IMPACT OF GOAL COMPATIBILITY ON SELF-CARE ADHERENCE AMONG PATIENTS WITH CONGESTIVE HEART FAILURE

(Spine title: Goal Compatibility as a Predictor of Self Care Adherence)

Thesis format: Monograph Article

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Graduate Program in Psychology

A thesis submitted in partial fulfillment
of the requirements for the degree of
Master of Science

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Impact of Goal Compatibility on Self-Care Adherence Among Patients with Congestive Heart Failure

is accepted in partial fulfillment of the
requirements for the degree of
Master of Science

Date

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ABSTRACT

Increasing adherence to self-care behaviours can optimize the health of patients with congestive heart failure (CHF). This study examined whether considering the compatibility of self-care to valued life goals can improve the prediction of self-care adherence, above and beyond knowledge and self-efficacy. Forty CHF patients (22.5% female; mean age = 66.22) identified their goals though a card-sort and rated the compatibility of self-care regimens to these priorities. Aspects of CHF knowledge, self-efficacy and adherence to self-care were also assessed. Results indicated that participants valued CHF management, but its importance did not correlate with adherence. General and applied knowledge was associated with compliance to weighing and diet, respectively, while self-efficacy correlated with diet as well as exercise. Goal compatibility added significant variance to explain exercise adherence after controlling for other variables. These findings point to the merit of designing interventions to help patients leverage valued goals to address targeted health behaviours.

Keywords: Congestive heart failure; self-care adherence; goal compatibility; motivation

ACKNOWLEDGEMENTS

First and foremost, I would like to extend my most heartfelt thanks to my advisor, Dr. Leora Swartzman, for her knowledge, enthusiasm, patience and constructive comments. This thesis was made possible through her devotion to nurture and sharpen all phases of the research project. Her guidance has greatly improved the clarity of my thinking and was invaluable to my professional and academic development. I sincerely appreciate her unwavering support through the obstacles of this thesis journey.

I owe my deepest gratitude to the staff cardiologist at London Health Sciences Centre, Dr. Malcolm Arnold, for his expertise, wisdom, kindness and generosity. His advice and contributions were instrumental to the development of this study and many thanks for his enthusiastic efforts to help with study recruitment.

I would also like to acknowledge Dr. Kathleen Dindoff for her insight and support that made the development of this project possible. I also wish to thank the members of my committee, Dr. Nick Kuiper, Dr. Graham Reid, Dr. Craig Hall and Dr. Clive Seligman for their expertise and advice. As well, I am grateful to the staff and nurses at the Cardiac Care Outpatients Clinic including Denise Pacheco, and Julie Smith for their helpful assistance. Special thanks to Honours student, Jeanine Lane, for her collaboration, good company and help with the data collection.

Lastly, I am grateful to my family and friends for their love, support, and encouragement. Thank you so much for sharing my joy and excitement during this process and for putting up with me during the more trying times.

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Impact of Goal Compatibility on Self-Care Compliance Among Patients with Congestive Heart Failure

Congestive heart failure (CHF) is a chronic condition marked by failure of the heart muscles to fill and/or eject blood. Its progression can arise from a number of different causes, most commonly myocardial infarction, cardiomyopathy and hypertension (Figueroa & Jay, 2006). CHF affects roughly 500,000 Canadians annually and its prevalence and incidence is on the rise (Ross et al., 2006). This condition poses a major burden in that it is the leading cause of hospitalization of adults over age 65 and is associated with elevated rates of mortality, morbidity and health expenditures (Lee, Johansen, Gong, Hall, Tu & Cox, 2004; Tsuyuki, Shibata, Nilsson, & Hervas-Malo, 2003). Those with CHF experience a wide range of adverse physiological and psychological symptoms, including edema (swelling), palpitations, breathlessness, fatigue, disturbed sleep, and depression (Redeker, 2008; Zambroski, Moser, Bhat & Ziegler, 2005). These symptoms, when not adequately managed, can place a strain on CHF patients and their caregivers (Annema, Luttik & Jaarsma, 2008; Peters-Klimm et al., 2009; Thornhill, Lyons, Nouwen & Lip, 2008).

The burden of CHF is partly driven by non- adherence to prescribed lifestyle changes, which includes dietary restrictions, daily weighing and regular physical activity (Moser, Dickson, Jaarsma, Lee, Stromberg & Riegel, 2012; Tsuyuki et al., 2003). The failure to initiate and maintain these self-care behaviours could lead to deterioration in patient health, exacerbation of life-threatening CHF symptoms and over-utilization of health resources (van der Wal, Jaarsma & Veldhuisen, 2005). Moreover, it has been estimated that 21% to 55% of CHF-related hospital readmissions are attributable to poor

self-care (Annema et al., 2008; Bennett et al., 1998; Livieratos, et al., 2009; Michalsen, Konig & Thimme, 1998).

What is Self-Care for Chronic Heart Failure?

The term '*self-care'* refers to patient- initiated practices that help maintain physiological stability and optimize physical well-being (Artinian, Magnan, Sloan & Lange, 2002; Jaarsma, Arestedt, Martensson, Dracup, & Stromberg, 2009). Although there is no gold standard definition for this concept, it is generally agreed that self-care involves making decisions, planning actions and being responsive to symptoms of CHF (Cameron, Worrall-Carter, Riegel, Lo & Stewart, 2009; Riegel, & Dickson, 2008). The term *self-management* often is used interchangeably with *self-care* to refer to patient-guided actions to optimize one's health (Gardetto, 2011).

The CHF practice guidelines put forth by the European Society of Cardiology (ESC) and the American Heart Association/American College of Cardiology (AHA/ACC) (Hunt, Abraham, Chin et al., 2001; Lainscak, Blue, Clark et al., 2011) advise health care professionals to encourage CHF patients to: 1) restrict sodium and fluid intake to prevent fluid retention that cause swelling and shortness of breath, 2) weigh themselves daily to monitor weight gain due to fluid retention, 3) maintain and balance physical activity with rest to avoid over exertion and 4) follow other healthy lifestyle habits (limiting alcohol and tobacco, and getting the seasonal flu shot).

Although compliance to medication is also vital for CHF management, research has primarily focused on adherence to self-care behaviours because patients struggle the most with lifestyle changes (Corvera-Tindel, Doering, Gomez, & Dracup, 2004;

Schweitzer, Head, & Dwer, 2007). That is, a large portion (over 90%) of patients report taking medication as prescribed, but a significantly lower proportion (58-61%) report weighing themselves daily, restricting their sodium intake (38- 70%) and exercising as instructed (30-56%) (Schnell-Hoehn, Naimark, & Tate, 2009; van der Wal, Jaarsma, Moser, Veeger, van Gilst, & van Veldhuisen, 2006). Given that adequate adherence to lifestyle recommendations can prevent the deterioration of health and burden to the health care system (Gardetto, 2011), it is crucial to identify and understand what drives adherence to CHF self-care recommendations.

Exploring Cognitive Determinants of Self-Care Compliance

Several health behaviour models have been applied to adherence, most commonly the Health Belief Model (HBM; Hochbaum, 1958; Rosenstock, 1974), the Common Sense Model of Self-Regulation (CSM; Leventhal, Nerenz, & Stelle, 1984), the Theory of Planned and Behaviour/ Theory of Reasoned Actions (TPB/TRA; Ajzen, 1991) and the Information Motivation and Behavioural Model (IMB; Fisher & Fisher, 1992). Although each theory differs somewhat in their construal and labeling of constructs, they all underscore the importance of *patient knowledge* and *self-efficacy.*

For example, the HBM is based on the premise that health behaviour stems primarily from the process of evaluating the perceived benefits and cost of performing a recommended behaviour (Champion & Skinner, 2008). According to this model, individuals will adhere to prescribed lifestyle recommendations if they have sufficient knowledge about the susceptibility of symptom exacerbation, benefits of self-care and have confidence in their ability to execute the act. Similarly, the CSM postulates that

non-adherence will occur when patients lack adequate information or instructions about self-care and/or when they are not confident about performing the treatment regimen (Horowitz, Rein, & Leventhal, 2004). The TRA/TPB model also stipulates that compliant patients believe they are capable of the action (i.e. self-efficacy) and expect it to produce the desired outcome (Montano & Kasprzyk, 2008).

Guided by these largely cognitive models, most adherence research has focused on the impact of patient *knowledge* about CHF self-care strategies and patient's *self-efficacy* or *self-confidence* about performing the recommended behaviours (Buck, Lee, Moser, et al., 2012; Clark, Freydberg, McAlister, Tsuyuki, Armstrong & Strain, 2008; Reily, Higgins, Smith et al., 2009; Schnell-Hoehn et al., 2009; Stromberg, 2005). A recurrent finding, however, is that knowledge and self-efficacy are insufficient for adherence (Clark et al; Nieuwenhuis et al., 2012; van der Wal et al., 2010). A more comprehensive theory is the IMB model, which includes motivational factors in addition to the aforementioned cognitive variables. This model was used as the conceptual framework for the present study, which is discussed further in sections below.

Knowledge as a Predictor of CHF Self-Care Adherence

Most patients do not understand the diagnosis of CHF and have misconceptions about the prescribed management regimens (Cameron et al., 2009; Clark et al., 2008; Ni, Nauman, Burgess, Wise, Crispell, & Hershberger, 1999). For example, Ni and colleagues (1999) sampled 113 CHF patients and found that 37% reportedly knew "little or nothing" about how to initiate self-care behaviours and 36% erroneously believed that fluid intake should be increased. Misconceptions about the purpose of weighing behaviours and when to respond to changes in physiology are also common among CHF patients (Riegel &

Carlson, 2002; Rogers, Abery, Bulpitt, Coats & Gibbs, 2000). Given these aforementioned findings, one might expect that patient education would improve adherence to CHF self-care behaviour. However, educational interventions have produced varied outcomes (see Boyde, Turner, Thompson & Steward, 2001 for review).

For example, Boyde, and colleagues (2012) provided 38 CHF patients with an educational manual and DVD about CHF self-care in a non-controlled study and found significant pre-post changes in levels of knowledge and adherence. Yet, adherence did not improve in a controlled trial that used an interactive computer-based educational program (Stromberg, Dahlstrom, & Fridlund, 2005). Although the intervention group had higher knowledge scores than those in the control group at the end of the study, there were no group differences in pre-post changes in compliance.

Thus, the overall research evidence has been mixed with regards to whether more knowledge translates to higher levels of adherence (Artinian et al., 2002; Clark et al., 2008; Niewenhuis et al., 2012; Riegel & Dickson, 2008). Accordingly, it makes sense to widen the focus to another construct that features prominently in health belief models, namely, self-efficacy.

Self-Efficacy as a Predictor of CHF Self-Care Adherence

Self-efficacy refers to the belief in one's capacity to engage in a behaviour, regardless of one's actual ability to do so (Bandura, 1977). It is a key determinant of whether or not an action will be attempted and is distinct from *outcome expectancy*, which is the judgment of whether or not the behaviour will produce the desired outcome (Bandura, 2006). With respect to self-care, this construct refers to perceived confidence

that one has the necessary skills to follow prescribed recommendations (Riegel & Dickson, 2008). In the CHF literature, the term *self-confidence* (rather than self-efficacy) often is used to refer to the judgment of one's is/her ability to perform an action.

Amongst CHF patients, self-efficacy emerged as the strongest predictor of self-care adherence above and beyond age, gender, depression, anxiety, illness comorbidity, illness severity and cognitive function variables (Cameron et al., 2009; Schweizer et al., 2007). Yet, interventions designed to improve self-care compliance seem not to benefit from leveraging self-efficacy. For example, the use of Motivational Interviewing (MI) to bolster self-efficacy towards CHF management improved self-confidence to apply behavioural skills but not actual self-care adherence (Paradis et al., 2010). Powell, Calvin, Janssen and colleagues (2010) also failed to observe improvements in self-care compliance after they taught CHF patients self-management skills bolstered by educational resources. The limited success achieved by these self-efficacy programs warrants the need to explore other factors that may affect self-care compliance.

Considering Motivation as a Predictor of Adherence

Later formulations of cognitively oriented theories have incorporated *motivational factors* as predictors of patient health behaviour. For instance, an elaboration of the TRA/TPB postulates that motivation (intention) and perceived ability (self-efficacy) are directly linked to action (Ajzen, 1991). Intention is considered to be inherently motivating as it drives the planning and the amount of effort that should be invested in pursuing an action (Hagger & Chatziarantis, 2008).

The Transtheoretical Model (TTM; DiClemente & Prochaska, 1982; Prochaska, Redding, & Evers, 2007) postulates that health behaviour change occurs in a series of stages and that low motivation underlies ambivalence about the new practice in the initial stage. Although health frameworks are taking steps towards expanding their conceptual breadth, the operationalization of motivation in these models is vague and does not capture its true meaning.

What is Motivation?

Motivation refers to those internal (intrinsic) and external (extrinsic) factors that propel efforts to attain personal desires or needs (McClelland, 1985). In essence, motivation is the energy that drives behavior. These motivational orientations are consciously represented as *values,* which are important guiding principles in people's lives that relate to a desirable state or end (Murray, 1951; Rokeach, 1973; Schwartz, 1992; 1996). Closely related to values are *personal goals*, defined as cognitively elaborated representations of what individuals are characteristically aiming to achieve through their behaviour (Brunstein, Schultheiss, & Grassmann, 1998; Emmons, 1986). The differences between these three constructs -motivations, values and goals- are admittedly subtle. Values are derived from superordinate needs and social norms, whereas goals are concrete manifestations of these values (Jolibert & Baumgartner, 1997). Motivation, in turn, can be inferred from goal-oriented behaviours or the level of value attributed to the performance of an activity (Hulleman, Durik, Schweigert, & Harackiewicz, 2008; Loke & Latham, 1994).

