持量表SSRS》

肖教授：

您好。我是泰国东方大学护理专业的在读博士研究生卞龙艳，也是江苏医药职业学院的护理教师。我的研究题目是"基于结构方程模型的结肠造口患者自我护理能力的影响因素及其相关性研究"。在我的研究中需要用到您的《社会支持量表SSRS》调查造口患者的社会支持情况，因此，向您申请是否允许我在该研究中使用您的量表？期待您的回复。

祝您身体健康，万事顺心！

Permission of Using the Social Impact Scale (SIS) (Chinese Version)



« 返回 | 回复 | 回复全部 | 转发 | 删除 | 彻底删除 | 举报 | 拒收 | 标记为... | 移动到...

RE: Re:RE: Apply the permission to use the Social Impact Scale (Chinese Version)

发件人：pchsiung <pchsiung@ntu.edu.tw>
时　间：2022年9月18日（星期一）下午5：14
收件人：一棵开花的树 <rose-1102@qq.com>
附　件：1 个 (Social Impact Scale (24).doc)

邮件可翻译为中文 立即翻译

秉荃敬上

Sincerely yours,

Ping-Chuan

Ping-Chuan Hsiung 熊秉荃, PhD (she/her)
Professor----------Approved Supervisor &
Department of Social Work---------- -Professional Member
National Taiwan University----------American Association for
1, Roosevelt Rd., Sec. 4------ ---------Marriage and Family Therapy
Taipei 10617, Taiwan, R.O.C.
Tel: 886-2-33661244
E-Mail: pchsiung@ntu.edu.tw

寄件者: 一棵开花的树 <rose-1102@qq.com>
寄件日期: 2022年9月18日 上午 11:17:06
收件者: 熊秉荃
主旨: Re:RE: Apply the permission to use the Social Impact Scale (Chinese Version)

Dear Dr. Ping-Chuan Hsiung

I have completed the agreement for your documentation. Thank you very much!

Best wishes,

Mrs. Longyan Bian

附件(1 个)

普通附件 (已通过电脑管家云查杀引擎扫描)

Social Impact Scale (24).doc (47.50K)
预览 下载 收藏 翻译

Permission of Using Permission of Using the Health-Promoting Lifestyle Profile II (HPLP II) (Chinese Version)

« 返回 | 回复 | 回复全部 | 转发 | 删除 | 彻底删除 | 举报 | 拒收 | 标记为... | 移动到... 上一封 下一封

permission ☆

发件人：Eva H <yuhwa42@gmail.com>
时 间：2022年9月18日（星期一）下午3：55
收件人：一棵开花的树 <rose-1102@qq.com>
抄 送：peylandu <peylandu@gmail.com>

纯文本 |

邮件处理：已于 2022年9月19日(星期二) 上午10:11 回复了此邮件

邮件可翻译为中文 立即翻译

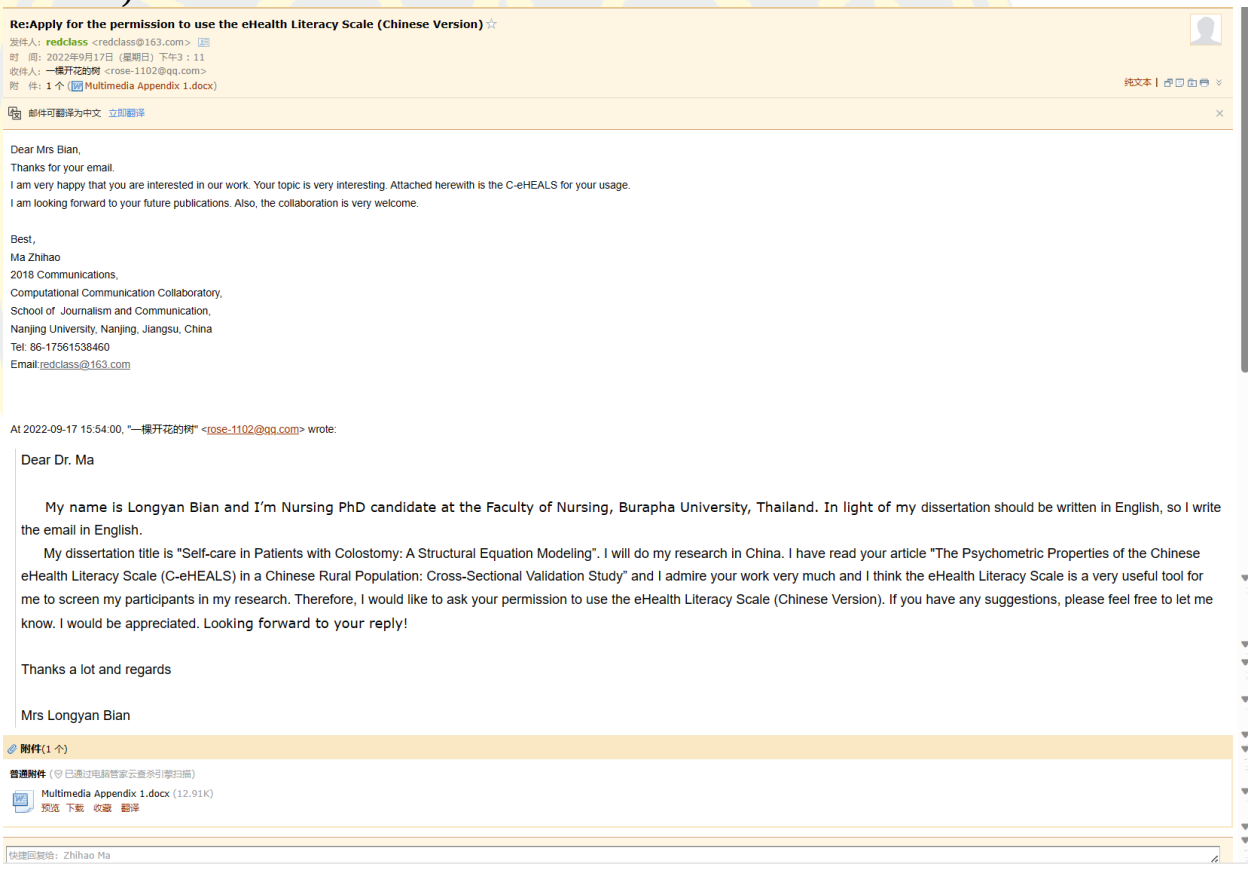
Mrs Longyan Bian,
I give you permission to use the Chinese version of the Health-Promoting Lifestyle Profile II (HPLP II).

Good luck with your research

Yu-Hwa Huang

« 返回 | 回复 | 回复全部 | 转发 | 删除 | 彻底删除 | 举报 | 拒收 | 标记为... | 移动到... 上一封 下一封

Permission of Using the eHealth Literacy Scale (eHEALS) (Chinese Version)



Re:Apply for the permission to use the eHealth Literacy Scale (Chinese Version) ☆

发件人：redclass <redclass@163.com>
时 间：2022年9月17日（星期日）下午3：11
收件人：一棵开花的树 <rose-1102@qq.com>
附 件：1 个 (Multimedia Appendix 1.docx)

纯文本 |

邮件可翻译为中文 立即翻译

Dear Mrs Bian,
Thanks for your email.
I am very happy that you are interested in our work. Your topic is very interesting. Attached herewith is the C-eHEALS for your usage.
I am looking forward to your future publications. Also, the collaboration is very welcome.

