ABSTRACT

Title of Dissertation: PREDICTORS OF PATIENT ACTIVATION
AMONG UNDERSERVED PATIENTS IN A
NURSE-MANAGED HEALTH CENTER: A
PILOT STUDY

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The concept of patient activation has gained traction as the term referring to patients

who understand their role in the care process and have "the knowledge, skills and

confidence" necessary to manage their illness over time (Hibbard & Mahoney, 2010).

Improving health outcomes for vulnerable and underserved populations who bear a

disproportionate burden of health disparities presents unique challenges for nurse

practitioners who provide primary care in nurse-managed health centers. Evidence

that activation improves patient self-management is prompting the search for theory-

based self-management support interventions to activate patients for self-

management, improve health outcomes, and sustain long-term gains. Yet, no previous

studies investigated the relationship between Self-determination Theory (SDT; Deci

& Ryan, 2000) and activation. The major purpose of this study, guided by the Triple

Aim (Berwick, Nolan, & Whittington, 2008) and nested in the Chronic Care Model

(Wagner et al., 2001), was to examine the degree to which two constructs– Autonomy Support and Autonomous Motivation– independently predicted Patient Activation, controlling for covariates. For this study, 130 nurse-managed health center patients completed an on-line 38-item survey onsite. The two independent measures were the 6-item Modified Health Care Climate Questionnaire (mHCCQ; Williams, McGregor, King, Nelson, & Glasgow, 2005; Cronbach's alpha =0.89) and the 8-item adapted Treatment Self-Regulation Questionnaire (TSRQ; Williams, Freedman, & Deci, 1998; Cronbach's alpha = 0.80). The Patient Activation Measure (PAM-13; Hibbard, Mahoney, Stock, & Tusler, 2005; Cronbach's alpha = 0.89) was the dependent measure. Autonomy Support was the only significant predictor, explaining 19.1% of the variance in patient activation. Five of six autonomy support survey items regressed on activation were significant, illustrating autonomy supportive communication styles contributing to activation. These results suggest theory-based patient, provider, and system level interventions to enhance self-management in primary care and educational and professional development curricula. Future investigations should examine additional sources of autonomy support and different measurements of autonomous motivation to improve the predictive power of the model. Longitudinal analyses should be conducted to further understand the relationship between autonomy support and autonomous motivation with patient activation, based on the premise that patient activation will sustain behavior change.

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STUDY

by

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CHAPTER 1:

INTRODUCTION

The global chronic disease burden exceeds that of acute communicable illnesses (Osbourne, Elsworth, & Whitfield, 2007). Approximately 117 million U.S. adults, almost half of the adult population, have at least one chronic health condition (Ward, Schiller, & Goodman, 2014). Health care costs incurred by these individuals account for 75% of total U.S. health care spending (Trehearne, Fishman, & Lin, 2014). Concerns about the health outcomes and costs of care associated with the continued growth in the number of persons living with chronic conditions has prompted the health care system to search for ways to assist individuals in improving behaviors that increase well-being and delaying adverse effects of chronic conditions (Lorig, Sobel, Ritter, Laurent, & Hobbs, 2001).

Glasgow, Orleans, Wagner, Curry, and Solberg (2001) contend that implementing effective prevention and management could avoid much of the chronic disease burden. Since primary care providers deliver the majority of chronic illness care (Bodenheimer, Wagner, & Grumbach, 2002), they join payers and policymakers as major stakeholders in improving health outcomes. Therefore, primary care practices have become increasingly engaged in promoting patient adoption of healthy preventive health behaviors and improving adherence to medical regimens.

Nurse-managed health centers (NMHCs) are among the primary care practices comprising the nation's safety net serving vulnerable populations, who bear a disproportionate burden of health disparities (American Association of Colleges of Nurses [AACN] Policy Brief, 2013; Hansen-Turton, Bailey, Torres, & Ritter, 2010). Nurse practitioners (NPs) in these centers face unique challenges in improving population

health outcomes of their patients. Confounding the problem, clinicians need new options to address the situation that patient education interventions alone aimed to improve adherence are seldom successful in changing health behaviors or improving disease control in the long term (Weingarten et al., 2002).