According to the Theory of Integrated Values Systems (Schwartz, 1992; 1994) values vary in importance and guide the selection of behaviour or events. The differences

in values are marked by their distinct motivational goals. According to Schwartz (1996), motivation is a dynamic interplay of compatible and incompatible values.

Since personal goals are less abstract and more proximal to behaviour than values (Brunstein et al., 1998), it has been suggested that the study of motivation should focus on *means goals,* that is, goals that service the attainment of another goal and on *end goals*, which are the desirable outcomes (Jolibert & Baumgartner, 1997; Locke & Latham, 1994). Applied to the context of CHF, self-care behaviors would be the means goal and keeping CHF under good control would be the end goal.

Motivational Variables in the CHF Self-Care Literature

Research on motivational factors as predictors of patient adherence to self-care regimens has been scarce and largely qualitative. van der Wal and colleagues (2010) asked 15 CHF patients about their thoughts and 'motivations' for following self-care regimens. Motivation was gauged by asking patients about their *reasons* for complying or not complying to self-care recommendations. The most cited reasons for compliance were the desire to avoid worsening of CHF symptoms and to feel comforted by knowing one is following physician's instructions. In contrast, common reasons for not following instructions were social pressures, not liking bland foods and being forgetful. Although these findings shed light on the barriers to and facilitators of self-care compliance, "reasons for compliance" is not synonymous with "motivation to comply" in that the former does not speak to the incentive and/or goals behind the behaviour.

Hicks and Holmes (2003) asked a sample of 38 CHF patients to rate the most salient factors contributing to their decisions to adhere. They found that therapeutic

'values' (the importance placed on performing specific CHF regimen) and personal beliefs and values (beliefs and values about health, quality of life, death and other life domains) more strongly influenced decisions to adhere than having adequate information and perceiving regimens as difficult. In light of these findings, the authors pointed to the merit of having a better understanding of adherence to CHF regimens by considering patient "values". Once again, these 'values' bear little semblance to values as per the theory of integrated value system (Schwartz, 1992; 1996).

Based on patient questionnaire responses and narrative descriptions of their practices, attitudes and confidence towards self-care, Dickson, Deatrick and Riegel (2008) generated a typology of self-care management levels: *experts, novices* and *inconsistent*. Patient experts were described as proficient with self-management due to ample experience, high cognitive functioning, self-efficacy, as well as positive attitudes toward their condition. Novices were those with insufficient experience with self-care management and consequently low self-efficacy, but nevertheless had positive attitudes about performing prescribed behaviours. Most interesting were the inconsistent patients, who had experience with self-management yet failed to develop adequate skill. What distinguished the expert and inconsistent patients is that the latter prioritized other life values, (i.e., taking care of family and managing comorbid conditions) over CHF self-care, and so they were less concerned about practicing the regimens.

Motivation as informed by goals has been studied in the context of 'motivational interviewing' (MI). An integral part of this approach is to direct patients' awareness to how their current behaviour relates to their stated goals (Miller & Rollnick, 2002). More specifically, patients are helped to appreciate the discrepancy between what *they are*

currently doing (e.g., not exercising) to what they *wish to achieve* (e.g. have more energy to play with their grandchildren) so that actions can be taken to bridge these gaps.

MI was designed to enhance patient's intrinsic motivation to change health behaviours by evoking the individual's *own* goals. A review of research findings using MI revealed that it is effective for improving health behaviours among patients with cardiovascular conditions (Thomas, Chair, Chan, Astin, Davidson & Ski, 2011); however, it's effectiveness for CHF self-care is less clear.

For example, Brodie, Inoue and Shaw (2008) randomly assigned 60 CHF patients to three groups: standard care condition (provision of educational resources), MI, or a combined MI and standard care group. The MI sessions focused on the goal of increasing energy expenditure and participants were encouraged to work through barriers to physical activity. They found that only 13% of the participants across all groups were implementing changes to their exercise regimens. The authors also noted that patients tended to digress during goal setting discussions and talked about health topics not related to CHF. Thus, it could be that the intervention 'failed' because participants did not value the targeted goal to increase energy expenditure, or found it less important than other non-CHF related goals. By regarding talk of these other goals as 'digressions', the researchers lost the opportunity to help patients work through these other roadblocks that impinge on their behaviour. Moreover, "increasing energy expenditure" is a means goal; it is not an end goal from a motivational standpoint. By focusing on the behaviour without considering *why* the goal matters to patients, leverage opportunities were lost.

Riegel, Dickson, Hoke, McMahon, Reise & Sayers (2006), in a non-controlled study, examined the impact of MI on adherence to CHF self-care regimen. Rather than

working towards prescribed goals, participants established their own targets based on how CHF "fit" into their lives. With a more patient-centred approach, over half of the participants (53.3%) showed improvements in their compliance with self-care behaviours. Thus, it is possible that MI interventions can be made more effective by abandoning the assumption that individuals ultimately wish to manage their CHF and instead capitalize on a wider range of goals to harness patient motivation for change.

Conceptualization of Motivation as Multiple Goals

Given that there is rarely a 1:1 mapping of behaviour onto a *single goal*, examining the interactions between *multiple goals* may provide a more effective approach to harnessing motivational factors in the service of self-care. Meyerson and Kline (2009) interviewed CHF patients about their reasons for meeting or not meeting their target self-care goals. Competing priorities in other life domains (e.g., taking care of sick husband) were commonly reported as barriers to adherence. That is, some patients found it difficult to focus on their heart failure in the face of other pressing matters, such as family issues and comorbid health concerns. This suggests that people tend to concurrently pursue multiple goals and it is the interrelations between these goals, rather than the pull of a single goal, that impact behaviour. The extent to which the achievement of a given goal is enhanced or impeded by the presence of another is termed *goal compatibility/facilitation* and *goal incompatibility/conflict* (Gebhardt, 2006).

Several lines of research, albeit with non-CHF populations, suggest that goal incompatibility can have an impact on adherence. For example, in a series of studies, Gebhardt and colleagues (Gebhardt, 1997; Gebhardt & Maes, 1998; Maes & Gebhardt,

2000) examined the personal goals of 312 individuals who did not exercise (non-exercisers), 466 individuals who exercised once or twice a week and 202 individuals who exercised at least three times a week. They found that sedentary individuals regarded regular exercise as an impediment to more in-house activities (such as chores and watching TV) than the comparison groups. Within the active groups, conflicts between personal goals and exercise at baseline predicted relapse to a sedentary lifestyle at one-year follow-up. Moreover, those who were sedentary at baseline but later adopted an active lifestyle had fewer goal conflicts at the first time point. These findings suggest that evaluation of goal conflicts can provide relevant information about whether health behaviours will be adopted and sustained.

In keeping with this, Presseau, Sniehotta, Francis and Gebhardt (2010) found that goal compatibility was predictive of physical activity, above and beyond self-efficacy and behavioural intention in an undergraduate sample. They asked 250 students to list personal projects (tasks or goals for school, home, community or leisure) that they planned to pursue in the next 3 months. 'Participate in physical activity' was then added to the list and participants were asked about their intention and confidence to perform the behaviour. Individuals then rated the extent to which each of their personal projects would facilitate and conflict with physical activity using 0-10 visual analogues. Goal compatibility was the best prospective predictor of exercise frequency.

To summarize, the CHF literature is beginning to include factors beyond patient knowledge and self-efficacy to explain compliance with self-care recommendations (Dickson & Riegel, 2008; Hicks & Holmes, 2003). Motivation has emerged as a construct of interest, but its operationalization has been poor (van der Wal et al., 2010).

Although motivation ostensibly has been the target of MI interventions geared towards improving self-care adherence (Brodie et al., 2008; Riegel et al., 2006), the efficacy of such interventions has been suboptimal, arguably because patient goals other than those that are CHF-related have largely been ignored.

As noted earlier, there may be some merit in moving towards an examination of goal compatibility (Gebhardt, 1997; 2006; 2007; Presseau et al., 2010), though this work is in its infancy and largely absent in CHF research. The above literature review highlights the need for more rigorous thinking and methods to understand and evaluate motivational factors on adherence among CHF patients in the context of goal compatibility and incompatibility. As well, there needs to be a unified theoretical model that explains the roles of motivational factors, along with other leading predictors of patient adherence (i.e., knowledge and self-efficacy).

A Conceptual Framework: The Information-Motivation Behavioural Skill (IMB) Model

The one health behaviour model that affords equal footing to knowledge, self-efficacy and motivation is the *information-motivation behavioural skill model* (IMB; Fisher & Fisher, 1996; 2009; Misovich, Martinez, Fisher, Bryan, & Catapano, 2003). According to the model (see Figure 1), *information* relevant to self-care enactment (such as facts about the regimen, consequences of non-compliance and adequate self-care) will guide actions and choices. *Motivation* to engage in self-care behaviours is another core component that influences the decision to follow medical recommendations. According to the theory, the extent to which one is motivated to perform a behaviour depends on

one's *attitude*, that is, one's beliefs and evaluations about the outcome and *social norms*, which are perceptions of others' support for performing such acts. Once again, however, this construal of motivation is not consistent with the more traditional definition of the concept as a basic drive or need (McClelland, 1985).

According to the IMB model, perceived behavioural skills (self-efficacy) are the gateway that either augment or suppress the effects of information and motivation. This is because the capacity to actually perform the behaviour is more proximal to adherence than information about the health behaviour change (Fisher & Fisher, 1992; 2009). However, information and motivation can directly affect adherence if the target act does not require complicated skills. In the case of CHF, some of the self-care regimens (diet and exercise routine) are more complex than others (daily weighing). Based on this theory, one would expect self-efficacy to mediate the effect of knowledge and motivation on adherence to diet and exercise, but less so for daily weighing.

It is clear that the IMB is advantageous over other health theories in that it includes three crucial domains – knowledge, motivation and behaviour. Yet it does not make room for goal compatibility/incompatibility and falls short with respect to how motivation is operationalized. That is, the IMB portrays motivation a set of attitudes and social norms, but these agents are influenced *by* motivational factors and are not driving forces in their own right (Lemmens, Ruiter, Veldhuizen & Schaalma, 2007). As such, the approach taken here, guided by the *theory of integrated value system* (Schwartz, 1994; 1996), was to construe motivation as a system of value/goal compatibility. The primary aim was to determine whether non-adherence arises from discrepancies between what

patients know they *should* do to achieve their desired CHF outcomes and what they *want* to do to achieve other valued outcomes.

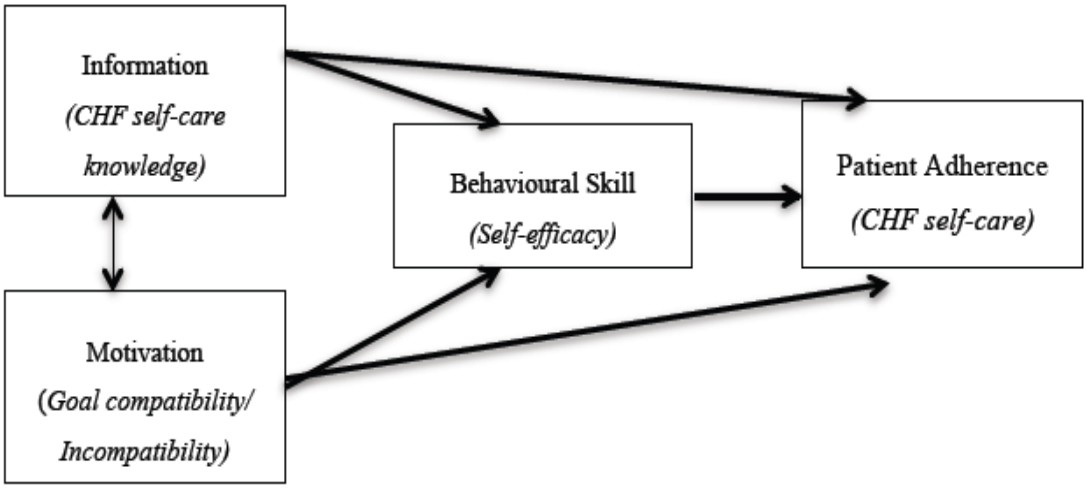

Figure 1. Predictors of heart failure self-care adherence according to an adapted version of the information-motivation behavioural skill model (Fisher & Fisher, 1992)

Study Rationale

Arguably, having an understanding of *what* goals get in the way of self-care management and *why* these elements facilitate or impede adherence to CHF regimens may help foster patient-centered CHF care. To my knowledge, no studies to date have examined "motivational trade-offs" as predictors of compliance to health care regimens and no information is available on the influence of this construct when it is juxtaposed against other key predictors of compliance to self-care.

In clinical practice, this knowledge could be used to identify patients who will have most difficulty following prescribed recommendations and to outline the roadblocks that need to be tackled and the enablers to be capitalized on. As well, illuminating the range

of patient goals and charting their compatibility and incompatibility with self-care regimens can help pinpoint where interventions (i.e., MI) can intercede to make for more efficient and effective patient care.

Accordingly, one objective of this study was to explore the motivational aspects of self-care adherence. That is, to simply describe *what* personal goals are important to CHF patients and where CHF management ranks relative to these goals. The second objective was to learn *why* patients are not compliant by examining the relationship between adherence to specific self-care behaviours with goal compatibility, knowledge and self-efficacy.

Based on research regarding goal conflicts and facilitation (e.g., Gebhardt et al., 2006) and tenets of the IMB model (Fisher & Fisher, 1992), the following hypotheses were put forth:

Hypothesis 1: Higher perceived compatibility of a specific CHF regimen with personal goals would be correlated with adherence to that self-care behaviour.

Hypothesis 2: Goal compatibility would account for added explanatory variance in CHF-regimen compliance above and beyond patient knowledge about CHF symptoms and self-management and perceived difficulty of the behaviours (self-efficacy).

Hypothesis 3: Self-efficacy would mediate the effects of goal compatibility (motivation) and knowledge on the adherence to diet and exercise but not to daily weighing.