Best,
Ma Zhihao
2018 Communications,
Computational Communication Collaboratory,
School of Journalism and Communication,
Nanjing University, Nanjing, Jiangsu, China
Tel: 86-17561538460
Email:redclass@163.com

At 2022-09-17 15:54:00, "一棵开花的树" <rose-1102@qq.com> wrote:

> Dear Dr. Ma
>
> My name is Longyan Bian and I'm Nursing PhD candidate at the Faculty of Nursing, Burapha University, Thailand. In light of my dissertation should be written in English, so I write the email in English.
> My dissertation title is "Self-care in Patients with Colostomy: A Structural Equation Modeling". I will do my research in China. I have read your article "The Psychometric Properties of the Chinese eHealth Literacy Scale (C-eHEALS) in a Chinese Rural Population: Cross-Sectional Validation Study" and I admire your work very much and I think the eHealth Literacy Scale is a very useful tool for me to screen my participants in my research. Therefore, I would like to ask your permission to use the eHealth Literacy Scale (Chinese Version). If you have any suggestions, please feel free to let me know. I would be appreciated. Looking forward to your reply!
>
> Thanks a lot and regards
>
> Mrs Longyan Bian

附件(1 个)

普通附件 (已通过电脑管家云查杀引擎扫描)

Multimedia Appendix 1.docx (12.91K)
预览 下载 收藏 翻译

快捷回复给：Zhihao Ma

Permission of Using the Ostomy Self-Care Index and （OSCI (Chinese Version)

Re:请求OSCI汉化量表的使用权 ☆

发件人：**yfuguo** <yfuguo@126.com>
时　间：2022年9月25日（星期一）上午10：46
收件人：一棵开花的树 <rose-1102@qq.com>

纯文本 |

可以

在 2022-09-24 22:17:17，"一棵开花的树" <rose-1102@qq.com> 写道：

杨教授：

　　您好。我是江苏医药职业学院的护理教师卞龙艳，目前也是泰国东方大学的在读博士生。我的博士研究课题是关于造口患者自我护理的影响因素模型的构建。在我的研究中，需要用到您汉化的Villa教授的造口患者自我照护指数量表 Ostomy Self-Care Index（OSCI）。我请求您允许我在研究中使用该量表。非常感谢您！期待您的回复！祝您身体健康，诸事顺利！

APPENDIX E

Additional analyses

Table Appendix 5-1 Standardized scores of continuous variables for testing univariate outliers (n = 400)

ID	ZDS	ZHPB	ZeH L	ZK	ZD	ZSS	ZS	ZSE	ZSC
1	1.180	1.021	0.715	1.308	-0.102	1.842	1.621	1.821	2.248
2	0.205	-0.324	-2.190	0.226	0.331	0.086	1.056	0.285	1.270
3	1.888	-2.267	-2.190	1.849	0.981	-1.865	1.056	-1.405	0.048
4	1.180	0.274	-0.011	1.308	0.115	1.452	1.621	-0.330	1.514
5	0.294	0.074	0.110	2.390	-0.318	0.671	1.621	1.821	0.944
6	-0.592	-0.872	0.715	1.308	-0.318	-0.695	0.491	0.285	1.514
7	-0.237	-1.121	-0.253	1.849	1.197	-1.865	1.056	-0.330	-0.197
8	1.445	-2.267	-2.190	0.226	0.981	-0.500	-0.075	-2.481	-0.767
9	1.091	-2.466	-2.190	0.226	0.981	-0.500	-0.640	-0.176	0.618
10	1.180	0.174	0.715	2.931	0.764	-2.060	1.621	0.285	0.455
11	-0.060	0.423	1.684	2.390	-2.267	1.842	0.491	1.514	2.248
12	2.065	-1.818	-0.737	0.767	1.197	-1.085	1.621	0.285	0.211
13	1.091	0.025	0.231	-1.397	1.414	-0.890	1.056	-1.252	-1.256
14	0.914	0.274	1.078	0.226	0.764	-1.085	1.056	-2.788	-2.641
15	0.914	-0.872	0.594	1.849	-0.318	0.086	1.056	1.053	1.270
16	-2.894	2.814	1.684	1.849	-0.318	1.842	0.491	1.821	2.248
17	-2.451	**3.611***	1.684	0.082	-1.116	1.842	1.517	1.821	2.248
18	0.205	-0.872	0.715	0.082	1.460	-1.280	-0.530	-0.637	-1.337
19	-0.149	0.971	-0.253	1.001	-0.043	0.281	1.517	1.667	2.085
20	-0.060	-1.818	-0.253	0.541	1.567	-1.865	-0.018	0.285	0.455
21	0.471	-0.274	0.110	-0.838	1.567	-1.865	1.517	-1.405	-1.012
22	-0.237	0.473	0.231	-0.838	-2.190	0.281	-0.530	-0.023	0.944
23	0.383	-0.175	0.473	-0.838	1.352	-0.890	1.517	-0.176	-1.256
24	0.471	-1.619	-1.221	0.082	2.640	0.086	1.006	0.285	0.455
25	1.888	-0.224	0.957	0.541	1.460	0.281	-2.577	-2.327	-1.256
26	-1.477	0.722	-0.253	0.082	0.386	-0.695	1.517	-0.023	0.781
27	0.648	-1.569	-1.100	0.541	1.352	-2.060	1.517	-2.481	-1.582

Table Appendix 5-1 (continued)

ID	ZDS	ZHPB	ZeH L	ZK	ZD	ZSS	ZS	ZSE	ZSC
28	0.825	1.170	0.473	-0.856	-0.318	1.842	-1.206	-0.023	1.351
29	0.028	-0.922	-0.253	0.767	-0.318	1.452	1.621	-0.023	0.944
30	1.622	-0.523	0.715	-0.315	1.414	-1.085	0.491	0.285	1.596
31	-0.769	-1.569	-0.253	-0.315	1.197	-2.060	-1.206	-1.252	-1.337
32	0.294	0.074	0.715	0.226	-0.968	1.061	1.621	0.899	1.351
33	0.383	0.822	0.715	0.767	1.197	1.842	0.491	0.285	0.781
34	-0.680	3.213	1.684	2.931	-2.051	1.842	1.621	1.821	2.248
35	-2.806	0.573	0.352	0.767	-0.968	1.842	1.621	1.821	2.248
36	-2.274	0.523	0.715	2.931	0.115	1.842	-1.206	0.285	0.455
37	-0.769	0.423	0.715	0.226	0.331	1.842	0.491	0.285	0.292
38	-0.769	0.622	0.715	1.308	-1.184	1.842	1.056	1.821	2.248
39	0.028	-0.972	-1.221	2.931	0.115	1.842	-0.075	0.285	0.537
40	-1.034	0.822	0.715	2.931	0.764	1.647	1.056	1.667	2.248
41	-1.212	0.274	-0.253	2.931	0.115	1.842	0.491	1.821	2.248
42	-0.414	-0.374	-0.253	2.931	-0.102	1.842	1.056	0.285	0.862
43	-0.769	0.423	0.715	2.931	0.115	1.842	1.056	0.285	0.862
44	-2.274	0.772	0.594	2.931	0.115	1.842	1.621	0.285	0.862
45	-0.769	0.274	-0.253	1.849	0.115	1.842	0.491	0.285	0.455
46	-0.237	0.822	-0.253	1.308	0.981	1.842	0.491	0.285	0.455
47	-1.300	0.722	0.715	2.931	-1.834	1.842	1.056	1.360	2.085
48	-2.894	1.170	1.684	2.931	-1.834	1.842	1.621	1.821	2.248
49	-0.769	0.224	0.715	2.931	1.197	1.842	0.491	0.285	0.455
50	-0.680	-0.224	-2.190	2.931	-0.751	1.842	0.491	-0.176	0.537
51	1.091	-0.573	-2.190	0.226	-1.834	-0.500	0.491	0.438	0.211
52	0.648	-0.175	-0.495	2.390	-2.267	-0.500	0.491	1.821	1.351
53	-0.326	0.423	-0.011	2.931	-2.051	0.671	0.491	0.285	1.433
54	1.268	-0.374	-2.190	1.849	-1.401	-0.304	-0.075	1.821	1.188

Table Appendix 5-1 (continued)