Furthermore, study results using multidisciplinary teams and behavioral interventions that demonstrated increases in patient adherence with medical regimens and adoption of healthy behaviors have not translated into similar results in clinical practice (Hill & Miller, 1996). Tailored interventions by health providers, based on models such as readiness to change, stage of change, and the health belief model, are seldom linked to sustained change in health status or health services utilization (Lorig & Holman, 2003). Experts (Fisher et al., 2005; Remmers et al., 2009) suggest that since such interventions are short-lived, longer-term sustainable strategies targeting both patients and providers are required to successfully manage chronic conditions. More recently, practice transformation demonstration projects, such as those by the Institute for Health Care Innovation, guided by the Chronic Care Model (CCM) created by Wagner et al. (2001) are reporting improved patient outcomes (Weitzman Institute, 2016).

Among the objectives of national health care reform policy advanced by the Patient Protection and Affordable Care Act of 2010 (PPACA) is the Triple Aim goal of improving the experience of care, the quality of care, and controlling costs, as summarized by Berwick, Nolan, and Whittington (2008). The CCM (Wagner et al., 2001) is a proactive, planned, and population-based approach to ambulatory care of patients with chronic illness. The CCM provides a template for improving prevention efforts (Glasgow et al., 2001). The CCM's self-management cornerstone emphasizes

enhancing patient-provider collaboration as a key health outcome improvement approach. More recently, research has validated the positive impact of a related concept, based in self-management, on health outcomes. This is patient activation, defined as patients' knowledge, skills, confidence, and willingness to manage their own health care (Hibbard & Mahoney, 2010).

Further, a body of research based on Self-determination Theory (SDT; Deci & Ryan, 2000) has contributed evidence on the utility of interventions enhancing patients' autonomy support, autonomous motivation, and perceived competence in changing health behaviors and achieving positive, long term health outcomes for chronic diseases, including hypertension, diabetes, and weight management, and health exercise behaviors. SDT is a major broad-based theory in the psychology of motivational processes on specific health behaviors. Two SDT constructs, autonomy support and autonomous motivation, may provide key information about patient and health care provider determinants of activation. The SDT construct of perceived competence appears redundant with the confidence component of the patient activation concept. Hence, it would be less instructive as to how to engender patient activation than the other two SDT constructs: autonomy support and autonomous motivation. As there is now considerable evidence that patient activation predicts long-term positive chronic care outcomes, patient activation itself is an important immediate outcome of healthcare delivery before long-term outcomes can be measured. Although not studied previously, autonomy support and autonomous motivation may predict patient activation and thus point to aspects of care delivery that enhance patient activation. The overall aim of this study was thus to examine whether these two SDT constructs impact patient activation.