Methods

Participants

Participants were congestive heart failure patients who received their care from the Cardiac Care Outpatient Clinic at University Hospital in London, ON. Recruitment took place between September 2011 to June 2012. Inclusion criteria included: 1) the ability to speak and read English; 2) adequate mental status (gauged by the attending physician); 3) not currently enrolled in a CHF self-management program and 4) mild to moderate CHF symptoms as identified by the New York Heart Association functional (NYHA) class II and III guidelines (Bennett, Riegel, Bittner, & Nicholas, 2002; Appendix A). Patients with NYHA class I and IV were excluded because self-care behaviours are not generally prescribed to individuals who are asymptomatic or who experience highly severe symptoms. The other exclusion criterion was current enrolment in a CHF self-management program. Please refer to Figure 2 for participant recruitment and enrollment statistics.

The sample consisted of forty participants (22.5% female) ranging in age from 38 to 82 years (M = 66.22; SD = 10.01). The predominance of males is consistent with other studies (i.e., Boyde et al., 2012; Schnell-Hoehn et al., 2009) and in part, reflects the higher prevalence of heart failure among men (Stromberg, & Martensson, 2003). The average years of schooling was 13.38 (SD = 3.82) and the mean number of years since CHF diagnosis was 5.72 (SD = 3.96). At the time of the study, 65.0% of participants were NYHA class II and 70.00% of patients had a comorbid diagnosis. Most participants were Caucasian (97.5%), married (67.6%) and were unemployed due either to CHF (24.3%) or retirement (54.0%). Please see Appendix B for additional demographic information.

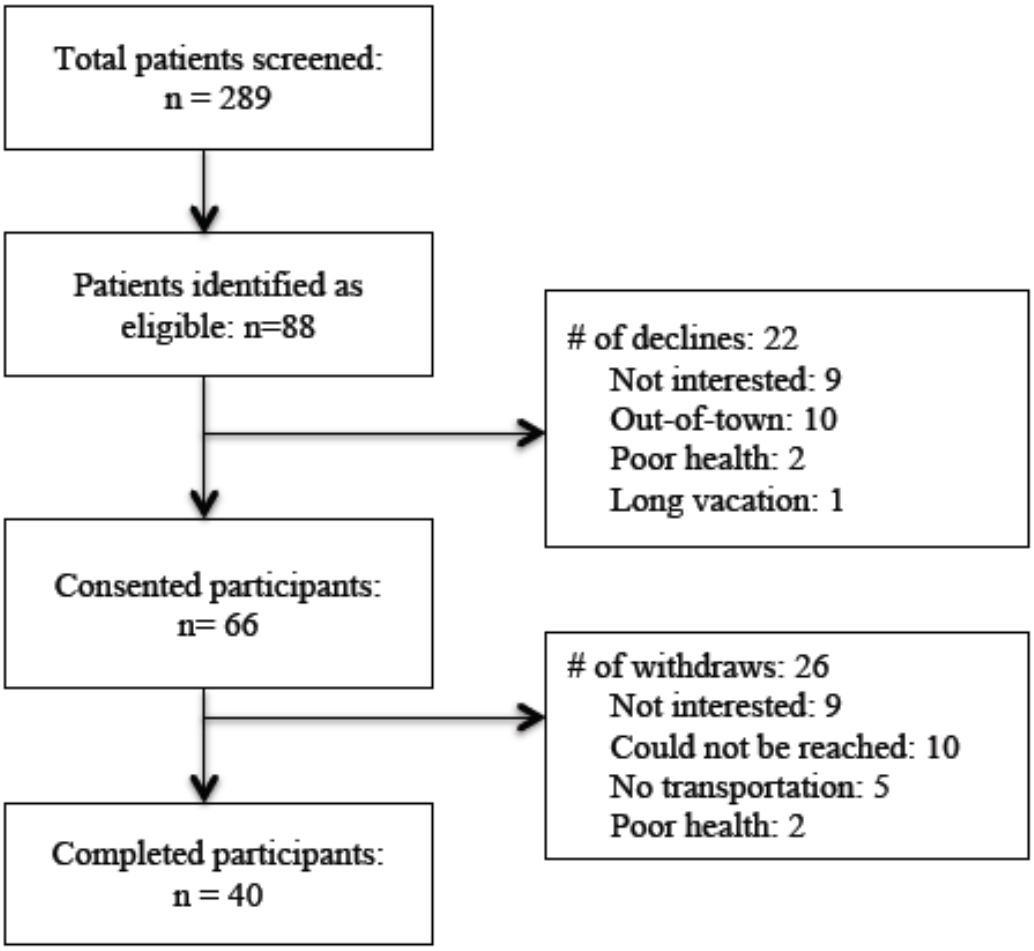

Figure 2. Flow chart outlining the recruitment and enrollment process.

Measures

Adherence outcome measure.

Patient compliance to salt and fluid restriction, daily weighing and physical activity recommendations was measured using a modified version of the Self-Care of Heart Failure index Version 6.2 (SCHFI V6.2; Riegel et al., 2000; 2004; 2009, Appendix C). The original SCHFI used the *self-management* (6 items) and *self-maintenance* (10

items) subscales to measure adherence, each of which included several behaviours. However, assessing overall compliance across a wide range of self-care behaviours has yielded somewhat low internal consistency scores (α ranging from .56-.60; Riegel et al., 2004; 2009). Accordingly, to improve the measure reliability and to better serve the study aims, items from the SCHFI maintenance and management subscales were reconstituted to gauge compliance to salt and fluid restriction (items 6,9,12,13; α = .67), physical activity (items 4, 7; α = .88) and daily weighing (items 1,2; α = 55). Each item was rated on a 1-4 point scale, which generated total raw scores ranging from 4-16 for the diet subscale and 2-8 for the weighing and physical activity subscales. The raw scores for each subscale were converted to standardized scores (0-100) as per the following formula: (Sum of participant raw scores – lowest possible raw subscale score) * 100/range of scores. Thus, higher scores indicate higher levels of adherence.

CHF knowledge.

The 15- item multiple-choice-based *Dutch Heart Failure Knowledge Scale* (DHFKS; van der Wal et al., 2005; Appendix D) assessed knowledge about CHF in general (4 items), its treatment (6 items) and symptom recognition (5 items). The total number of correct answers indicates the level of patient CHF knowledge, with scores ranging from 0 (no knowledge) to 15 (optimal knowledge). The scale has been shown to be valid and reliable (α = .62; van der Wal et al., 2005) and has been widely used in the literature (e.g., Buck et al., 2012; Nieuwenhuis et al., 2012; van der Wal et al., 2006).

To assess *applied* knowledge, participants completed an adapted version of the *Knowledge Acquisition Questionnaire* (KAQ; Gwadry-Sridhar et al., 2003), which taps the extent to which one understands the rationale and procedures for the various elements

of self-care (See Appendix E). The scale is in multiple-choice format, with scores ranging from 0 (inability to apply CHF knowledge) to 8 (good ability to apply CHF knowledge). The KAQ has been shown to be internally consistent (α = .61-.66; Gwadry et al., 2003).

Self-efficacy.

Perceived ability to perform self-care behaviours was assessed by the 6-item Confidence subscale from the Self-Care of Heart Failure Index (SCHFI) measure (Riegel et al., 2000; 2004; 2009; Appendix C, Section C). Patients rated their level of confidence for following self-care regimens using a scale that ranged from 1 (not confident) to 4 (very confident). A sample item, "Follow the treatment advice you have been given". The raw scores (ranging from 6-24) from the confidence scale were standardized to a 0-100 point range using the formula: (sum of raw scores from six items -6)*100/18). Higher scores indicate higher levels of self-efficacy.

Demographic and medical information.

A 14-item patient demographic questionnaire was created for the purpose of this study (Appendix F) and relevant medical information (duration of CHF diagnosis and NYHA class) was obtained from a review of hospital records.

Prioritized goals.

Participants identified their most important life goals through a *Card-Sort Task.* To develop the task stimuli, an extensive review of qualitative research was conducted on the lived experiences of CHF patients and their reported reasons for self-care adherence and non-adherence. The list of common values, beliefs and goals identified through the literature were then evaluated and refined by a cardiologist and two health psychologists to create the final set of 20 goals that were organized into five goal domains (Appendix

G): 1) *CHF symptoms, 2) health and longevity, 3) functional status, 4) social functioning and 5) pleasure and well-being* derived from themes that emerged from previous qualitative analyses (Freydberg et al., 2010; Mahoney, 2001; Martensson, Karlsson, & Fridlund, 1997; 1998; Scotto; 2009; Stull et al., 1999; van der Wal et al., 2010). Each goal was printed in large type on its own 3.7"x 2.5" index card.

At the beginning of the card-sort task, participants were asked to sort the stack of 20-cards into three piles: "Very Important", "Somewhat Important" and "Less Important". They then selected the five most important goals from the "Very Important" pile and rank ordered them. An index card, on which was printed "Taking care of my heart failure," was then presented to participants and they were asked to indicate where it ranked amongst their top five goals.

The degree of importance (very, somewhat, less) and the rank order, ranging from 1 (first priority) to 6 (sixth priority) of each goal was recorded (see Appendix H for the record sheet). The five top ranked goals as well as the "Taking Care of Heart Failure" then were used in the competing and facilitating goal task, as described below.

Goal compatibility and incompatibility.

The *Competing Goals Task* (depicted in Figure 3) assessed the extent to which participants perceived CHF self-care behaviours as compatible (facilitating) or incompatible (competing) with the achievement of personal goals (both CHF AND non-CHF related). The centerpiece of the task was a rectangular board (11.22 " x 6.30 ") with a slide that moved along a straight path, anchored by -10 (Not at All Compatible) on one end, 0 (neutral) in the middle and +10 (Very Compatible) on the other. Negative scale points (-10 to < 0) represented goal incompatibility and positive scale points (> 0 up to +

10) indicated compatibility. The use of visual analogues to measure goal compatibility was adopted from a previous study of the same construct (Presseau et al., 2010).

A stack of the five top-ranked goal cards (generated from the card sorting task) and the CHF-management goal card was placed adjacent to the +10 anchor. Participants were presented with the three (2.75in in diameter) behaviour cards sequentially (random order). On each card was a description of the specific self-care behaviours noted in the ESC and AHA/ACC practice guidelines (Hunt et al., 2001; Lainscak et al., 2011): 1) "limit my sodium and fluid intake" 2) "weigh myself daily" and 3) "follow the recommended level of physical activity".

At the onset of each trial, the slide containing one of the three behaviour cards was attached to the slide and positioned at the 'zero' mark on the scale board. Participants were asked to move the behaviour card along the scale to indicate the degree to which they judged a self-care regimen took them away from or towards the prioritized goal. Once the card was moved to the desired point on the scale, the corresponding numerical rating was recorded (see Appendix I for response sheet) and the participant proceeded to rate the next prioritized goal in the card stack. Participants repeated this process until they rated the compatibility of the 3 behaviour cards to each of the 6 prioritized goals (also presented in random order), for a total of 18 trials.

To ensure they understood the task, participants were given a demonstration trial with a neutral stimulus (i.e., non-CHF related goals and behaviours). They also were encouraged to "think aloud" as they proceeded through the task.

The ratings provided in the compatibility goals task were computed into *goal compatibility scores.* First, a value of 10 was added to each rating so that the recoded

values ranged from 0 (not at all compatible) to 20 (very compatible). Second, the total number of goal compatibility scores for each type of self-care behaviour were summed and divided by six to produce a mean value.

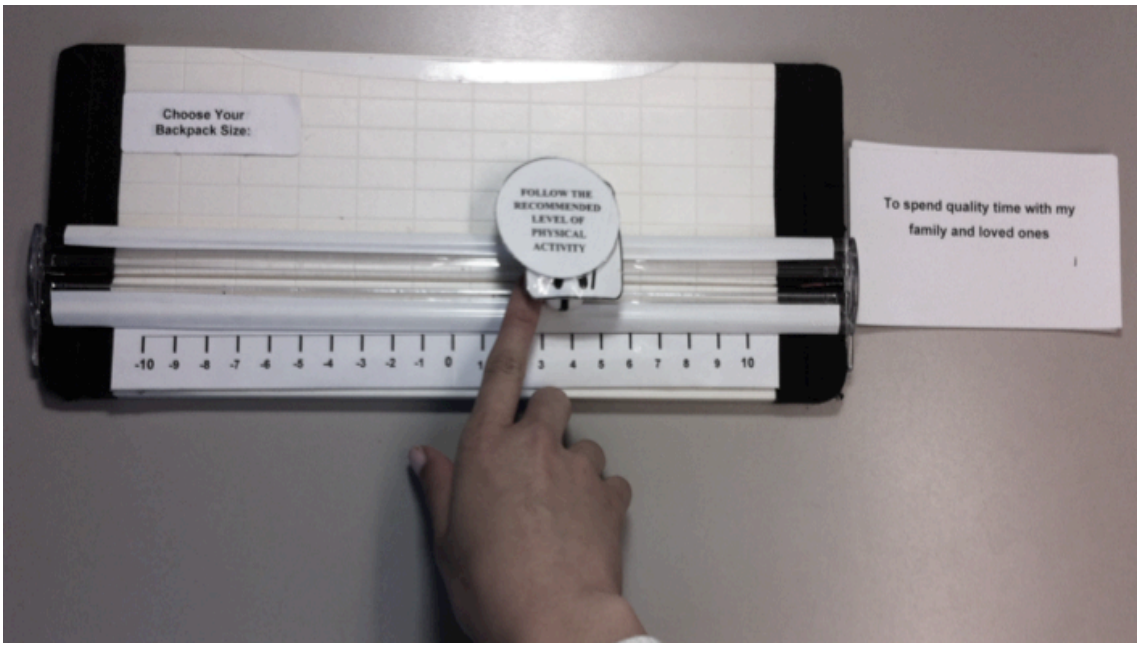

Figure 3. Photograph of the goal compatibility task during test phase with the priority goal cards on the right, and the behaviour card attached to the slide.