ID	ZDS	ZHPB	ZeH L	ZK	ZD	ZSS	ZS	ZSE	ZSC
55	1.534	-1.121	-2.190	1.308	-0.318	-0.695	-0.075	-0.176	0.862
56	1.534	-2.117	-2.190	0.767	-0.751	-1.085	-0.075	-0.791	-0.278
57	1.003	0.025	-2.190	-0.315	-0.318	-0.109	1.056	0.592	1.188
58	0.914	-0.075	-2.190	2.931	-0.968	0.866	1.621	0.131	1.514
59	1.622	-1.420	-2.190	-0.315	-1.184	0.086	1.056	-0.944	-0.034
60	2.154	-1.520	-2.190	0.767	-1.184	-0.695	1.621	0.285	-0.115
61	1.711	-1.918	-2.190	-0.315	-1.184	0.086	1.056	0.285	1.107
62	1.977	-2.117	-2.190	1.308	-1.401	-0.109	1.056	0.285	1.270
63	2.685	-2.964	-2.190	-0.315	1.197	1.452	-0.640	-0.484	0.048
64	1.977	-2.267	-2.190	-1.938	-0.751	-0.695	-0.640	-0.176	0.048
65	0.383	-2.815	-2.190	-0.315	-0.102	-0.500	1.621	0.131	0.374
66	0.737	-1.719	-1.705	-0.856	-0.751	0.086	1.621	1.053	1.596
67	1.445	0.672	-0.495	1.849	-1.184	1.647	1.621	1.821	2.003
68	1.003	-0.673	-1.342	0.226	-0.318	0.086	1.621	0.438	1.351
69	0.294	-1.719	-2.190	-0.856	-1.401	-1.280	-0.075	-0.944	0.862
70	-0.326	-0.025	-1.705	-0.315	0.331	1.842	-0.075	1.206	0.781
71	-0.592	0.324	1.320	0.226	0.115	-1.085	1.621	1.821	1.270
72	1.357	-1.968	-2.190	0.226	-0.968	1.257	1.621	0.592	1.351
73	0.914	0.473	-0.011	-1.397	-0.102	1.257	1.621	1.821	1.188
74	0.914	0.174	0.110	-0.315	-1.184	1.061	1.621	-0.791	1.759
75	0.737	1.370	-1.826	-1.397	-1.184	0.671	-0.075	0.745	0.781
76	0.648	-0.224	-1.584	0.767	-0.318	0.476	-0.075	0.592	0.700
77	0.825	0.324	-2.068	-0.856	-1.184	1.257	-0.075	-0.176	0.537
78	-0.592	0.124	0.594	0.767	-0.968	0.281	-0.640	0.438	1.514
79	0.028	-1.420	0.110	0.226	0.764	-2.060	-0.075	0.285	0.292
80	0.825	0.473	0.473	1.849	0.115	1.452	-0.075	0.131	0.700
81	-0.326	0.274	0.594	-0.315	-1.834	0.086	-1.206	-0.023	-1.745

Table Appendix 5-1 (continued)

ID	ZDS	ZHPB	ZeH L	ZK	ZD	ZSS	ZS	ZSE	ZSC
82	1.268	-0.324	-2.190	-0.315	1.414	0.086	1.056	-1.405	0.129
83	0.560	1.220	-0.737	-0.315	-0.318	0.866	-0.075	0.285	-0.034
84	0.825	-2.018	-0.132	-0.315	0.981	-1.475	-0.075	-1.252	0.292
85	1.091	0.025	-0.132	-0.315	0.331	0.671	-0.640	-0.791	-0.930
86	0.648	-0.523	-0.858	-0.315	0.115	0.671	-1.206	0.745	0.781
87	-1.477	2.465	-1.100	-0.315	-0.318	0.281	-0.075	1.053	-0.197
88	-0.149	0.622	-2.190	0.226	-0.318	1.061	-1.206	1.053	-0.360
89	0.737	-1.270	-0.858	1.849	0.981	-1.085	-0.640	-0.791	-0.930
90	0.560	0.174	0.473	0.226	-0.318	-0.695	0.491	-0.330	0.374
91	0.294	-0.573	0.836	0.226	0.115	0.671	-1.206	0.285	-0.360
92	0.117	-0.573	-1.221	-0.315	-0.751	0.866	-1.206	-1.559	-0.441
93	0.471	-0.075	0.473	-0.315	-0.318	1.452	0.491	0.438	0.374
94	1.445	-2.167	-0.495	-0.315	0.331	0.086	0.491	0.592	-0.360
95	1.268	-0.822	0.473	0.226	-0.102	0.281	1.056	-0.944	-0.360
96	0.117	-1.171	-2.068	0.226	1.197	0.086	-1.206	0.745	-2.315
97	1.003	-3.313	-3.172	-0.315	1.106	**-3.430***	1.621	**-4.324***	**-4.923***
98	-0.769	0.622	0.715	0.226	1.197	-2.060	-1.206	-2.788	-1.989
99	-1.566	1.320	-0.011	-0.315	-0.968	0.476	-1.206	1.053	-0.686
100	0.294	0.523	-0.858	-0.856	0.331	0.866	-1.206	0.131	-0.278
101	0.028	-0.424	-0.616	-0.315	-1.834	-0.500	-1.206	0.899	-0.686
102	-0.060	-1.370	-1.463	-0.856	-1.401	0.476	-1.206	0.899	-0.767
103	0.648	0.573	0.231	0.226	-1.184	0.086	0.491	0.745	0.700
104	0.205	-0.025	0.352	-0.856	0.764	-0.890	-1.206	-1.866	-1.175
105	-0.503	0.921	1.078	0.226	1.197	0.476	-0.640	-1.252	-0.849
106	1.091	-1.071	-0.011	-0.315	-0.318	-1.085	-1.206	-0.637	-1.500
107	1.622	-1.121	-1.584	-0.856	2.064	-0.109	-1.206	-2.327	-2.641
108	-1.920	2.366	1.199	0.767	2.930	1.257	-0.075	1.053	1.270

Table Appendix 5-1 (continued)

ID	ZDS	ZHPB	ZeH L	ZK	ZD	ZSS	ZS	ZSE	ZSC
109	1.003	1.918	0.231	0.767	-0.751	-1.085	-0.075	1.053	0.537
110	-1.034	-1.520	-1.584	0.767	-0.102	-2.060	-1.206	-0.330	-1.500
111	-0.414	1.270	0.715	0.767	-0.102	0.671	-0.075	0.899	-0.115
112	-1.389	0.822	0.715	0.767	-0.751	-0.890	1.056	0.745	0.129
113	1.622	-0.324	-0.979	-0.315	1.197	-0.304	-0.075	-1.098	-0.034
114	-0.946	0.473	-0.253	-0.315	-0.751	1.061	-1.206	0.285	-0.767
115	-1.389	1.021	-0.616	-0.856	1.197	0.866	0.491	0.285	0.862
116	1.622	-0.075	0.473	-1.938	1.414	0.866	-0.075	-0.330	0.048
117	0.294	1.170	-1.342	-2.479	0.981	0.671	0.491	0.899	0.781
118	-0.769	-1.071	-0.132	-1.397	1.414	-2.060	-2.337	-2.173	-2.478
119	-0.769	-1.719	-0.737	-1.397	0.981	-2.256	-2.337	-2.327	-2.315
120	1.268	0.672	-0.374	-0.315	2.064	-1.280	1.056	0.592	0.455
121	-0.592	1.170	0.473	-0.315	1.414	0.476	0.491	1.206	0.944
122	-1.123	-1.270	-1.584	-1.397	0.981	0.476	-1.206	-1.252	0.455
123	-1.743	-0.523	-1.584	-1.397	0.331	-0.500	-1.206	-0.944	0.048
124	-1.566	1.768	0.715	0.226	0.115	0.086	-1.206	0.592	-0.115
125	-0.503	0.722	0.836	1.308	0.331	0.476	1.621	0.745	0.862
126	-1.920	0.473	-2.190	-0.856	-0.318	1.061	1.056	0.285	0.211
127	-0.326	-0.025	0.473	-0.315	-0.102	0.671	1.056	0.592	-0.034
128	-0.503	-0.025	-1.705	-1.938	-0.102	0.476	-1.206	1.053	-0.278
129	0.383	-0.025	0.352	-1.397	2.064	1.452	-0.640	0.899	-0.441
130	0.560	1.071	0.110	0.767	2.497	0.281	-0.640	-2.327	0.048
131	0.560	-0.573	-0.011	-0.315	0.331	0.086	-0.075	-0.023	0.211
132	0.294	-0.473	-0.495	-0.315	1.743	1.089	-1.771	**-3.402 ***	-1.500
133	0.471	0.473	-0.253	-1.397	2.280	-0.890	1.056	0.131	0.048
134	0.914	0.124	0.957	-2.479	-0.968	1.061	-1.771	0.745	-0.441
135	-1.477	0.373	0.352	0.226	0.764	0.671	1.056	0.131	-0.278