Conceptual Underpinnings of the Study

This study was grounded in three concepts. The first is the Triple Aim goal of improving the experience of care, patient outcomes, and cost control (Berwick et al., 2008). The second is the CCM pillar of self-management, which is the concept of Patient Activation (Hibbard & Cunningham, 2008). The third are the Self-determination Theory constructs of autonomy support and autonomous motivation (Deci & Ryan, 2000). Based on previous findings of activation studies on the contribution of demographics and primary care use factors, these variables were also examined in the research conceptual model shown in Figure 1.
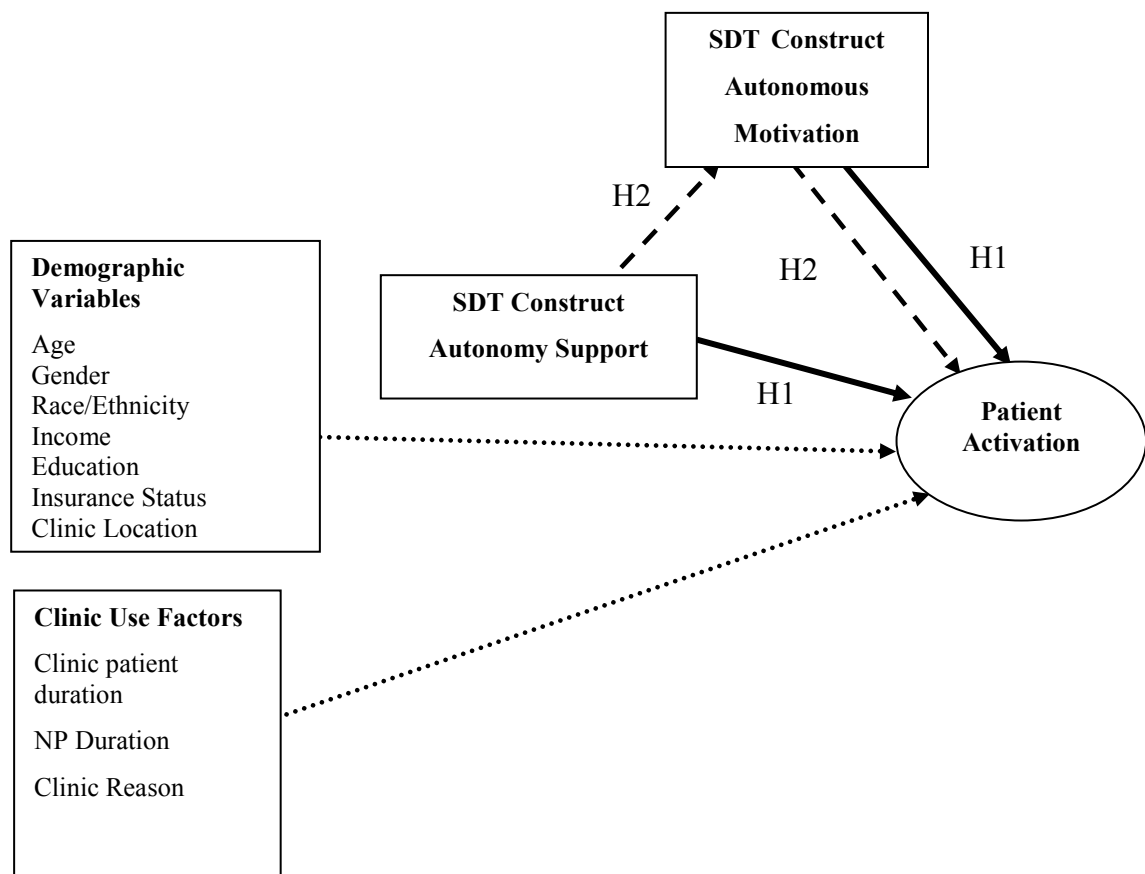
Figure 1. Research Conceptual Model
The two solid arrows represent hypothesis 1, the dashed arrows represent hypothesis 2, (mediation), and the dotted line arrows represent the covariates.

The Triple Aim

The Triple Aim refers to the goals of improving the individual experience of care, population health, and reducing the cost of care (Berwick et al., 2008). As a health reform objective, the Triple Aim has refocused the quality improvement efforts advanced by the Institute of Medicine's (IOM, 2001) six dimensions of safety; effectiveness; patient centeredness; timeliness, efficiency and equity; improved health outcomes; and less costly health service utilization into a broader system of linked goals (Berwick et al., 2008). Common barriers to accomplishing the Triple Aim include provider-centric rather than patient centric-care and clinicians who utilize more familiar practices rather than adopting new practices and utilizing new care support systems that may improve patients' chronic care management.

To address such barriers in ambulatory settings, Berwick et al. (2008) suggest several approaches. First, to employ a population focus to track the patient's experience of care, using patient engagement as a system performance metric indicator. Second, populations served need to be better informed about determinants of their own health status and the benefits and limitations of individual health care practices and procedures (Berwick et al., 2008). Third, Berwick et al. recommend that health care providers work collaboratively with chronically ill members of the population in a long-term relationship within a patient centered medical home (PCMH) and to establish a plan for these patients' ongoing care.