Procedures:

The sequence of study procedures is summarized in Figure 4. The study was reviewed and received ethics approval from the Health Sciences Research Ethics Board at Western University and the Lawson Health Research Institute at the London Health Sciences Centre (please see Appendix J for approval letter).

The cardiologist at the Cardiac Care Inpatient Clinic identified patients who met entry criteria. Of the 289 screened, 88 participants (30.5%) were deemed by him to be

eligible. At the end of their scheduled appointment, a member of the health care team asked prospective participants whether they would be willing to be approached about a research study. All but one agreed. The research associate (most often K. Zhang) entered the room, provided a brief overview of the study and explained the one- hour time commitment for the in-person testing/interview session. If the patient was willing to learn more about the study, the research associate reviewed the Letter of Information and verbally explained all sections of this document in detail. Prospective participants were encouraged to ask questions during this process. Once all questions were clarified and prospective participants appeared to understand the study procedures, they were asked whether they would be willing to participate. The 75.0% (66 of 88) who did so received a hard copy of the Letter of Information and signed the Informed Consent statement (Appendices K and L, respectively). Of those, 40 ended up participating, for an overall response rate of 45.5%. See Figure 3 for the overall recruitment figures as well as reasons for drop-off at each successive level.

Nine of the 40 (i.e., 22%) participants were immediately available for testing, and completed the study at the hospital in a private interview room near the cardiac clinic. The remainder provided their contact information so that a testing appointment could be set up for another time either at the hospital or at the research office. The sequence of testing (depicted in Figure 4) is as follows:

(1) Participants completed the card-sort task to identify prioritized goals. This took approximately 5-7 minutes (see Appendix M for instructions script)

(2) The research associate explained the Competing Goal Task and demonstrated a practice trial. For a script of the instructions, refer to Appendix N. Once it appeared that

participants understood what they were being asked to do, they were given one of three behaviour cards. The behaviour card was then attached to the slide and participants moved the slide to indicate the compatibility of this self-care behaviour with their personal and CHF goals. This process was repeated until all behaviour to prioritized goal cards have been rated. Participants were encouraged to talk aloud to explain the rationale for their ratings while they completed the task. This segment took around 30-40 minutes.

(3) Lastly, participants were asked to fill CHF knowledge, self-efficacy and self-care questionnaires, which took approximately 15-25 minutes to complete. At the end of the testing session (roughly 45-60 minutes total), participants were thanked and given a $25 honorarium.

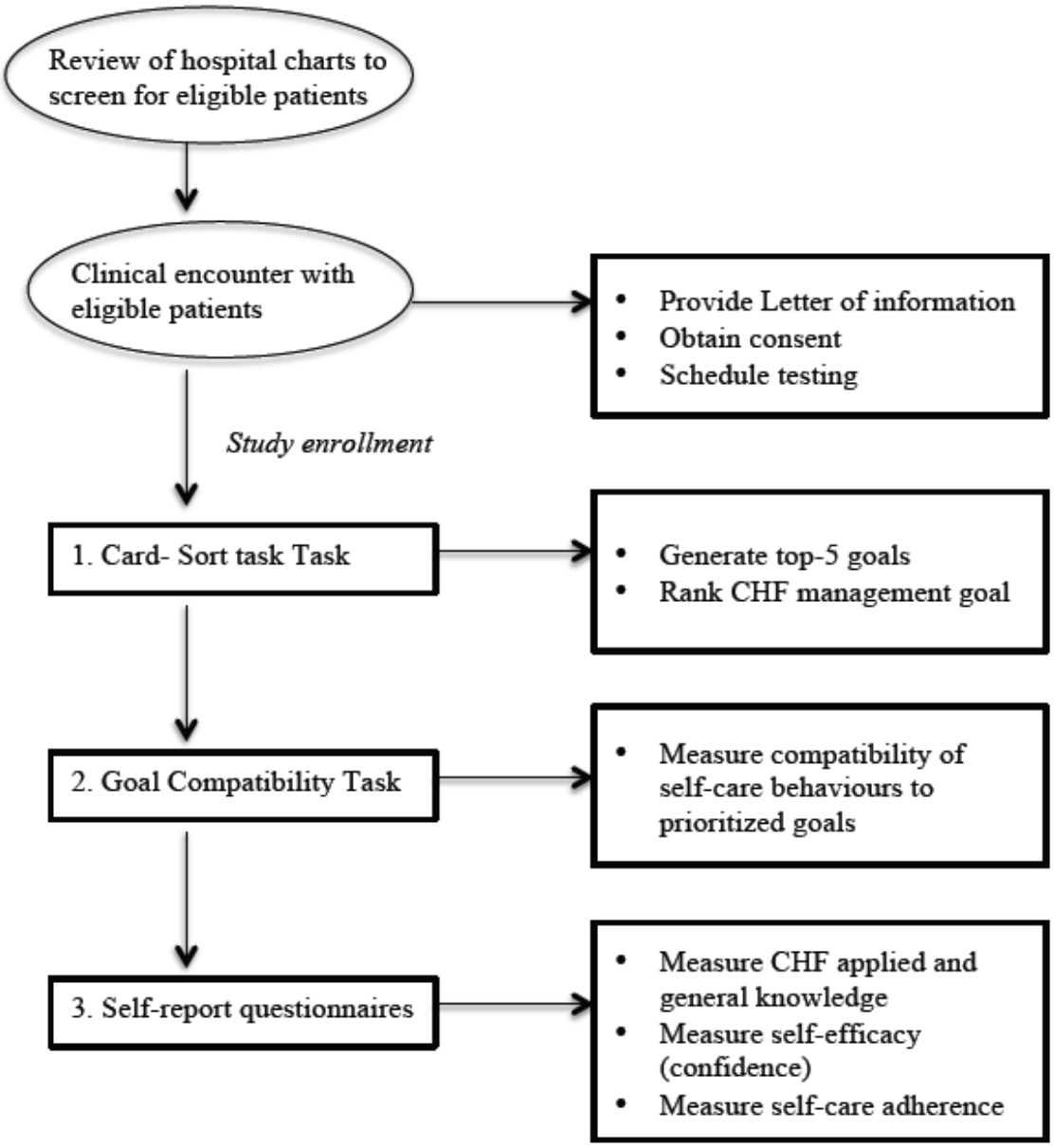

Figure 4. Flow chart outlining the study procedures

Results

Descriptive Statistics

Descriptive statistics for the variables of interest are presented in Table 1. Distributional properties for all and internal consistency for most measures are in the acceptable range.

Self-care adherence.

As predicted, the adherence measure was more internally consistent when broken down by specific behaviours, diet, regular weighing and physical activity (αs = .67, .55, .88, respectively) than by the more abstract and broader constructs of maintenance (α = .31) and management (α =.62).

The mean subscale scores (ranging from 51.1-55.0) were below the 70 threshold indicator for adequate compliance (Riegel & Dickson, 2009). Based on this criterion, only 32.5%, 22.5%, and 30.0% of the sample was adherent to the diet, weighing and exercise components of CHF regimens, respectively. Patients with NYHA class III were less compliant to physical activity recommendations than those in class II (r = -.43, p = .006) but none of the other demographic and medical status variables correlated with adherence (Table 2).

Self-efficacy.

The Self Care Heart Failure Index (SCHFI) confidence scale was highly internally consistent (α = .85, Table 1) and not correlated with any of the demographic variables, with rs ranging from -.29 to .09 (ps > .5).

Table 1

Psychometric Properties of Questionnaire Measures

Variable	# of Items	*M* (*SD*)	Possible Range	Observed Range	α	Skew	Kurtosis
Self-Care Adherence							
SCHFI management	6	51.1 (24.8)	0-100	0-100	.62	.08	.83
SCHFI maintenance	10	62.2 (12.2)	0-100	33.3-83.3	.31	-.33	-.41
SCHFI diet	4	55.1 (25.2)	0-100	0 - 100	.67	-.38	-.54
SCHFI weighing	2	51.3 (29.6)	0-100	0 – 100	.55	.14	-.99
SCHFI physical activity	2	55.0 (31.6)	0-100	16.7-100	.88	.23	-1.4
Goal Compatibility							
Diet restriction	6	14.4 (2.9)	0-20	9.0– 20	.78	-.12	-.90
Weighing	6	12.6 (3.5)	0-20	7.4 – 20	.91	.91	-.39
Physical activity	6	13.5 (4.5)	0-20	5.5 – 20	.89	-.34	-1.07
Self-efficacy							
SCHFI confidence	6	62.4 (17.4)	0-100	33.4-100	.84	.55	-.24
Knowledge							
DHFKS	15	11.4 (2.23)	0-15	6 - 14	.57	-.69	-.24
KAQ	6	9.76 (1.71)	0-14	6-12.5	.36	-.61	.61

Note. α = alpha; *M* = mean; SD = standard deviation; SCHFI = Self-care Heart Failure index; DHFKS = Dutch Heart Failure Knowledge Scale; KAQ= Knowledge Acquisition Questionnaire

Table 2

Pearson Correlations Between Self-Care Adherence and Demographic Variables

	Adherence		
	Dietary restriction	Daily weighing	Physical activity
Demographics			
Age	.05	.15	.06
Gender (1=Male, 2=Female)	.13	.18	.02
CHF duration	-.28	-.16	-.14
NYHA class (1= II, 2 = III)	-.16	.15	-.43**
Comorbidity (1=Yes, 2 =No)	.18	-.31	.17
Years of education	.02	.13	-.04
Relationship status (1=Partner, 2 = No partner)	.09	.03	.26
Work status (1=Not working; 2 = Working)	.13	-.09	.01
Household income	.04	.21	-.01

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

NYHA class = New York Heart Failure Association classification; *SCHFI* = Self-Care Heart Failure Index; *CHF* = congestive heart failure

Table 3

Pearson Correlations between Goal Compatibility and Demographic Variables

	Goal Compatibility Scores		
	Dietary restriction	Daily weighing	Physical activity
Demographics			
Age	-.08	.25	-.20
Gender (1=Male, 2=Female)	.16	.07	-.17
CHF duration	-.31*	-.13	.01
NYHA class (1 = II, 2 = III)	-.31*	-.12	-.14
Comorbidity (1=Yes, 2 =No)	.00	.09	.30
Years of education	.18	.13	-.04
Relationship status (1=Partner, 2 = No partner)	-.12	-.06	-.04
Work status (1=Not working; 2 = Working)	.13	-.18	.38*
Household income	.12	.18	-.03

Note. *$p < .05$, **$p < .01$, ***$p < .001$
NYHA class = New York Heart Failure Association classification; *SCHFI* = Self-Care Heart Failure Index; *CHF* = congestive heart failure

CHF knowledge.

The Dutch Heart Failure Knowledge Scale (DHFKS) and Knowledge Acquisition Questionnaire (KAQ) scores were significantly correlated ($r = .31$, $p = .05$). Internal consistency for the DHFKS ($\alpha = .57$; Table 1) was acceptable and comparable to that reported by its developers and other researchers (Boyde et al., 2011; van der Wal et al., 2005). However, the KAQ had low internal consistency ($\alpha = .36$)- considerably lower than that reported by the developers of the scale ($\alpha = .61$- $.66$; Gwadry et al., 2003).

The correlations of the two knowledge variables with each demographic factor are presented in Table 4. Older participants had less knowledge and were less able to apply it

and those currently employed (versus those retired or on disability) had more general knowledge. No other correlations were statistically significant.

Table 4

Pearson Correlations between Knowledge and Demographic Variables

	Knowledge	
	General	Applied
Demographics		
Age	-.40*	-.32*
Gender (1=Male, 2=Female)	.09	.09
CHF duration	-.14	.15
NYHA class (1 = II, 2 = III	-.31	-.07
Comorbidity (1=Yes, 2 =No)	.20	-.02
Years of education	.23	.05
Relationship status (1=Partner, 2 = No partner)	.21	.07
Work status (1=Not working; 2 = Working)	.38*	.20
Household income	.19	.06

Note. *$p < .05$, **$p < .01$, ***$p < .001$
NYHA class = New York Heart Failure Association classification; *SCHFI* = Self-Care Heart Failure Index; *CHF* = congestive heart failure

Prioritized Goals

Table 5 presents the proportion of time a goal was sorted as 'very important,' and its mean importance score (3= very important; 2 = somewhat important; 1= less important). Also displayed are the proportion of time a goal was selected as a top-five priority, its tendency to be ranked first when selected and the mean rank position (1 = 1st; 6 = 6th).