Table Appendix 5-1 (continued)

ID	ZDS	ZHPB	ZeH L	ZK	ZD	ZSS	ZS	ZSE	ZSC
136	-0.503	-0.224	-1.947	-0.856	0.115	0.476	1.621	1.053	0.048
137	-1.389	1.170	0.473	-0.315	0.331	0.476	1.056	1.053	-0.523
138	1.977	-0.274	-0.858	-0.856	2.280	-0.109	-0.640	-1.098	0.455
139	-1.389	-0.075	-0.132	-0.315	-1.401	-0.109	-1.206	0.899	-1.012
140	1.091	0.921	-0.979	0.226	-0.318	0.086	-0.075	0.285	0.211
141	1.357	-0.025	0.957	0.226	0.981	0.476	-0.640	0.745	-0.278
142	-0.237	0.971	0.352	0.767	-1.184	0.086	-0.075	1.053	0.129
143	0.825	1.320	-0.132	0.226	2.497	0.281	-0.640	-0.791	0.129
144	0.737	-1.171	0.473	0.226	0.764	0.281	-0.640	0.131	-0.197
145	-0.769	-1.569	-1.912	-0.315	**3.442***	-1.547	-2.337	-2.788	-3.130
146	-0.503	0.025	0.231	0.226	0.764	-0.500	-0.640	0.285	0.292
147	2.331	-0.274	-0.616	-0.315	-1.401	-0.500	-0.075	-0.637	-0.278
148	2.331	-0.274	-0.495	0.226	0.331	-0.304	-0.640	0.285	-0.604
149	-0.592	0.971	-1.100	-0.315	-0.968	0.086	-0.640	0.899	-0.523
150	-0.769	-0.772	-1.463	-0.315	-0.102	0.281	-0.640	1.206	-0.930
151	0.737	-0.573	0.231	0.226	-0.968	0.086	-0.640	0.899	0.374
152	-1.212	-0.224	-1.826	-0.315	-0.318	0.476	-0.640	1.053	-0.197
153	-0.414	-0.473	-1.705	-0.315	-0.968	-0.695	-1.206	0.745	-0.197
154	0.294	0.025	0.836	0.226	-0.318	0.476	-1.206	0.745	-0.441
155	-0.592	-1.370	-1.705	1.849	0.115	0.671	-1.206	1.514	-0.441
156	0.914	-0.872	-1.342	2.390	1.847	0.281	-1.206	-0.330	-0.686
157	0.737	0.473	0.110	1.308	0.115	0.671	-0.640	0.899	0.048
158	1.445	0.074	-0.132	0.767	-0.968	0.281	-1.206	0.131	-0.278
159	-0.326	-0.523	0.110	0.226	-0.102	-0.109	-0.640	0.592	-0.360
160	0.294	-0.274	0.594	0.226	-0.751	0.086	-0.640	0.285	-0.767
161	1.445	-0.723	-1.463	-1.397	-0.102	0.671	-0.640	0.899	0.862
162	0.294	0.573	0.352	0.767	1.847	0.281	-1.206	1.053	-0.278

Table Appendix 5-1 (continued)

ID	ZDS	ZHPB	ZeH L	ZK	ZD	ZSS	ZS	ZSE	ZSC
163	-0.149	-0.922	0.352	-0.315	0.115	0.476	-1.206	0.899	-0.197
164	0.294	-0.125	-0.132	-0.315	0.115	0.281	-1.206	0.745	-0.034
165	-0.237	-0.424	-1.705	-0.315	0.331	0.281	-0.640	-0.023	-0.360
166	-0.060	-0.125	-1.584	-0.315	0.115	0.476	-1.206	0.899	-0.441
167	0.471	0.473	0.957	-0.315	-0.751	0.671	-0.640	0.745	0.292
168	-0.149	-0.025	-0.132	-0.856	0.764	0.476	-0.640	0.592	-0.034
169	0.294	0.025	0.957	-0.315	-0.318	0.476	-1.206	0.899	-0.360
170	0.028	-0.224	-1.463	-0.315	-2.267	0.476	-1.206	0.592	-0.441
171	0.117	-0.374	-0.374	0.226	0.764	-0.109	-1.206	0.131	-0.441
172	0.205	-0.523	-0.858	-0.315	-0.968	-0.109	-1.206	0.745	-0.441
173	0.028	-0.125	-0.858	-1.397	-0.318	0.086	-1.206	0.285	0.048
174	-0.237	0.324	-0.979	-0.315	-0.102	-0.109	0.491	0.285	0.292
175	-0.237	-0.025	-1.342	-0.315	-0.968	0.866	-1.206	0.899	-0.115
176	-0.680	0.224	0.957	-0.315	-0.751	0.671	-0.075	0.745	1.107
177	-0.680	0.174	0.957	0.226	-1.834	1.061	-0.075	0.745	0.211
178	-0.149	1.519	0.957	0.767	-0.751	0.476	-0.075	0.899	0.455
179	0.028	-0.075	0.473	-0.315	-0.751	0.671	-0.075	1.053	0.618
180	0.383	0.672	-0.737	-0.315	-0.102	0.671	-0.075	0.899	0.374
181	-0.414	0.473	1.078	-0.315	-0.102	0.866	-0.075	0.899	-0.441
182	-0.149	0.672	0.957	-0.315	0.764	-0.109	-0.075	0.745	-0.034
183	-0.769	-0.175	0.836	-0.315	-0.318	0.086	-0.075	-0.023	0.292
184	0.028	0.025	-0.858	-0.315	-0.751	0.281	-0.075	0.899	0.048
185	0.205	0.174	1.078	-0.315	-0.102	0.476	-0.075	1.053	0.129
186	0.205	0.124	0.836	-0.315	-0.968	-0.304	-0.075	0.285	0.374
187	0.028	-0.274	0.352	-0.315	0.764	0.671	-0.075	0.592	0.129
188	0.383	0.373	-0.132	0.226	-0.318	0.086	0.491	0.899	0.211
189	0.205	0.324	0.836	0.226	0.115	0.671	0.491	0.899	0.618

Table Appendix 5-1 (continued)