Table 5

Frequency and Mean of Goal Importance Ratings and Priority Ranking

	Importance		Rank		
Goal Items	% Very Important	*M* Score[a] (*SD*)	% Top5	% First	*M* Rank[b] (*SD*)
To take care of my heart failure	--	--	--	*31.4*	*2.40 (1.37)*
CHF Symptom Domain		*2.39 (.35)*			*3.57 (1.55)*
1.To have enough energy to do the things I need/want to do	80.00	2.78 (.79)	52.50	14.3	3.32 (1.56)
2. To get a good night's sleep	47.50	2.40 (.63)	15.00	16.7	4.83 (1.32)
3. To be able to breathe easily	70.00	2.65 (.58)	27.50	36.4	2.45 (1.44)
4. To avoid having dry mouth	17.50	1.73 (.75)	0.00	0.0	n/a
Health & Longevity Domain		*2.59 (.36)*			*3.50 (1.78)*
5. To stay out of the hospital	77.50	2.77 (.42)	30.00	8.3	3.92 (1.62)
6. To manage my illnesses other than heart failure	50.00	2.40 (.67)	22.50	11.1	3.78 (1.86)
7. To live a long life	52.50	2.50 (.55)	27.50	27.3	3.00 (1.73)
Social Relationships Domain		*2.48 (.39)*			*3.28 (1.47)*
8. To avoid being a burden to my family and loved ones	65.00	2.60 (.59)	35.00	7.1	3.57 (1.65)
9. To take care of my family and loved ones	72.50	2.70 (.51)	32.5	30.8	2.77 (1.69)
10. To spend quality time with family and loved ones	82.50	2.82 (.38)	47.50	15.8	3.10 (1.59)
11. To be an active member of my community	27.50	1.90 (.81)	5.00	0.0	5.50 (1.59)
12. To be accepted by family and friends	55.00	2.40 (.74)	7.50	0.0	4.67 (.577)

Table 5 (continued)

	Importance		Rank		
Goal Items	% Very Important	*M* Score[a] (*SD*)	% Top 5	% First	*M* Rank[b] (*SD*)
Autonomy Domain		*2.63 (.36)*			*3.51 (1.48)*
13. To be able to work (inside and outside the home)	42.50	2.22 (.77)	15.00	0.0	3.83 (.98)
14. To have control over how I live my life	82.50	2.77 (.53)	42.50	29.4	3.11 (1.69)
15. To maintain my physical independence	90.00	2.90 (.30)	55.00	4.5	3.54 (1.62)
16. To be able to afford the costs of running my household	75.00	2.62 (.70)	20.00	25.0	3.87 (2.03)
Pleasure/Well-Being		*2.41 (.42)*			*4.82 (1.37)*
17. To feel good about my self	72.50	2.70 (.51)	20.00	0.0	5.50 (.756)
18. To have a peace of mind	60.00	2.50 (.68)	20.00	12.5	4.00 (1.85)
19. To eat the foods I like	32.50	2.10 (.74)	5.00	0.0	5.00 (.00)
20. To enjoy myself and have fun	42.50	2.32 (.65)	20.00	0.0	4.87 (1.13)

Note. M = mean; *SD* = standard deviation; % Very Important= percentage of participants who rated a goal item as 'Very Important'; % Top 5= percentage of participants who rated a goal as a top-five goal.;% first= percentage participants who ranked a goal as first

[a] Importance score range from 1(less important) to 3 (very important);

[b]Rank positions range from 1(first rank) to 6 (sixth rank);

On balance, goals having to do with CHF symptoms, health and longevity, autonomy and social relationships were rated as more important than those pertaining to pleasure and well-being. With respect to goals bearing on CHF symptoms, having enough energy and being able to breathe easily were judged more important than getting a good night's sleep and avoiding dry mouth. Over 50% of the participants chose "having enough energy to do the things I want to do" as one of their top five goals. Health and longevity was less important, as staying out of hospital was one of the top five goals for only 30% of the sample, and living a long life was selected only 27.5% of the time.

Given that a large proportion of participants considered, "to maintain my physical independence," (55%) and "having control over how I live my life," (42%) among their top five goals, it is clear that these CHF patients highly valued their autonomy. Moreover, when selected as a priority goal, "having control over how I live my life" was ranked first by 29.4 % of participants. Participants similarly valued maintaining close and non-dependent relationships with family and close friends. That is, almost 50% selected "spending quality time with family and loved ones" among their top five goals. For a sizable portion, not being a burden to (35%) and taking care of others (32.5%) were high priorities. Of those selecting the latter as one of their top five goals, 30.8% ranked it first.

When participants were asked to consider where taking care of their CHF fits in with the grander scheme of the other top-five goals, 31% of the sample ranked it as their top priority, with a mean ranking of 2.4. This was rivaled in priority only by being able to breathe easily and taking care of family and loved ones (mean ratings of 2.45 and 2.77, respectively). Notably, the degree to which patients prioritized CHF management was not

associated with adherence (diet: $r = .09$, $p = .60$; weighing: $r = -.13$, $p = .46$; physical activity: $r = -.11$, $p = .52$).

Bivariate Correlations between Predictors of Interest and Self-Care Adherence

Bivariate correlations between the knowledge, self-efficacy and goal compatibility measures with adherence to dietary restrictions, daily weighing and physical activity are shown in presented in Table 6. Applied knowledge was associated with adherence to diet whereas general knowledge correlated with daily weighing. Higher self-efficacy was correlated with better adherence to diet and physical activity.

Table 6

Bivariate Correlations between Predictor and Outcome Variables

	Adherence		
	Diet	Daily Weighing	Physical Activity
Knowledge			
General	.20	.35*	-.04
Applied	.33*	.10	-.01
Self-Efficacy			
	.53**	.14	.36*
Goal Compatibility			
Dietary restriction	.28	.22	.29
Daily weighing	.04	.15	.07
Physical activity	-.10	-.23	.33*

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

Hypothesis 1.

It was hypothesized that higher perceived goal compatibility for a self-care behaviour would be associated with adherence to that specific regimen. The extent to which dietary and weighing recommendations were compatible with valued life goals was not associated with adherence to those respective self-care regimens ($r = .15$, $p = .34$; $r = .24$, $p = .08$, respectively; see Table 6). However, higher compatibility between physical activity and valued life goals was associated with better adherence to exercise regimens ($r = .33$, $p = .04$). Accordingly, Hypothesis 2 (see below) was tested only for adherence to exercise.

Hypothesis 2.

A hierarchical regression analysis (Table 7) was performed to determine whether goal compatibility predicts adherence to physical activity recommendations, above and beyond other key factors outlined in the IMB model. Since illness severity (as per NYHA class) was the only demographic variable to correlate with adherence to physical activity, it was entered as a control variable in the first step. Knowledge variables (as measured by the DHFKS and KAQ) were entered in the second step, followed by self-efficacy (as per the SCHFI confidence scale) at the third step. Goal compatibility, the primary variable of interest, was entered in the final step.

Illness severity explained 18.1% of variance in adherence to physical activity ($F(1, 38) = 8.39$, $p = .006$). The inclusion of knowledge variables at the second step did not add significant explanatory variance ($F\Delta(2, 36) = .79$, $p = .463$). Self-efficacy accounted for 8.5% of the variance above that accounted for by illness severity and knowledge ($F\Delta$

(1, 35), p = .047). Finally, as hypothesized, goal compatibility accounted for a significant amount of variance (7.8%) in adherence above and beyond illness severity, knowledge and self-efficacy, ($F\Delta$ (1, 34) = 4.27, p = .046). Combined, the predicators explained 37.8% of the variance in adherence to exercise, which was a large effect (f^2= .61).

Table 7

Hierarchical Regression Analysis Predicting the Effects of Illness Severity, Knowledge, Self-efficacy, and Goal Compatibility on Adherence to Physical Activity

	Step 1		Step 2		Step 3		Step 4	
Predictors	β	SE (B)	β	SE (B)	β	SE (B)	β	SE (B)
Illness Severity								
NYHA class	-.42**	9.61	-.49**	10.17	-.43**	9,91	-.34*	9.85
Knowledge								
DHFKS	--	--	-.20	-2.33	.-.15	2.26	-.04	2.28
KAQ	--	--	.02	-2.88	-.08	2.90	-.06	2.78
Self-Efficacy								
SCHFI Confidence	--	--	.--	--	.31*	.28	.36*	.27
Goal Compatibility								
Physical Activity		--	--	--	--	--	.31*	1.04
Total R^2	.18**		.21*		.30*		.38**	
$R^2\Delta$	.18**		.03		.08*		.08*	
F	8.39**		3.29*		3.74*		4.13**	

Note. SE (B)= standard error of unstandardized coefficient; NYHA class = New York Heart Association classification; DHFKS= Dutch Heart Failure Knowledge scale; KAQ = Knowledge Acquisition Questionnaire; SCHFI = Self-care Heart Failure Index; R^2 = change in R^2
* $p < .05$; **$p < .01$; *** $p < .001$

Hypothesis 3.

Given that goal compatibility and self-efficacy were not correlated (r = -.13, p = .44), testing the hypothesis that self-efficacy would mediate the relationship between goal compatibility and adherence to self-care behaviour was not warranted.

Discussion

The main aim of this study was to determine whether considering the valued life goals of patients, both health and non-health related, could advance the understanding of CHF self-care adherence. This was the first quantitative study to explore patient priorities outside of CHF care, and to report on the importance of illness-management when juxtaposed against other personal goals. Moreover, the interactive task of judging goal compatibility was a novel approach examining possible barriers and enablers of patient compliance.

The following is a summary of the noteworthy findings:

1) For CHF patients, managing their illness condition was an important goal, but equally important was being able to breathe easily and having a sense of autonomy.
2) Although over one third of individuals ranked taking care of CHF as their most prioritized goal, higher rankings for CHF management was not associated with better self-care adherence.
3) Knowledge predicted adherence to diet and weighing recommendations.
4) Self-efficacy predicted adherence to diet and physical activity regimens.
5) Consistent with Hypothesis 1, the extent to which exercising was seen as compatible with other valued life goals predicted adherence to that element of CHF self-care.

6) Consistent with Hypothesis 2, the extent to which exercising was seen as compatible with other valued life goals explained a significant amount of variance in this self-care behaviour, beyond that accounted for knowledge or self-efficacy.

What Matters to Individuals with CHF?

An examination of the goals most frequently chosen as a "top-five" (i.e., maintaining physical independence (55.0%); having energy for activities (52.5%); having control over life functions (42.5%); and avoid being a burden to others (35%)) suggests that personal autonomy is highly valued by this population. This is consistent with previous qualitative studies that reported on the importance of preserving functional autonomy to CHF patients (Freydberg et al., 2010; Mahoney, 2001; Martensson et al., 1997; 1998). This finding highlights the need for providers to address this potential source of distress by helping CHF patients formulate realistic expectations of their physical capacity.

Maintaining the quality of social relationships was also a prominent theme, with 82% of the participants rating this goal as very important and 47.5% selecting it as one of their top-five goals. Consistent with this finding, Thornhill and colleagues (2008) noted that CHF patients appreciated and relied heavily on family members for physical and emotional support in their qualitative study. Participants expressed that having good relations with loved ones helped them navigate through their illness experience. From a clinical standpoint, this information suggests that there may be some merit in providing supplementary peer support (through virtual or actual groups) for those desirous of this kind of assistance but have a small and/or ineffectual social network.

Although the study participants shared some common goals, on average, there were notable variations in what individuals considered a priority. For example, less than a third of the sample (27.5%) selected being able to breathe easily as a top-five goal, but it was ranked first by a sizable portion (34.1%) of participants who considered it important. This goal was chosen more frequently as a top priority than other important goals, such as maintaining a sense of independence (4.5%) and spending quality time with family (15.8%). It is likely that participants who wished to avoid shortness of breath were symptomatic individuals who experienced its debilitating consequences. As reported by Zambroski and colleagues (2005), shortness of breath is one of the most distressing and burdensome CHF symptoms and it has a negative impact quality of life.

Although a sizeable proportion of participants (31.4%) ranked taking care of their CHF as their top priority, the perceived importance of CHF management was not associated with adherence to any of the three components of self-care. On balance, participants in this study were non- adherent to their self-care routines. The compliance rate for dietary restrictions (32.5%) in this study was comparatively lower than those reported in other studies (61.0-79.0%; Niewenhuis et al., 2010; Schnell-Hoehn et al., 2009), but higher than the 9.8% adherence rate in Schweitzer and colleagues' (2007) study. The proportion of patients who adequately followed daily weighing (22.5%) and exercise regimens (30.0%) in this study were comparable to that reported (35% and 39%, respectively) by van der Wal et al. (2006). Overall, these findings echo previous reports that adherence to CHF self-care is poor (Moser et al., 2012).

One might propose that patients did not adhere to the self-care recommendations because they did not believe that the regimens would have the purported effect, or in the

parlance of Bandura's Social Learning Theory (1977), they had low *outcome expectancy*. The data, however, do not bear this out. That is, on balance, participants judged diet (M = 16.72, SD = 3.75), exercise (M = 15.95; SD= 3.99) and daily weighing (M = 14.98, SD = 3.68) as reasonably compatible with managing their CHF. The data, however, *do* suggest that non-adherence to daily weighing stemmed from lack of general CHF knowledge, while low levels of self-efficacy and inability to apply knowledge compromised adherence to dietary restrictions. As well, incompatibility of prescribed self-care behaviour with patients' valued goals and low self-efficacy contributed to non-adherence to physical activity.

Knowledge and Self-care Adherence

Participants were more likely to monitor their weight if they had a general understanding of CHF self-care (r = .35) and they were more adherent to salt and fluid restrictions if they knew how to apply CHF information (r = .36). Consistent with the latter finding, Neily et al., (2002) found that teaching patients how to read salt labels significantly improved their level of compliance. Based on the research evidence, it is possible that the delivery of information tailored to the specific self-care tasks can help improve weighing and dietary behaviours. However, provision of CHF information is insufficient to benefit adherence to exercise, possibly because patients are required to interpret their own physical capacity rather than rely on didactic knowledge.

Self-efficacy Predicts Some Aspects of Adherence

Another notable finding was that higher self-efficacy was associated with better compliance to exercise (r = .36) and diet (r = .53) but not to daily weighing (r = .14). This pattern of findings makes sense given that among the three self-care behaviours, weighing is the most straightforward and requires the least amount of skill (Evangelista, Doering, Dracup, Westlake, Hamilton, & Fonarow, 2003). Not surprisingly, self-efficacy has the most impact on tasks that have requisite skills (Bandura, 2006). These findings contribute to the large and growing body of literature showing that self-efficacy plays a role in self-care compliance (Buck et al., 2012; Cameron et al., 2009; Schnell- Hoehn et al., 2009; Schweitzer et al., 2007).

Goal Compatibility Predicts Physical Activity Adherence

The main study finding was that even with adequate knowledge and self-efficacy, CHF patients would not follow exercise regimens if they failed to perceive its compatibility with their valued life goals. Yet, the same did not apply to weighing and dietary restriction.

One possible explanation is that physical activity may be more closely connected to the self-concept than other regimens. Perhaps the enactment of this regimen draws attention to what being physically active *means* for one's valued life goals (Tierney et al., 2011). In qualitative studies, it has been observed that patients experience a loss of identity when they compare their prior level of physical activity to current circumstances (Martensson, 1997; 1998; Scotto; 2009; Stull et al., 1999).

It is possible that, when asked to rate the compatibility of exercise regimens to CHF and non-CHF related goals, patients were considering the extent to which their physical activity level threatened or maintained their sense of self. For some patients, exercise may not be compatible with goals such as 'spending quality time with family' because being physically active compromised their energy for other activities. In contrast, others may believe that regular exercise helps maintain their energy level and thus see it as a means of preserving functional autonomy.

Study Limitations

There are two sets of limitations, one pertaining to the sample and the other to the measures. With respect to the former, the current study was based on a small sample size ($N = 40$), which can limit statistical power. However, a post hoc analysis using G*Power indicated that the large variance explained in the hierarchical regression model (37.8 %) yielded a power of .96 ($f^2 = .61$). Thus, the observed effects, based on this small sample are not only statistically but likely to be practically meaningful.

Females comprised only 22.5% of the sample, which is comparable to the proportion of females (20-29%) in other CHF adherence studies (Artinian et al., 2002; Calrson et al., 2001; Schnell-Hoehn et al., 2009; Schweitzer et al., 2007) and reflective of the higher incidence of CHF among men (Rodeheffer et al., 1993; Stromberg & Martensson, 2003). The predominance of males makes it challenging to detect gender-specific effects and there may be some merit in over-sampling females in future studies to allow for such comparisons.

A potential measurement problem is that some participants had trouble completing the 'goal compatibility task', which was modeled after the approach used with an undergraduate sample (Presseau et al., 2010). In this older sample (mean age of 66.01), some participants had difficulty comprehending the meaning of compatibility ratings and required repeated prompts from the researcher. Fortunately, the in-person interview format allowed the researcher to gauge and address participant misunderstandings during the testing. Although the goal compatibility task yielded high internal consistency, further research is needed to determine its validity for use among older adults.

In the present study, the cardiologist excluded patients he deemed cognitively incapable of participating study. Yet, this process was based on clinical judgment and not with formal measures. Accordingly, it was not possible to control for the potential confounding influence of cognitive functioning.

Another potential methodological weakness is the reliance on self-report measures of adherence. Self-reports tend to overestimate the levels of adherence gleaned from objective measures (Nieuwenhuis, Jaarsma, van Veldhuisen & van der Wal, 2012). Arguably, objective indicators of adherence, which include urinary samples, activity monitors and 'smart scales" for sodium, exercise and daily weighing, respectively, would have been too costly and cumbersome. Also, the low adherence rate found in this sample suggests it is unlikely that patients over-reported the practice of self-care in the study.

Furthermore, it is possible that the questionnaire items assessing physical activity adherence did not align with the actual exercise instructions given to patients. While current practice guidelines encourage all NYHA class I-III CHF patients to perform at

least 20 minutes of physical activity per day (Lainscak et al., 2011), verbal reports of participants revealed that this was not always communicated to them. As such, it is unknown whether exercise non-adherence rates found in this study reflect patient incompliance or failure of physicians to prescribe the regimen. A better approach to measure adherence is to give participants clear exercise instructions and then monitor their practices in daily logs. Progress reports and visual presentations of patient performance can be provided to reinforce tracking behaviour.

Lastly, this study did not control for affective variables, such as depressive and anxiety-related symptoms. According to theories of emotion dysregulation, diminished goal-oriented behaviour is associated with higher depressive symptoms severity and anxiety sensitivity (Gratz & Roemer, 2004; Jacobson, Martell, & Dimidjian, 2001; Tull & Gratz, 2008). Yet, CHF adherence studies have failed to show a significant link between depressive and anxiety-related symptoms with patient compliance (Covera-Tindel et al., 2004, Holzapfel et al., 2009; Schweitzer et al., 2007). Nevertheless, assessing emotional factors can help elucidate whether non-adherence is due to lack of goal-oriented behaviours or the incompatibility between self-care regimens and valued-life goals.

Conclusion and Implications

The study findings partially support the tenets of the IMB model by showing that knowledge, self-efficacy and motivation are all indeed predictors of adherence. However, the level of influence each had on compliance depended on which aspect of the self-care regimen was being predicted. Self-efficacy was more predictive of effortful, complicated behaviours (diet and exercise) than more straightforward tasks (weighing). Whereas

knowledge and self-efficacy were sufficient preconditions for following weighing and diet recommendations, adherence to exercise depended on whether this regimen fulfilled other life goals. Health models, such as the IMB, can enhance their conceptual breadth and clarity by investigating motivational factors in the form of goals.

Notably, the administration of the goal compatibility task took too much time and effort to make it a suitable tool for routine clinic use. However, if used as part of a nurse-coaching program or MI intervention aimed at improving exercise adherence, the goal compatibility task can help measure ambivalence towards health behaviour change. That is, the present findings have underlined the importance of assessing not only CHF but also non-CHF related goals to pinpoint areas of discord between sense of self and the consequences of practicing physical activity recommendations.

For example, interventions could enhance self-care compliance to exercise regimens by framing physical activity as compatible to a range of valued goals in addition to CHF management. This may involve changing patients' expectations about physical capacity and helping them perceive the *value* of maintaining regular activity. By encouraging patients to focus on the benefits of physical activity rather than teaching them about what they *should* do, this is more likely to generate intrinsic motivation to follow self-care regimen. Turning the spotlight on the extent to which CHF patients see their prescribed regimen as taking them towards or away from the things that matter them is consistent with patient-centred care.

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Appendix A: NYHA Classification

Table A1

New York Heart Association (NYHA) Functional Classification System for Heart Failure

Class	Description
I (Mild)	No limitation of physical activity. Ordinary physical activity does not cause undue fatigue, dyspnea palpitation or angina pain.
II (Mild-Moderate)	Slight limitations of physical activity. Ordinary physical activity results in fatigue, palpitation, dyspnea or angina pain.
III (Moderate)	Marked limitation of physical activity. Comfortable at rest. Less than ordinary activity causes fatigue, palpitations, dyspnea or angina pain.
IV (Severe)	Unable to carry out any physical activity without discomfort. Symptoms of cardiac insufficiency at rest. If any physical activity is undertaken, discomfort is increased.

Note. Adapted from *Nomenclature and Criteria for Diagnosis of Diseases of the Heart and Great Vessels- 9th edition* (p. 253-255) by M. Dolgin, 1994, Boston, MA: Little, Brown and Company.

Appendix B: Participant Demographic Information

Table A2

Participant Demographic Characteristics

Variable	*n*	%
Relationship Status		
Legally married	26	65.0
Separated/divorced	6	15.0
Common-law	3	7.5
Single	2	5.0
Widowed	3	7.5
Household Income		
<$ 20,000	5	12.5
$20,000 - $40,000	14	35.0
$41, 000 - $60, 000	9	22.5
$61, 000 - $80, 000	4	10.0
> $ 100, 0000	2	5.0
Choose not to answer	5	12.5
Work Status		
Not working	31	77.5
Working part-time	4	10.0
Working full-time	4	10.0
N/A	1	2.5
Other diagnosis[a]		
Aneurysm	1	2.5
Arthritis	2	5.0
Asthma	1	2.5
Bipolar	1	2.5
Cancer	2	5.5
Chronic Obstructive Pulmonary Disease	4	10.0
Depression	1	2.5
Diabetes	11	27.5
Gout	2	5.0
Hypertension	1	2.50
High Cholesterol/Blood Pressure	2	5.0
Irritable Bowel Syndrome	1	2.5
Lower Back Infusion	1	2.5
Narcolepsy	1	2.5
Respiratory Problems	1	2.5
Sleep Apnea	3	7.5
Thyroid	2	5.0

Note N/A= No answer

[a] Some patients had more than one comorbid diagnosis

Appendix C: Self-Care Heart Failure Index

How You Use Self Care

1. Think about how you have been feeling in the **last month** as you complete these items. All answers will be kept confidential.

SECTION A:

Listed below are common instructions given to persons with heart failure. How routinely do you do the following?

	1. Never or rarely	**2. Sometimes**	**3. Frequently**	**4. Always or daily**
1. Weigh yourself?	1	2	3	4
2. Check your ankles for swelling?	1	2	3	4
3. Try to avoid getting sick (e.g., flu shot, avoid ill people)?	1	2	3	4
4. Do some physical activity?	1	2	3	4
5. Keep doctor or nurse appointments?	1	2	3	4
6. Eat a low salt diet?	1	2	3	4
7. Exercise for 30 minutes?	1	2	3	4
8. Forget to take one of your medicines?	1	2	3	4
9. Ask for low salt items when eating out or visiting others?	1	2	3	4
10. Use a system (pill box, reminders) to help you remember your medicines?	1	2	3	4

SECTION B:

Many patients have symptoms due to their heart failure. Trouble breathing and ankle swelling are common symptoms of heart failure.

In the past month, have you had trouble breathing or ankle swelling? Circle one.

0) No
1) Yes

11. If you had trouble breathing or ankle swelling in the past month…

(circle **one** number)

	Have not had these	**I did not recognize it**	**Not Quickly**	**Some-what Quickly**	**Quickly**	**Very Quickly**
How quickly did you recognize it as a symptom of heart failure?	N/A	0	1	2	3	4

Listed below are remedies that people with heart failure use. If you have trouble breathing or ankle swelling, how likely are you to try one of these remedies?(circle **one** number for each remedy)

	Not Likely	**Somewhat Likely**	**Likely**	**Very Likely**
12. Reduce the salt in your diet	1	2	3	4
13. Reduce your fluid intake	1	2	3	4
14. Take an extra water pill	1	2	3	4
15. Call your doctor or nurse for guidance	1	2	3	4

16. Think of a remedy you tried the last time you had trouble breathing or ankle swelling, (circle **one** number)

	I did not try anything	**Not Sure**	**Somewhat Sure**	**Sure**	**Very Sure**
How sure were you that the remedy helped or did not help?	0	1	2	3	4

SECTION C:

In general, how confident are you that you can:

	Not Confident	**Somewhat Confident**	**Very Confident**	**Extremely Confident**
17. Keep yourself free of heart failure symptoms?	1	2	3	4
18. Follow the treatment advice you have been given?	1	2	3	4
19. Evaluate the importance of your symptoms?	1	2	3	4
20. Recognize changes in your health if they occur?	1	2	3	4
21. Do something that will relieve your symptoms?	1	2	3	4
22. Evaluate how well a remedy works?	1	2	3	4

Appendix D: Dutch Heart Failure Knowledge Scale

You may or may not be familiar with the items below, but please try your best to answer each question by circling one of three options. All answers will be kept private.

1. How often should patients with severe heart failure weigh themselves?

    a. Every week

    b. Now and then

    c. Everyday

2. Why is it important that patients with heart failure weigh themselves regularly?

    a. Because many patients with heart failure have a poor appetite

    b. To check whether the body is retaining fluid

    c. To assess the right dose of medicines

3. How much fluid are you allowed to take at home each day?

    a. 1.5 to 2.5 litres at the most

    b. As little fluid as possible

    c. As much fluid as possible

4. Which of these statements is true?

    a. When I cough a lot, it is better not to take my heart failure medication

    b. When I am feeling better, I can stop taking my medication for heart failure

    c. It is important that I take my heart failure medication regularly

5. What is the best thing to do in case of increased shortness of breath or swollen legs?

    a. Call the doctor or the nurse

    b. Wait until the next check-up

    c. Take less medication

6. What can cause a rapid worsening of heart failure symptoms?

a. A high-fat diet

b. A cold or the flu

c. Lack of exercise

7. What does heart failure mean?

a. That the heart is unable to pump enough blood around the body

b. That someone is not getting enough exercise and is in poor condition

c. That there is blood clot in the blood vessels of the heart

8. Why can the legs swell up when you have heart failure?

a. Because the valves in the blood vessels in the legs do not function properly

b. Because the muscles in the legs are not getting enough oxygen

c. Because of accumulation of fluid in the legs

9. What is the function of the heart?

a. To absorb nutrients from the blood

b. To pump blood around the body

c. To provide the blood with oxygen

10. Why should some one with heart failure follow a low salt diet?

a. Salt promotes fluid retention

b. Salt cause constriction of the blood vessels

c. Salt increases the heart rate

11. What are the main causes of heart failure?

a. A myocardial infarction and high blood pressure

b. Lung problems and allergy

c. Obesity and diabetes

12. Which statement about exercise for people with heart failure is true?

a. It is important to exercise as little as possible at home in order to relieve the heart

b. It is important to exercise at home and to rest regularly in between

c. It is important to exercise as much as possible at home

13. Why are water pills prescribed to someone with heart failure?

a. To lower the blood pressure

b. To prevent fluid retention in the body

c. Because then they can drink more

14. Which statement about weight increase and heart failure is true?

a. An increase of over 2 kg in 2 or 3 days should be reported to the doctor at the next check-up
b. In case of an increase of over 2 kg in 2 or 3 days, you should contact your doctor or nurse
c. In case of any increase of over 2 kg in 2 or 3 days, you should eat less

15. What is the best thing to do when you are thirsty?

a. Suck an ice cube

b. Suck on a cough drop/lozenge

c. Drink a lot of fluid

Scoring Key: 1 point for each correct answer (highlighted). Sum all correct answers

Appendix E: Knowledge Acquisition Questionnaire

1. How well do you think you understand heart failure? Use the scale below where a "1" means you know very little and "5" means you are very knowledgeable. (Please circle the number that applies to you.)

1	2	3	4	5
Know very little				Very knowledgeable

The following questions will measure your understanding about heart failure. (Please circle your answer).