ID	ZDS	ZHPB	ZeHL	ZK	ZD	ZSS	ZS	ZSE	ZSC
190	0.117	0.523	1.442	-0.315	-0.751	0.671	1.056	0.899	0.700
191	-0.237	0.124	0.231	-0.315	-0.968	0.476	-1.206	0.592	-0.360
192	-0.060	0.971	1.199	-0.315	-0.751	0.476	-0.075	0.745	0.781
193	0.383	0.423	-0.495	-0.315	-0.102	0.281	-0.075	0.745	0.292
194	0.028	0.722	1.320	0.767	-0.751	-0.109	-0.640	0.438	0.374
195	-0.149	0.772	-1.342	0.226	-2.051	-0.109	-0.640	0.899	0.374
196	0.117	0.423	1.078	0.767	0.331	0.671	-0.640	1.053	0.292
197	-0.237	0.822	-1.100	-0.315	-0.318	0.086	0.491	0.899	-0.197
198	0.294	0.373	-1.342	-0.315	-1.184	0.086	-0.075	0.899	-0.278
199	-0.060	0.423	0.594	0.767	-1.184	-0.304	-0.640	0.592	-0.197
200	-0.326	-0.224	0.352	0.767	-0.751	0.866	-0.640	0.745	0.374
201	-0.414	0.274	-0.858	-0.315	0.331	-0.500	-0.640	0.899	0.292
202	0.383	-0.175	-1.584	0.767	-0.968	-0.304	-0.640	-0.176	-0.197
203	0.737	-0.175	-0.979	-0.315	-0.318	0.476	1.056	1.053	0.537
204	0.471	-0.075	0.352	-1.397	-0.318	0.671	-0.640	0.899	-0.197
205	0.205	0.025	-1.342	-1.938	-0.968	0.086	-0.640	0.745	-0.360
206	-0.149	1.220	1.320	-0.315	-0.102	-0.109	-0.640	0.899	-0.034
207	0.294	0.324	0.957	-0.315	0.331	0.476	-0.640	0.285	-0.278
208	-2.894	2.416	0.607	1.849	1.106	**-3.430***	1.621	-0.637	2.248
209	-2.894	3.063	0.715	-1.397	2.064	1.842	-0.640	1.053	0.211
210	-0.237	0.871	1.199	0.226	-0.318	0.086	0.491	1.206	0.862
211	-1.654	2.366	1.199	-1.938	0.981	-0.890	-1.206	-0.791	-0.360
212	-2.186	0.772	0.594	0.767	1.197	-1.475	-1.206	-2.788	-2.315
213	1.711	0.822	1.563	-1.938	0.981	0.476	1.056	0.438	0.781
214	-0.769	-1.569	-1.221	-0.315	1.197	-2.060	-2.337	-2.788	-3.130
215	-0.769	-1.221	-1.221	-0.315	1.414	-2.256	1.621	-2.788	-2.967
216	-0.769	-1.520	-1.221	-0.315	1.847	0.671	1.621	0.285	0.455

Table Appendix 5-1 (continued)

ID	ZDS	ZHPB	ZeH L	ZK	ZD	ZSS	ZS	ZSE	ZSC
217	-0.769	-1.569	-1.912	-0.315	1.106	**-3.430***	1.621	**-4.324***	**-4.923***
218	0.471	-0.175	0.352	-0.315	-0.318	-0.109	-0.075	0.899	0.292
219	1.357	1.021	0.607	1.849	1.106	**-3.430***	1.621	**-4.324***	**-4.923***
220	0.028	-0.623	-0.374	0.226	1.197	-0.695	-1.206	-1.866	-1.745
221	-2.894	-1.520	0.715	0.767	1.197	0.086	1.621	0.285	0.455
222	-2.894	**3.611***	1.079	0.767	-1.018	2.219	1.621	1.821	2.248
223	1.357	1.021	0.715	0.226	0.764	-0.109	1.056	0.285	0.455
224	-1.831	-0.175	0.715	-1.397	1.197	1.842	1.621	1.821	0.944
225	-0.769	1.519	0.715	-1.938	-0.102	1.842	1.621	1.821	2.248
226	0.294	-0.424	-0.737	0.226	1.197	-1.475	-0.640	-1.559	-1.745
227	0.117	-1.171	-3.015	0.226	2.168	-1.547	-1.206	0.745	-2.315
228	-0.060	-0.224	0.715	-0.856	-0.318	-0.695	-0.640	-0.023	-0.197
229	-2.894	**3.611***	1.237	-0.315	-0.381	2.219	1.621	1.821	2.248
230	0.560	0.025	0.594	0.226	0.331	-0.109	-0.640	0.438	-0.604
231	0.294	0.373	0.836	0.226	-0.968	-0.109	-0.640	0.899	-0.278
232	0.205	0.722	1.078	-0.315	-1.401	-0.109	-0.640	0.438	-0.441
233	0.560	1.469	1.078	-0.315	-0.968	-0.500	-0.640	1.053	0.048
234	-0.149	0.423	0.957	0.226	-0.102	-0.109	-0.640	0.438	-0.034
235	0.383	-0.473	-0.374	-0.315	0.764	-0.500	-0.640	-0.023	-0.441
236	-0.769	0.772	-0.253	0.767	0.764	1.647	-0.640	0.285	-0.278
237	0.294	0.772	0.715	-0.856	1.197	-2.060	-0.640	-1.252	-0.767
238	0.383	0.971	-0.253	-0.856	1.197	-2.060	-0.640	-1.252	-1.337
239	-0.414	0.921	0.715	-1.397	1.197	-2.060	1.621	0.285	0.862
240	-0.326	0.324	0.110	-0.315	-0.318	-0.304	-0.075	0.899	-0.197
241	0.028	0.174	0.594	0.226	1.197	0.281	-0.075	-0.176	0.292
242	0.028	-0.025	0.594	-0.856	-0.102	-0.109	-0.075	-0.023	-0.523
243	-0.503	0.324	-0.374	-0.315	-0.751	0.281	-0.075	-0.330	-0.115

Table Appendix 5-1 (continued)

ID	ZDS	ZHPB	ZeH L	ZK	ZD	ZSS	ZS	ZSE	ZSC
244	0.028	0.622	0.473	-1.938	-0.318	0.086	0.491	-0.484	-0.360
245	-0.237	0.822	1.320	-0.315	-0.751	-0.304	1.056	-0.484	-0.523
246	0.117	0.124	1.199	-1.397	0.115	0.671	0.491	-0.023	-0.197
247	-0.237	0.373	0.594	-0.315	0.115	0.866	0.491	0.438	-0.604
248	-0.237	-0.125	-0.616	-0.315	0.115	-0.109	-0.075	0.131	-0.360
249	-0.503	0.324	0.231	0.226	-1.184	-0.109	-0.075	-0.484	-0.523
250	-0.149	0.174	0.231	-0.315	-1.184	0.281	-0.075	-0.330	-0.278
251	-0.326	0.871	-0.253	1.849	1.197	-2.060	1.621	-1.252	-1.337
252	0.383	0.274	1.199	-0.856	-0.102	0.086	1.621	-0.484	-0.523
253	0.294	0.822	0.957	-0.856	0.331	0.476	1.621	-0.023	-0.360
254	0.383	0.174	0.836	-0.315	-0.318	0.671	0.491	-0.176	-0.034
255	-0.414	0.174	0.836	-0.315	0.331	0.281	0.491	0.438	-0.034
256	0.117	0.074	0.473	-0.315	-0.102	0.281	-0.075	-0.023	-0.278
257	0.471	-0.175	-0.011	-1.397	0.115	0.281	1.056	-0.176	-0.034
258	0.205	0.124	-0.011	-0.315	-0.751	-0.695	1.056	-0.023	-0.441
259	-0.237	0.573	1.320	-0.856	-0.968	0.086	1.056	-0.023	0.129
260	-0.414	1.071	1.199	-1.397	-0.751	-0.500	1.056	-0.330	-0.034
261	0.028	0.124	0.110	-0.315	-0.968	-0.695	1.621	-0.330	-0.360
262	-0.060	0.025	0.594	-0.315	-0.102	0.281	1.621	-0.176	-0.360
263	0.294	0.224	1.078	0.226	-0.318	0.281	1.056	-0.484	-0.115
264	0.205	0.074	0.110	-0.315	-0.102	0.476	0.491	-0.484	0.048
265	-0.060	0.124	-0.011	-0.315	-0.102	-0.304	0.491	-0.176	-0.278
266	-0.060	-0.224	0.352	-0.315	0.981	-0.304	0.491	-0.023	-0.441
267	-0.149	-0.274	0.231	-0.315	-0.968	-0.304	0.491	-0.330	-0.197
268	-0.503	0.573	1.320	0.767	-1.401	0.476	1.621	0.131	-0.115
269	-0.149	-0.125	0.231	-0.315	0.115	-0.304	-1.206	-0.637	-0.441
270	-0.060	-0.274	0.594	-0.315	-1.184	-0.304	-1.206	-0.330	-0.604

Table Appendix 5-1 (continued)

ID	ZDS	ZHPB	ZeH L	ZK	ZD	ZSS	ZS	ZSE	ZSC
271	0.117	-0.324	0.231	-1.397	-0.102	-0.109	-1.206	-0.484	-0.034
272	-0.326	-0.424	0.594	-0.315	-0.751	-0.304	-1.771	-0.791	-0.686
273	0.560	-0.224	-0.011	-0.315	-0.751	-0.695	-0.640	-0.637	-0.360
274	0.383	-0.324	0.594	-0.315	-1.184	-0.500	-0.640	-0.637	-0.197
275	0.205	-0.025	0.594	-0.315	-0.968	-0.500	-1.771	-0.637	-0.278
276	-0.414	0.523	1.078	-0.315	0.331	-0.109	-1.771	-0.176	-0.360
277	-0.149	-0.324	0.352	-0.856	-0.751	-0.500	1.621	-0.637	-0.034
278	0.028	0.074	0.352	-1.938	-0.318	-0.109	1.621	-0.330	-0.278
279	0.294	0.124	0.715	-0.315	-0.751	-0.109	1.621	-0.637	0.211
280	-0.060	-0.473	-0.132	-0.315	-0.751	-0.500	1.621	-0.637	0.211
281	-0.237	0.224	0.231	-0.856	-0.102	-0.500	-0.640	-0.484	-0.034
282	0.648	-0.324	0.715	0.226	1.197	-0.109	-0.640	-0.484	-0.523
283	0.117	-0.025	-0.011	0.767	-0.318	-0.304	-0.075	-0.484	-0.523
284	-0.060	-0.125	-0.495	-0.315	-0.968	-0.304	-0.075	-0.023	-0.604
285	-0.149	0.074	-0.011	-0.315	-0.751	-0.109	-1.206	-0.484	-0.360
286	-0.414	-0.125	1.320	-0.315	0.981	0.281	-0.640	-0.637	-0.197
287	0.205	-0.175	-0.132	-0.315	-0.751	-0.695	-0.640	-0.637	-0.360
288	-0.237	-0.125	0.352	-0.315	0.115	0.086	-0.640	-0.791	-0.197
289	-0.149	-0.374	-0.011	-1.397	-0.968	0.281	-0.640	-0.637	-0.360
290	0.117	-0.224	-0.132	-0.315	0.331	-0.109	-0.640	-0.330	-0.441
291	-0.503	0.174	1.078	-0.856	-0.968	0.086	-0.640	-0.176	-0.278
292	0.205	-0.424	0.594	-0.856	-0.102	-0.304	-0.640	-0.023	-0.360
293	-0.149	-0.673	-0.374	-0.315	0.764	-0.695	-1.206	-0.637	-0.849
294	0.205	-0.424	-0.858	-0.315	-0.968	-0.695	-0.640	0.131	-0.523
295	0.117	-0.424	0.594	-0.315	-1.401	-0.500	-1.206	-0.176	-0.360
296	0.294	-0.224	-0.495	-0.315	0.981	-0.109	-1.206	-0.637	-0.523
297	0.205	-0.324	-0.374	-0.315	1.414	-0.109	-1.206	-0.637	-0.523

Table Appendix 5-1 (continued)

ID	ZDS	ZHPB	ZeH L	ZK	ZD	ZSS	ZS	ZSE	ZSC
298	0.028	-0.075	0.231	-0.315	0.115	-0.500	-1.206	-0.330	-0.767
299	-0.237	-0.224	0.715	-0.856	0.981	-0.304	-0.075	-0.176	-0.360
300	-0.414	-0.175	1.320	-0.315	-0.102	0.476	-0.075	-0.330	0.048
301	0.117	-0.125	-0.011	-0.315	0.764	-0.304	-0.075	-0.484	-0.115
302	-0.503	0.224	1.320	-0.315	-1.184	-0.109	-0.640	-0.023	-0.360
303	-0.060	-0.224	-0.495	-0.315	0.331	-0.500	-0.640	-0.023	-0.441
304	-0.060	-0.224	-0.011	-0.315	0.981	-0.109	-0.640	-0.484	-0.115
305	0.117	0.224	0.957	-1.397	0.115	0.281	-0.640	-0.637	-0.115
306	0.205	-0.274	-0.011	-0.315	0.764	-0.304	0.491	-0.330	-0.360
307	-0.326	-0.324	1.199	-0.315	-1.401	0.476	0.491	-0.637	-0.360
308	-0.060	-0.224	0.231	-0.315	1.197	-0.500	-0.640	-0.791	0.048
309	0.117	-0.424	-0.495	-0.315	-0.318	-0.109	-0.640	-0.176	-0.523
310	0.205	0.074	0.352	-0.315	-0.968	0.476	-0.640	0.131	-0.604
311	0.028	0.573	0.352	-0.315	0.981	0.086	-0.640	0.285	-0.115
312	0.294	0.324	1.199	-0.315	-0.751	0.086	-0.640	0.285	-0.278
313	0.471	-0.374	0.352	-1.397	0.764	0.086	-0.640	-0.637	-0.197
314	0.028	0.025	-0.253	-0.315	-1.184	-0.109	-0.075	-0.637	-0.686
315	0.294	0.025	-0.011	-0.315	-0.751	-0.109	-0.075	-0.023	-0.278
316	0.028	-0.424	1.199	-0.315	-0.102	-0.500	-0.075	-0.484	-0.604
317	0.294	-0.473	-0.495	-0.315	1.847	-0.500	-0.640	-0.637	-0.767
318	0.471	-0.573	-0.253	-0.315	-0.102	-0.695	-0.640	-0.023	-0.686
319	0.294	-0.374	-0.374	-0.315	1.197	-0.695	-1.206	-0.637	-0.197
320	0.471	-0.473	1.199	-0.315	-0.968	0.281	-1.206	-0.637	-0.278
321	0.383	-0.772	0.473	-0.315	-0.102	-0.109	-1.206	-0.791	-0.686
322	0.028	-0.473	-0.253	-0.315	0.331	-0.500	-1.206	-0.637	-0.686
323	0.205	-0.573	1.199	-0.315	-0.751	-0.500	-1.206	-0.637	-0.767
324	0.205	-0.523	-0.132	-1.397	-0.102	-0.500	-1.206	-0.637	-0.441

Table Appendix 5-1 (continued)