2. In general, patients with heart failure should:
   (a) Stay on bed rest to reduce the workload of the heart
   (b) Do regular light exercise up to, but not beyond, the point of producing symptoms
   (c) Do strenuous exercise to help strengthen the heart

3. Patients with heart failure should weigh themselves once a day. It is best to use the same scale and wear the same amount of clothing. Weights should be done:
   (a) After breakfast, after urinating
   (b) Before breakfast, before urinating
   (c) After breakfast, before urinating
   (d) Before breakfast, after urinating

4. Patients with heart failure should usually drink:
   (a) Less than 4 glasses of fluid per day
   (b) 6-8 glasses of fluid per day
   (c) More than 8 glasses of fluid per day

The following questions require <u>more than one answer:</u> (Please circle your answers).

5. From the following list, identify foods that are high in salt:
   (a) Garlic powder
   (b) Canned soup
   (c) Canned vegetables
   (d) Tomato juice
   (e) Cold cuts (for example, bologna)

6. From the following list, please identify the signs or symptoms of worsening heart failure:

(a) Increasing shortness of breath

(b) Blurred vision

(c) Swelling of the ankles or legs

(d) Cough

(e) Difficulty breathing when lying down

(f) Metallic taste in mouth

(g) Sudden attacks of breathlessness at night

(h) Skin rash

(i) Fatigue

(j) Sudden weight gain

Scoring Key:

1. 1 =1; 2 =2; 3 = 3; 4 =4 ; 5 =5
2. b =1
3. d =1
4. b =1
5. b to e = 0.5 for each
6. a = 0.5; b = 0.5; c = 0.5; d = 0.5; e = 0.5; g = 0.5; i = 0.5; j = 0.5

Sum all scores (maximum 14)

Appendix F: Demographic Questionnaire

1. Your age _____

2. Your gender: MALE ____ FEMALE ____

3. Your height:_____ft./in. Your weight: _____lbs.

4. Your current relationship status: (Please check one)

___ Legally married ___ Never married (single)
___ Separated or Divorced ___ Widowed
___ Living common-law

5. Which of the following best describes your current job status? (Please check all that apply)

____ Employed outside the home, full- time (30 or more hours per week)
____ Employed outside the home, part- time (less than 30 hours per week)
____ Retired
____ Homemaker
____ On disability
____ Working from home
____ Student
____ Unemployed
____ Other (please specify

6. How many hours of paid work per week did you perform prior to your heart failure?
_____

7. How many hours of paid work per week do you perform now? _____

8. Which of the following best describes your current working status? (Please check one)

___ I am not working because of my heart failure
___ I am not working for another reason, not related to my heart failure
___ I am working in a light duty or modified work position on a temporary basis until I am able to return to the same job I held at the time my heart failure began.
___ I am working in a new permanent job that is less physically demanding than the job I held prior to my heart failure diagnosis.
___ I am working at the same job I held at the time my heart failure began.
___ Student
___ Other (please specify)
_____

9. The range in which your annual household income falls is: (Please check one)

___ Under $20, 000
___ $21,000 - $40,000
___ $41,000 - $60,000
___ $61,000 - $80,000
___ $81,000 - $100,000
___ Over $100,000
____ Choose Not to Answer

10. What ethnicity/race do you identify with? (for example, Caucasian/European Canadian, Greek, Chinese, South-Asian, Mixed etc.)

_____

11. How many years of schooling have you completed? (Completing grades 1 through 13 would give you a total of 13 years; add one year for each additional year of schooling completed beyond Grade 13)
_____ years

12. What certificates, diplomas or degrees have you obtained? (Please check all that apply)

___ None
___ Secondary/high school graduation certificate or equivalent
___ Trade certificate or diploma
___ Other non-university certificate or diploma (e.g., CEGEP, Community College)
___ University certificate or diploma below a bachelor level
___ Bachelor degree(s) (e.g. B.A., B.Sc.)
___ University certificate or diploma above bachelor level
___ Master degree (s) (e.g. M.A., M.SC.)
___ Earned doctorate (e.g. Ph.D., D.Sc.)
___ Degree in medicine, dentistry, veterinary medicine or optometry (e.g. M.D., D.D.S.)

13. Do you have any other health problems other than your heart failure?
Yes _____ No_____

If yes, briefly indicate what it is (or what they are):
_____
_____

14. Are you currently taking any medication for health conditions other than heart failure?
Yes _____ No_____

If yes, briefly indicate what it is (or what they are):
_____
_____

Appendix G: Literature Review for Card-Items

Table A3

Summary of Literature Findings used to Develop Card-items

Card Content	Evidence	Reference
CHF Symptoms:		
To have enough energy to do the things I need or want to do	• Fatigue is one of the most disabling symptoms of CHF • Patients may either view prescribed regimens as taxing or may view it as helpful to alleviate fatigue	Martensson et al., 1997;1998 Meyerson & Kline, 2009
To be able to get a good night's sleep	• Speculation that sleep deprivation is associated with poor self-care capacity • A good night's rest is valued among patients	Meyerson & Kline, 2009 Redeker, 2008
To be able to breathe easily	• Breathlessness is a common aversive symptom and is associated with poor quality of life and depression	Bekelman et al., 2007 Zambroski et al., 2005
To be able to avoid dry mouth	• Highly prevalent and distressing symptom • Desire to avoid this symptom may conflict with certain self-care regiments (i.e., fluid restriction)	Zambroski, et al., 2005

Health and Longevity:		
To stay out of hospital	• Fear of hospitalization is one of the most common reasons for self-care adherence	Dickson & Riegel, 2008 Martensson et al., 1997; 1998 Meyerson & Kline, 2009 van der Wal et al., 2010
To manage my illnesses other than CHF	• Management of other comorbid conditions takes precedence over adhering to CHF regimens	Mahoney, 2001 Meyerson & Kline, 2009
To live a long life	• Fear of dying has been cited as a common concern among CHF patients	Hicks & Holmes, 2003
Social Relationships:		
To avoid being a burden to my family and loved ones	• Patients can feel guilty about imposing on loved ones	Mahoney, 2001 Meyerson & Kline, 2009
To take care of my family and loved ones	• Patients can be more concerned about being the caregiver of a spouse/family member with a chronic condition than manage their own health	Meyerson & Kline, 2009 van der Wal et., 2010
To spend quality time with my family and loved ones	• Many self-care behaviours exclude patients from attending social activities	Freydverg et al., 2010 Scotto, 2005
To be an active member of my community	• Self-care regimens are viewed as time-consuming and restricting to community involvement	Freydverg et al., 2010 Meyerson & Kline, 2009
To be accepted by family and friends	• Some patients think following self-care regimens would	Dickson & Riegel, 2008 Mahoney, 2001

	lead to alienation and estrangement from family and friend	Meyerson & Kline, 2009 Scotto, 2005 van der Wal., 2010
Autonomy Status		
To be able to work (inside or outside the home)	• Many patients have reported that continuing their work (household or job-related) is important to them	Freydverg et al., 2010 Martensson et al., 1997;1998 Meyerson & Kline, 2009 Scotto, 2005
To maintain my physical independence	• Patients reported the desire to have mastery of their physical functions	Hicks and Holmes, 2003 Martensson et al., 1997; 1998 Scotto, 2005
To have control over how I live my life	• Some patients verbalized the importance of having an unrestricted lifestyle	Hicks and Holmes, 2003 Martensson et al., 1997; 1998 Scotto, 2005
To be able to afford the costs of running my household	• Patients with CHF are worried about their financial resources	Scotto, 2005 van der Wal et al., 2010
Well Being		
To feel good about myself	• Performing certain self-care behaviours (i.e., weighing oneself) is seen as aversive to the sense of self • Patients valued self-esteem and self- identity	Scotto, 2005 Van der Wal et al., 2010
To have a peace of mind	• Important for patients to feel at ease about their illness condition • Desire to have reduced anxiety and fear commonly	Mahoney, 2001 Martensson et al., 1997;1998 Meyerson & Kleine, 2009

	reported	
To eat the foods I like	• Patients often wish to engage in indulgences	Scotto, 2005 van der Wal et al., 2010
To enjoy myself and have fun	• Many individuals with CHF want to enjoy life	Meyerson & Kline, 2009

Appendix H: Card-Sort Response Sheet

Personal Goal Card	Card #	Rank	Pile *(LI= Less Important; SI = Somewhat Important; VI= Very Important)*
A	1		
B	2		
C	3		
D	4		
E	5		
F	6		
G	7		
H	8		
I	9		
J	10		
K	11		
L	12		
M	13		
N	14		
O	15		
P	16		
Q	17		
R	18		
S	19		
T	20		
Take care of HF			

Scoring Key:

Importance Scores:
LI = 1; SI = 2; VI =3

Rank Scores:
Rank 1 =1; Rank 2 = 2; Rank 3= 3; Rank 4 = 4; Rank 5 = 5; Rank 6 = 6

Appendix I: Goal Compatibility Task Response Sheet

Self-Care Behaviour	Personal Goal	Goal Domain	Rating
I. Limit My Sodium and Fluid Intake			
	Take care of HF		
II. Follow the Recommended Level of Physical Activity			
	Take care of HF		
III. Weigh Myself Daily			
	Take care of HF		

Scoring Key

Domain 1: Goals # 1-4; *Domain 2:* Goals # 5- 7
Domain 3: Goals # 8 –12; *Domain 4:* Goals #13- 16
Domain 5: Goals #17-20

Self-care Behaviour Subscales
1) Add '10' to all values
2) Sum all ratings for each self-care behaviour and divide by six

Appendix J: Research Ethics Approval

Use of Human Participants - Ethics Approval Notice

Principal Investigator: Prof. Leora Swartzman
Review Number: 18054E
Review Level: Delegated
Approved Local Adult Participants: 85
Approved Local Minor Participants: 0
Protocol Title: Identifying and understanding the impact of competing goals on self-care compliance among patients with Chronic Heart Failure
Department & Institution: Psychology, University of Western Ontario
Sponsor: MITACS Inc.

Ethics Approval Date: June 16, 2011 **Expiry Date:** December 31, 2012
Documents Reviewed & Approved & Documents Received for Information:

Document Name	Comments	Version Date
UWO Protocol		
Letter of Information & Consent		2011/04/19
Other	Telephone Script	2011/06/16

This is to notify you that The University of Western Ontario Research Ethics Board for Health Sciences Research Involving Human Subjects (HSREB) which is organized and operates according to the Tri-Council Policy Statement: Ethical Conduct of Research Involving Humans and the Health Canada/ICH Good Clinical Practice Practices: Consolidated Guidelines; and the applicable laws and regulations of Ontario has reviewed and granted approval to the above referenced revision(s) or amendment(s) on the approval date noted above. The membership of this REB also complies with the membership requirements for REB's as defined in Division 5 of the Food and Drug Regulations.

The ethics approval for this study shall remain valid until the expiry date noted above assuming timely and acceptable responses to the HSREB's periodic requests for surveillance and monitoring information. If you require an updated approval notice prior to that time you must request it using the UWO Updated Approval Request Form.

Members of the HSREB who are named as investigators in research studies, or declare a conflict of interest, do not participate in discussion related to, nor vote on, such studies when they are presented to the HSREB.

The Chair of the HSREB is Dr. Joseph Gilbert. The UWO HSREB is registered with the U.S. Department of Health & Human Services under the IRB registration number IRB 00000940.

Ethics Officer to Contact for Further Information

Janice Sutherland (jsuther@uwo.ca)	Grace Kelly (grace.kelly@uwo.ca)	Shantel Walcott (swalcot@uwo.ca)

This is an official document. Please retain the original in your files.

Appendix K: Letter of Information

LETTER OF INFORMATION

Project Title: Identifying and understanding the impact of competing goals on self-care compliance among patients with Chronic Heart Failure

Investigators:

Dr. Leora Swartzman, Ph.D.
Department of Psychology
Western University

Dr. Malcolm Arnold, M.D.
Division of Cardiology
London Health Sciences Centre

Karen Zhang, MSc Candidate
Department of Psychology
Western University

Dr. Kathleen Dindoff, Ph.D.
Behavioural Support Services
Sykes Assistance Services Corporation

Study

As an individual attending the Cardiac Care Program, you are invited to participate in a research study that looks at what makes self-care management easy or hard to follow for patients with chronic heart failure.

The purpose of this letter is to provide you with the information you need in order to make an informed decision about whether or not to participate in this study. Please take the time to read this carefully and feel free to ask questions if anything is unclear or if there are words or phrases you do not understand.

Description of Study Procedures

Approximately 85 patients from the Cardiac Care clinic at the University Hospital and Victoria Hospital will take part in this study. If you decide to participate you will be asked to sign the consent form and then complete a few study tasks. The tasks are designed to get a sense of your views about your heart failure self-care management, and how these routines fit into your daily life. Each activity is important to help us understand how you manage your heart failure. Here is what you can expect from participating in the study:

Review of Health Records: Your medical record at the clinic will be reviewed to verify your diagnosis of heart failure and/or any other health conditions. This information is collected for research purposes only, and will not be shared with anyone else.

Card Sort Task: We are interested to learn about some of your goals and wishes (other than taking care of your heart failure symptoms) that are very important to you. To help you share, you will be given a deck of cards that has personal goals written on them, and will be asked to put these cards into different piles to show which ones are important to you. This part of the study takes around 5-7 minutes.

Competing Goals Task: This task uses a board-game-like tool where you will be asked to indicate whether certain self-care routines get in the way or help you achieve your goals and wishes. To help us understand your reasoning, you will be asked to talk us through your answers. Your responses will be audio recorded, but the recordings will have no identifying

information except a participant number. Your privacy is most important to us and we will make all efforts to ensure that the recordings are kept secure and confidential. This activity takes approximately 20-30 minutes.

Surveys: You will be asked to complete four surveys about how you view heart failure and the self-care routines, as well as some additional information about you. The surveys will each take around 5 minutes to complete.