ID	ZDS	ZHPB	ZeH L	ZK	ZD	ZSS	ZS	ZSE	ZSC
325	0.294	-0.424	0.836	-0.315	-2.051	-0.304	-0.075	-0.484	-0.604
326	0.648	-0.473	-0.253	-0.856	0.331	-0.304	-0.640	-0.484	0.048
327	-0.149	-0.324	1.199	-0.315	0.115	-0.109	-1.206	-0.484	-0.197
328	0.471	-0.523	0.110	-0.315	-0.968	-0.304	-1.206	-0.637	-0.197
329	0.471	-0.374	-0.132	-0.856	1.197	-0.695	-0.075	-0.637	-0.523
330	0.383	-0.374	0.352	-0.315	0.331	0.086	-1.206	-0.791	-0.278
331	0.205	-0.324	-0.495	-0.315	0.331	-0.109	-1.206	-0.637	-0.441
332	-0.237	-0.324	-0.132	-0.315	0.115	-0.304	-1.206	-0.637	-0.523
333	0.383	-0.424	-0.495	-0.315	0.331	-0.500	-1.206	-0.637	-0.278
334	-0.149	-0.424	1.199	-0.315	-1.184	-0.500	-0.640	-0.791	-0.523
335	-0.149	0.025	1.199	-0.315	-0.751	0.086	-0.640	-0.791	-0.197
336	0.737	0.324	-0.011	0.767	0.115	-0.695	-0.640	-0.637	-0.197
337	0.383	-0.623	-0.495	-0.315	1.414	-0.695	-0.640	-0.791	-0.523
338	0.471	-0.523	0.231	0.226	0.764	-0.500	-0.640	-0.637	-0.604
339	-0.149	-0.623	-0.132	-0.315	0.115	-0.500	-0.640	-0.791	-0.360
340	0.028	-0.573	-0.495	-0.315	-0.318	-0.695	-0.640	-0.791	-0.523
341	-0.149	-0.623	-0.011	-0.315	-0.751	-0.500	-0.075	-0.637	-0.034
342	0.205	-0.125	-0.253	-0.315	-0.318	-0.304	-0.075	-0.637	-0.115
343	0.471	-0.424	-0.253	-0.315	-0.968	-0.695	-0.075	-0.330	-0.441
344	0.294	-0.424	-0.132	-0.315	0.764	-0.695	-0.075	-0.791	-0.604
345	0.117	-0.723	1.078	-0.315	0.331	-0.109	-0.075	-0.484	-0.034
346	0.117	0.324	1.199	-0.315	-0.102	-0.500	-0.075	0.131	-0.360
347	-0.503	-0.224	0.836	-0.315	-0.318	-0.695	-0.075	-0.484	-0.197
348	0.560	-0.025	-0.616	-0.856	-1.184	-0.890	-0.640	-0.176	-0.604
349	-0.414	-0.324	-0.495	0.226	1.847	-0.500	-0.075	-0.791	-0.197
350	0.383	-0.872	-0.011	0.226	0.331	-0.304	-1.206	-0.637	-0.441
351	-0.237	-0.972	-0.253	0.226	0.115	-0.695	-0.640	-0.637	-0.604

Table Appendix 5-1 (continued)

ID	ZDS	ZHPB	ZeH L	ZK	ZD	ZSS	ZS	ZSE	ZSC
352	-0.237	-0.424	-0.253	-0.315	-0.751	-0.500	1.056	-0.791	-0.523
353	-0.149	-0.523	-0.979	-0.315	0.764	-0.500	-0.640	-0.176	-0.523
354	0.205	-0.573	-0.011	0.226	-0.318	-0.109	1.056	-0.484	-0.523
355	0.294	-0.473	-0.011	0.767	0.764	-0.695	1.621	-0.637	-0.360
356	0.117	-0.523	1.199	-0.315	-1.184	-0.109	1.056	-0.637	-0.278
357	0.383	-0.473	-0.495	0.226	-0.751	-0.500	1.056	-0.637	-0.441
358	0.117	-0.324	-0.616	-1.397	-0.318	-0.304	1.056	-0.637	0.211
359	0.205	-0.473	0.110	0.767	0.331	-0.304	1.056	0.131	-0.278
360	-2.186	-0.822	0.594	0.767	0.115	-0.109	1.621	0.285	0.455
361	**3.482***	**3.462***	1.552	1.308	-0.381	2.219	1.621	1.821	2.248
362	-0.060	-0.075	-0.132	-0.315	0.331	-0.695	-0.075	-0.637	-0.360
363	-2.894	1.021	0.715	0.226	-0.751	0.086	1.621	1.821	2.248
364	-1.034	1.021	1.078	0.767	-0.102	0.281	1.621	-0.023	1.351
365	0.294	-0.573	0.836	-0.315	0.331	-0.500	-0.075	-0.637	-0.604
366	0.117	-0.424	-0.253	-0.315	-0.102	-0.500	-0.075	-0.330	-0.604
367	0.205	-0.175	0.594	-0.315	0.331	-0.109	-0.075	-0.637	-0.278
368	0.028	0.224	0.715	1.849	1.197	1.061	1.056	0.285	0.374
369	-1.212	-0.772	0.594	0.767	0.331	-1.475	1.621	-1.098	0.862
370	0.294	-0.424	0.352	-0.315	1.197	-0.500	1.056	-0.637	-0.278
371	-0.326	-0.523	0.473	0.767	0.981	0.671	1.621	0.131	1.025
372	-0.503	-0.374	1.320	-1.397	-1.184	-0.109	-0.075	-0.637	-0.441
373	-0.237	-0.573	0.352	-0.315	-1.184	-0.695	-0.075	-0.637	-0.441
374	0.117	-0.324	1.199	-1.397	-0.102	-0.500	-0.075	-0.637	-0.197
375	-0.149	-0.075	-0.737	-0.315	0.115	-0.890	-0.075	-0.637	-0.441
376	0.383	-0.374	1.078	-1.397	0.115	-0.695	-0.075	-0.637	-0.034
377	0.028	-0.424	-0.979	0.226	-0.318	-0.695	-0.075	-0.637	-0.360
378	0.383	-0.473	0.957	-0.315	-0.102	-0.695	-0.075	-0.484	-0.604

Table Appendix 5-1 (continued)

ID	ZDS	ZHPB	ZeH L	ZK	ZD	ZSS	ZS	ZSE	ZSC
379	0.294	-0.723	-0.737	-0.315	0.981	-0.304	-0.075	-0.637	-0.115
380	0.117	-0.374	-0.374	0.226	1.197	-0.304	-0.075	-0.637	-0.197
381	-2.451	0.772	1.684	0.767	-0.968	1.842	0.491	0.285	0.374
382	-2.806	1.270	1.684	0.767	-2.051	1.842	1.621	1.667	1.922
383	-1.743	0.971	1.320	0.767	-0.968	0.866	0.491	0.285	0.455
384	-2.540	1.668	1.684	0.767	-1.401	0.866	1.621	1.821	2.248
385	**3.482***	**3.611***	0.922	0.226	1.106	2.219	0.491	0.285	0.455
386	-1.212	0.921	1.684	0.767	-0.751	0.866	1.621	1.821	2.248
387	-0.769	-1.221	-1.912	-0.315	3.017	-1.736	1.621	-2.788	-2.967
388	-2.894	0.871	1.320	0.226	-1.401	0.866	0.491	1.206	1.270
389	-2.894	2.914	-0.253	-0.315	1.197	0.281	0.491	0.745	0.700
390	-2.894	2.465	1.684	0.767	-2.051	1.647	1.621	1.821	2.248
391	0.560	-0.623	-0.253	0.767	0.764	-1.085	-1.206	-0.791	-0.441
392	0.117	-0.424	-0.979	-0.856	1.197	-0.304	-1.206	-0.637	-0.441
393	0.205	-0.175	0.231	0.767	-0.751	-0.304	-1.206	-0.484	-0.604
394	0.028	-0.822	0.231	0.767	-0.968	-0.109	-1.206	-0.484	-0.523
395	0.205	-0.324	1.320	0.767	-0.751	-0.304	-1.206	-0.637	-0.278
396	0.471	-0.374	-0.253	0.767	-1.184	-0.890	-1.206	-0.637	-0.523
397	0.294	0.274	0.836	-0.856	-0.318	-0.695	0.491	-0.637	0.211
398	-0.060	-0.175	-0.495	-0.856	0.115	-0.109	-1.206	-0.637	-0.441
399	0.294	-0.274	-0.132	0.767	1.197	-0.695	-1.206	-0.791	-0.278
400	0.205	-0.324	0.473	0.767	1.847	-0.500	-1.206	-0.637	-0.278

Notice: ID = number of samples, DS=Disease Stigma, HPB=Health Promoting Behaviors, eH L=eHealth Literacy, K=Knowledge, D=Depression, SS=Social Support, S=Skills, SE=Self-Efficacy, SC=Self-Care