Study Location:
You can complete the study in a private room at clinic today. Or, you can schedule another time to do the study, either at the clinic or in your home, whichever you would prefer.

Reimbursement
To thank you for taking your time to complete the study and to reimburse you for any parking expenses, you will receive a $25.00 honorarium at the end of the session.

If you are required to make a second trip to the clinic for the purposes of this study, you will be reimbursed for any additional parking or travel costs incurred.

Risks and Discomforts
We do not believe this study poses any risk to your health or safety.

Benefits
Information gathered from the study may lead to the development of improved clinical care for patients with chronic heart failure. As well, the activities in the study may draw your attention to aspects of your care you may not have thought of. You may benefit from asking your health-care provider about these concerns.

Withdrawal
Participation in this study is completely voluntary. You may refuse to participate, refuse to answer questions, or withdraw from the study at any time with no effect on your future care. There will be no penalty of any kind to your compensation if you withdraw from the study early. That is, you will

still receive payment even if you withdraw or refuse to answer any specific questions.

If you withdraw before the study is complete, any information collected up until that point would still be used for data analysis.

Participation in Other Studies
If you are involved with or plan to participate in an ongoing study, please inform the research associate right away. You may not be eligible to participate in both research studies.

Confidentiality
Maintaining your confidentiality is of the utmost importance to us. Your physician will not see any of your answers and if the results of this study are published, no one will know you were a part of the study. Your name will not appear on any of your answer sheets, and your personal information (full name and contact information) will be stored in a password-protected file that is separate from your study data.

To ensure that information gathered from this study is kept private and secure, your research records will be handled in the following manner:
All information being taken offsite to the University of Western Ontario for data analysis will not have any identifying information except a participant number.

Your audio recordings will be transferred immediately to a secure University network and deleted from the recording device after the testing session.
Only members of the research team will listen to your audio recordings. These files will be destroyed once your responses have been coded.
All electronic data are stored on a secure firewall protected network at the University of Western Ontario.
Hard copies of your questionnaires are contained in locked cabinets in a research office that requires authorized key entry.

There is only one file that links your personal information to your study data, but this file is password protected and accessible only to Dr. Swartzman, and research associate, Ms. Zhang. This list will be destroyed

once all the data have been collected and analyzed, and your answers will be deemed anonymous.

We will only release your records should representatives of the University of Western Ontario Health Sciences Research Ethics Board wish to contact you or require access to your study-related records to monitor the conduct of the research.

Contact Person
If you have any questions about the study procedure or content, please feel free to contact Ms. Karen Zhang.

If you have questions about your rights as a research participant or the conduct of the study you may contact Dr. David Hill, Scientific Director, Lawson Health Research Institute.

Legal Rights
You do not waive any of your legal rights by signing the consent form. This letter is yours to keep.

Appendix L: Consent Form

Consent to participate in the study entitled:

Identifying and understanding the impact of competing goals on self-care compliance among patients with Chronic Heart Failure

I, _____, have read the Letter of Information, had the nature of the study explained to me, and I agree to participate.

All questions have been answered to my satisfaction.

_____ _____

DATE SIGNATURE

_____

NAME OF PERSON OBTAINING CONSENT (please print)

_____

SIGNATURE OF PERSON OBTAINING CONSENT

Appendix M: Script for Card-Sort Task

Card-Sort.

"This first task is designed to help us figure out matters most to you in life. Here is a deck of cards. On each of these cards, you will find descriptions of different goals in life. Please read each card carefully, and think about how important that goal is for you personally. After you read each card, please place it in front of one of these three labels - Not Important, Important and Very Important – to indicate how important it is for you. There are no right or wrong answers. Do you have any questions before we begin?"

Rank-Ordering

"Great. Now I will give you back your pile of 'Very Important' goals [combine with 'Important goals' if there are less than five cards in the 'Very Important' pile], and ask you to pick five that are MOST important to you"

[After five has chosen] "Now can you put them in order of importance? 1 would mean it is the most important goal or priority in your life"

"Here is the goal to take of your heart failure. Where does this fit with your other goals?"

Appendix N: Script for Goal Compatibility

Please note that this script is to be used as a general guide.
[...] Indicates actions that the research associate (RA) should follow

Description of task:
"This next task helps me better understand what it is like for you to follow heart failure recommendations when you have other goals that are important to you. First, I will give you a general idea of the task. I'll then go over the step-by-step procedures of what the activity involves in an example. Does that sound good to you?"

Description of the assessment tool:

- If you look here, we have a board with a scale that ranges from -10 to +10 [point to horizontal scale]. These goals that you told me were most important from the card-sort goes here [place stack of goal cards next to +10].
- In a moment, I am going to ask you whether your doctors' recommendations for taking care of your heart failure (like watching your salt) get in the way of doing these other things that are important to you [move empty slide away from stack of goals] or help you towards these goals [move empty slide toward stack of goals].
- I will now explain the task step-by-step. Are you ready to watch me do an example?

Practice Run:
- Let's say that the goal of having clean clothes is very important to me [place example goal card next to +10].
- The task that I am asked to do is buy groceries [attach 'buy groceries' card on the slide]
- Based on my experiences, buying groceries take time away from doing laundry so this task gets in the way of having clean clothes [point to goal card]. Since it gets in the way, I will give it a negative rating [point to across negative numbers]. Now from the scale of -10 to -1 (-10 being that it gets in the way all of the time) I will give it a -6 [move slide to number].
- Or, from my experiences I find that once I start doing one chore, I am motivated to do another. In this case, doing groceries actually indirectly helps with my goal of having clean clothes. Since it helps me, I will give it a positive rating [point to positive scale]. Now from the scale of 1 to 10 (10 being that it helps me all the time) I will give it a 7.
- Or, if buying groceries does not affect my goal, I keep the slide at zero.
- If you move the slide closer to your goal, it shows that you think it helps or fits with the goal. If you move the task further away from your goal, it shows that you think it gets in the way.
- As you can see there are no right or wrong answers! I am just interested to learn about your experiences. Are you ready to try this task now? We'll go through it together.

Description of Procedures:
1) The first recommendation is ____ [pick up a behaviour card and attach it to the slide]. Has this been recommended to you? What have you been told? [If participant was not told to follow recommendation, ask them how they would feel if they were told to follow the regimen]. What has been your experience with this recommendation [Open up dialogue]

2) Now think about the times when you were following this recommendation. Does following the recommendations take you away or toward this personal goal here [point to goal card]? [Reflect on participant responses to see if they are suggesting goal compatibility or incompatibility]"

If goal incompatibility: "Since it takes you away from your goal, let's look at the negative scale. If -10 means that [name self-care behaviour] takes you in the opposite direction of [name personal goal] every time, what number would you choose to show how much it gets in the way?

If goal compatibility: "Since it takes you toward your goal, let's look at the positive scale. If +10 means that [name self-care behaviour] helps you toward [name personal goal] every time, what number would you choose to show much it helps?

3) Great, let's rate the next goal.

[Repeat until all six personal goals have been rated against the three self-card behaviours, 18 trials].

Suggested Prompts:
- "Think about why you follow/do not follow this recommendation here."
- "It's fine if you don't know how much it *actually* helps. Based on your experiences, how much do you *think* or *feel* that it can help or get in the way of your goal?"
- "Does your rating show how negative/positive you feel about the recommendation? Ok, can you tell me how much you think this recommendation helps or interferes with [name goal]?
- "Does it indirectly get in the way/help with your goal?"

Appendix O: Curriculum Vitae

NAME: Karen Zhang

EDUCATION

2005 – 2009	Queen's University, Kingston, ON Honours BSc. Psychology, Supervisor: D. Tripp
2010 – 2012	University of Western Ontario M.Sc. Candidate Clinical Psychology, Supervisor: L. Swartzman

AWARDS and SCHOLARSHIPS

2011- 2012	Graduate Thesis Research Awards Fund The University of Western Ontario Value: $750
2011-2012	MITACS Accelerate Award: Research Internship MITACS Accelerate Program Value $15, 000
2011-2012	Western Graduate Research Scholarship (WGRS) The University of Western Ontario Value: $5,500
2010-2011	Meritorious Student Award for Best Abstract The Annual Meeting of the Society of Behavioral Medicine
2010- 2011	CIHR Canada Graduate Scholarship: Master's Research Award Canadian Institute of Health Research (CIHR) Value: $ 17, 500
2010 – 2011	Western Graduate Research Scholarship (WGRS) The University of Western Ontario Value: $5, 347

MANUSCRIPT SUBMITTED

Hart, T., Coon, D., Kowalkowski, M., **Zhang, K.,** & Herson, J., Latini, D. (2011). *Gay Men with*
Prostate Cancer Report Worse Health-Related Quality of Life than Heterosexual Men. Manuscript submitted for publication.

SELECTED CONFERENCE PRESENTATIONS and PAPERS

Zhang, K. M., Swartzman, L. C., Arnold, M., & Dindoff, K. (2012). Effects of Competing Goals on Patient Adherence to Congestive Heart Failure Recommendations. Poster presented at the Canadian Psychological Assocation's 73rd Annual Convention, Halifax, Nova Scotia.

Zhang, K. M., Gryfe, N., & Swartzman, L. C. (2011). Getting vaccinated against H1N1: The relative roles of perceived risk, anticipated regret and medical scepticism [Abstract]. *Annals of Behavior Medicine (Annual Meeting Supplement), 41*, s189. ***Selected as a Meritorious Student Abstract***

Gryfe Saperia, N., **Zhang, K. M.,** Swartzman, L. C. (2011). *Sick with regret: How anticipated emotion influences the inclination to get the H1N1 shot.* Poster presented at The Canadian Psychological Association's 72nd Annual Convention, Toronto, ON.

Swartzman, L., McAskile, C., Smith, J., Norman, R., **Zhang, K.** ***(Presenter)*** (2011). E*mpathy helps and pity hinders the willingness to interact with those prone to depression: A Vignette Study.* Poster presented at The Canadian Psychological Association's 72nd Annual Convention, Toronto, ON.

Zhang, K. M., Hart, S.L., Kowalkowski, M., & Latini, D.M. (2010). *Predicting Health Quality of Life for Gay/Bisexual Men with Prostate Cancer.* Poster to be presented at the Association for Behavioral and Cognitive Therapies 44th Annual Convention, San Francisco, CA.

Zhang, K., Crangle, C., Hart, S. L., & Latini, D. M. (2010). Predictors of satisfaction with care for gay men with prostate cancer [Abstract]. *Annals of Behavior Medicine, (Annual Meeting Supplement) 39*, s232.

Hart, S. L., Latini, D., Belanger, J., Donia, J., **Zhang, K.,** & Varma, M. (2009). *Initial reactions to colorectal cancer diagnosis are associated with later decreased fear of recurrence.* Paper presented at the 31st Annual Meeting & Scientific Sessions of the Society of Behavioral Medicine, Seattle, WA.

Zhang, K., Hart, S.L., Belanger, J., & Crangle, C. (2009). *Neuroticism of newly diagnosed colorectal cancer patients and their partners predicts patient depressive symptoms and quality of life.* Poster presented at the Association for Behavioural and Cognitive Therapies 43rd Annual Convention, New York, New York.

Zhang, K., Hsieh, A., & Tripp, D. (2009). *Observer pain estimation and empathy in cultural concordant and discordant dyads*. Poster presented at the 39th Annual Undergraduate Thesis Conference, McMaster University, Hamilton, ON.

RESEARCH EXPERIENCE

2010-2011	Research Intern to Sykes Assistance Services Corporation Sykes Assistance Services Corporation, London, ON
2009-2010	Research Lab Manager to Dr. Stacey Hart Psychosocial Medicine Lab, Department of Psychology, Ryerson University
2005-2009	Volunteer Research Assistant to Dr. Dean Tripp Pain Research Lab, Department of Psychology, Queen's University
2007-2008	Volunteer Research Assistant to Dr. Keith Nicholson (C. Psych.) Comprehensive Pain Program, Toronto Western Hospital, Toronto ON.
2007-2008	Research Assistant to Dr. Ana Ortiz de Guinea Lopez de Arana Queen's School of Business, Commerce Faculty, Queen's University
2006-2007	Volunteer Research Assistant to Dr. Marc Lewis Brain and Behaviour Lab, Ontario Institute for Studies in

SUPERVISORY EXPERIENCE

2011- 2012	Co-Supervisor for Honours Thesis Student, J. Lane Department of Psychology, The University of Western Ontario
2009- 2010	Co-Supervisor for Honours Thesis Student, S. Balint Department of Psychology, Ryerson University

TEACHING EXPERIENCE

2012- Present	Course Designer for Research Methods and Statistics Lab Department of Psychology, The University of Western Ontario
2011-2012	Teaching Assistant Lab Instructor Department of Psychology, The University of Western Ontario

2010-2011	Designer for Interactive Classroom Demonstrations TopHat Monocole, Waterloo, Ontario
2010- Present	Teaching Assistant Department of Psychology, The University of Western Ontario
	Courses: PSYCH 2035, Psychological Aspect of Life Skills PSYCH 2800, Research Methods and Design PSYCH 2036, Psychology of Health and Illness PSYCH 3300, Clinical Psychology

AFFILIATIONS WITH PROFESSIONAL ASSOCIATIONS

2012-Present	Canadian Psychological Association (Student Affiliate)
2011- Present	Ontario Psychological Association (Student Member)
2011-Present	London Regional Psychological (Student Affiliate)
2009-2011	The Society of Behavioral Medicine (Student Affiliate)
2009- 2010	Association for Behavioral and Cognitive Therapies (Student Affiliate)

SERVICE

2011 – Present	Member Conventions Committee Ontario Psychological Association
2010 – Present	Member Advocacy Through Action The University of Western Ontario
2011-202	Member Psychology Graduate Student Association The University of Western Ontario
2011-12	Councilor Society of Graduate Studies The University of Western Ontario