*Outlier ID # 17, 97,132, 145, 208, 217, 219, 222, 229, 361, 385

Table Appendix 5-2 Test of multivariate outliers by using mahalanobis distanced (n = 400)

ID	MAH_P	ID	MAH_P	ID	MAH_P	ID	MAH_P
1	0.2092	28	0.0546	55	0.1493	82	0.0749
2	0.3487	29	0.3482	56	0.2982	83	0.6243
3	0.0228	30	0.0257	57	0.2421	84	0.1619
4	0.1359	31	0.2955	58	0.0084	85	0.7767
5	0.1728	32	0.7220	59	0.1357	86	0.7352
6	0.1812	33	0.4331	60	0.055	87	0.0284
7	0.1562	34	0.0055	61	0.1133	88	0.0974
8	0.0707	35	0.0764	62	0.0427	89	0.3997
9	0.1142	36	0.0081	63	0.0052	90	0.9499
10	0.0028	37	0.6171	64	0.0824	91	0.7335
11	0.0466	38	0.5481	65	0.0409	92	0.1276
12	0.0676	39	0.0459	66	0.0728	93	0.8407
13	0.3277	40	0.0988	67	0.1314	94	0.181
14	0.0102	41	0.0815	68	0.5181	95	0.5928
15	0.2823	42	0.0965	69	0.0126	96	0.0013
16	0.0581	43	0.1115	70	0.3602	97	0.0000
17	0.0066	44	0.0210	71	0.0570	98	0.0631
18	0.0690	45	0.3877	72	0.0531	99	0.2506
19	0.4786	46	0.4067	73	0.1561	100	0.7472
20	0.0327	47	0.0886	74	0.0194	101	0.3219
21	0.4029	48	0.0119	75	0.0481	102	0.1950
22	0.3363	49	0.0460	76	0.8133	103	0.9140
23	0.2160	50	0.0038	77	0.0830	104	0.6948
24	0.0731	51	0.1940	78	0.4446	105	0.4686
25	0.0535	52	0.0221	79	0.1058	106	0.7593
26	0.2171	53	0.0591	80	0.4394	107	0.0410
27	0.3681	54	0.0165	81	0.1844	108	0.0146

Table Appendix 5-2 (continued)

ID	MAH_P	ID	MAH_P	ID	MAH_P	ID	MAH_P
109	0.0346	136	0.0985	163	0.5559	190	0.7872
110	0.0581	137	0.2442	164	0.9311	191	0.9024
111	0.8193	138	0.0614	165	0.8289	192	0.9398
112	0.5182	139	0.2217	166	0.5332	193	0.9873
113	0.6014	140	0.6203	167	0.9156	194	0.7933
114	0.5869	141	0.3476	168	0.9330	195	0.2018
115	0.3907	142	0.7911	169	0.6772	196	0.7569
116	0.1656	143	0.0934	170	0.2344	197	0.5792
117	0.0504	144	0.6956	171	0.9383	198	0.5173
118	0.1232	145	0.0045	172	0.7551	199	0.7969
119	0.0790	146	0.9276	173	0.8191	200	0.9296
120	0.0765	147	0.2920	174	0.9644	201	0.7730
121	0.6701	148	0.3716	175	0.602	202	0.6319
122	0.0090	149	0.3566	176	0.8875	203	0.7927
123	0.0533	150	0.1396	177	0.7109	204	0.7204
124	0.5097	151	0.8278	178	0.8413	205	0.3653
125	0.8184	152	0.3031	179	0.9649	206	0.7396
126	0.0196	153	0.3543	180	0.9292	207	0.9500
127	0.8487	154	0.7357	181	0.6924	208	0.0000
128	0.1802	155	0.0148	182	0.8767	209	0.0012
129	0.0541	156	0.0478	183	0.9639	210	0.8990
130	0.0023	157	0.6671	184	0.9382	211	0.0340
131	0.9964	158	0.5726	185	0.8431	212	0.0068
132	0.0012	159	0.9318	186	0.9514	213	0.0415
133	0.1904	160	0.8785	187	0.9330	214	0.0372
134	0.0783	161	0.3673	188	0.9696	215	0.0028
135	0.5936	162	0.1620	189	0.9720	216	0.0433

Table Appendix 5-2 (continued)

ID	MAH_P	ID	MAH_P	ID	MAH_P	ID	MAH_P
217	0.0000	244	0.6167	271	0.8117	298	0.9850
218	0.9493	245	0.6922	272	0.6902	299	0.9326
219	0.0000	246	0.6492	273	0.9658	300	0.8709
220	0.6495	247	0.7385	274	0.8587	301	0.9989
221	0.0012	248	0.9976	275	0.5802	302	0.8504
222	0.0254	249	0.9223	276	0.7387	303	0.9968
223	0.5331	250	0.9598	277	0.5914	304	0.9849
224	0.0028	251	0.0187	278	0.3012	305	0.7906
225	0.0588	252	0.4128	279	0.6616	306	0.9956
226	0.7280	253	0.4015	280	0.697	307	0.5210
227	0.0005	254	0.9503	281	0.9696	308	0.8783
228	0.9416	255	0.9684	282	0.8792	309	0.9988
229	0.0157	256	0.9993	283	0.9914	310	0.9478
230	0.8699	257	0.7709	284	0.9687	311	0.9673
231	0.7441	258	0.8641	285	0.9439	312	0.9156
232	0.7234	259	0.7396	286	0.7272	313	0.8476
233	0.3051	260	0.5094	287	0.9728	314	0.9115
234	0.9727	261	0.6476	288	0.9757	315	0.9982
235	0.9888	262	0.6838	289	0.7700	316	0.9289
236	0.4479	263	0.8662	290	0.9998	317	0.8686
237	0.3331	264	0.9835	291	0.8903	318	0.9870
238	0.2569	265	0.9992	292	0.9735	319	0.8534
239	0.0304	266	0.9540	293	0.9609	320	0.5840
240	0.9265	267	0.9775	294	0.9109	321	0.9224
241	0.9559	268	0.4175	295	0.7657	322	0.9875
242	0.9876	269	0.9780	296	0.9523	323	0.7260
243	0.9634	270	0.8702	297	0.8938	324	0.8979

Table Appendix 5-2 (continued)

ID	MAH_P	ID	MAH_P	ID	MAH_P	ID	MAH_P
325	0.5551	344	0.9980	363	0.0564	382	0.0601
326	0.9683	345	0.8635	364	0.6106	383	0.7023
327	0.7942	346	0.9491	365	0.9704	384	0.1588
328	0.8456	347	0.9683	366	0.9997	385	0.0000
329	0.9710	348	0.7904	367	0.9961	386	0.3726
330	0.9150	349	0.8046	368	0.4305	387	0.0003
331	0.9783	350	0.9444	369	0.0728	388	0.1979
332	0.9814	351	0.9789	370	0.8736	389	0.0144
333	0.9607	352	0.8420	371	0.5300	390	0.0540
334	0.7152	353	0.9732	372	0.4693	391	0.7484
335	0.8130	354	0.9296	373	0.9075	392	0.8470
336	0.8510	355	0.7565	374	0.7448	393	0.8695
337	0.9498	356	0.5498	375	0.9851	394	0.7799
338	0.9859	357	0.8935	376	0.7071	395	0.5449
339	0.9905	358	0.6509	377	0.9761	396	0.6312
340	0.9890	359	0.9049	378	0.9554	397	0.8465
341	0.9624	360	0.1336	379	0.9797	398	0.9552
342	0.9967	361	0.0000	380	0.9845	399	0.7259
343	0.9795	362	0.9993	381	0.1088	400	0.4867

Notice: ID = number of samples, MAH_P = p-value of Mahalanobis distance

*Outlier ID # 10, 45, 96, 97, 98, 208, 209, 213, 217, 219, 221, 222, 227, 229, 361, 385, 387

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