The Chronic Care Model

The Chronic Care Model (CCM) for primary care of patients with chronic illness is recognized as a major ambulatory care improvement approach, guiding collaboratives

formed to confront health disparities and other national quality improvement initiatives, according to Coleman, Austin, Brach, and Wagner (2009). The W. A. MacColl Institute for Health Care Innovation (IHI) at Group Health Cooperative of Puget Sound (Bodenheimer, Wagner, & Grumbach, 2002; Wagner et al., 2001) developed the CCM as a framework to improve chronic illness management using patient-centered, population-based, and evidence based methods (Coleman et al., 2009). Interest in the CCM has undergone resurgence because CCM concepts provide a conceptual framework for achieving the Triple Aim in primary care by incorporating PCMH principles that specifically emphasize patient self-management behaviors as components of practice transformation. The CCM's six system-level ambulatory care practice changes (self-management support, organization of health care and its providers, decision support, clinical information systems, health care system design, and community resources and policies) facilitate patient-centered, evidenced based care to improve patient outcomes (Coleman et al., 2009). As such, they provide a detailed roadmap for primary care practice redesign (Coleman et al., 2009). Bodenheimer, Wagner, and Grumbach (2002) propose the "New Model of Care for Family Practice" using a patient-centered team approach (Martin et al., 2004) now incorporated into the PCMH model (Agency for Healthcare Research and Quality [AHRQ], 2014).

Two CCM pillars, patient centered care and self-management, support the integration of patients and their families as members of the health care team (Bodenheimer, Wagner, et al., 2002; Hibbard, Mahoney, Stock, & Tusler, 2007; Von Korff, Grumman, Schaefer, Curry, & Wagner, 1997). According to Bodenheimer, Lorig, Holman, and Grumbach (2002), the premise of the CCM is that optimal chronic care

requires interactions between a prepared, proactive practice team and an informed activated patient. Bodenheimer, Lorig, et al. specify that "the new patient-physician relationship for chronic disease features informed, activated patients in partnership with their physicians" (p. 2469). Hibbard, Mahoney, Stock, and Tusler (2004, 2007) further elaborate that a knowledgeable and activated patient who can be a collaborative partner in managing their health is essential to successful implementation of the CCM and to achieving the Triple Aim. Hence, the literature suggests the concept of patient activation originates in the patient-centered and self-management CCM components.

The CCM is a useful practice transformation model for primary care practices, given their concurrent role in preventive and chronic care. In an overview of applications of the CCM to prevention programs, Glasgow et al. (2001) established that chronic disease management programs are preventive in orientation, since they aim to prevent exacerbations, complications, treatment side effects, and emotional distress. Subsequently, as a framework for translating general ideas for change into specific applications, Hung et al. (2007) propose that practice transformation guided by the CCM and the Care Model could be expanded to populations other than the chronically ill. Koh, Brach, Harris, and Parchman (2013) further clarify that the widely adopted CCM is now known as the Care Model, suggesting it has broader application for primary prevention and health behavior change. In addition, Koh et al. propose a Health Literate Care Model that combines health literacy improvement strategies with the widely adopted Care Model. Thus, practice transformation principles guided by the CCM are appropriate for nurse-managed health centers since they provide primary care to vulnerable populations

across prevention and chronic illness disease states (American Association of Colleges of Nursing [AACN] Policy Brief, 2013).

Self-management

The CCM's emphasis on the relationship between patient self-management and improvement in patient care quality underscores the significance of understanding patient self-management in the context of primary care practice. Barlow, Wright, Sheasby, Turner, & Hainsworth (2002) define patient self-management as "the individual's ability to manage the symptoms, treatment, physical and psychosocial consequences and life-style changes inherent in living with a chronic condition" (p. 178). Concurrent with the CCM development, the British National Health Service (BNHS) identified that increased chronic disease prevalence required a similar shift in responsibility for management from paternalistic models of health care, characterized by the patient passive acceptance of chronic disease management by health professionals, towards individual responsibility for chronic disease management (Barlow et al., 2002). Two initiatives, the BNHS Direct and the Expert Patients Task Force, were based on the premise that patients are the experts who are able to access information relevant to their health care needs and carryout self-management tasks (Barlow et al., 2002). Battersby et al. (2010) cite evidence from studies demonstrating that effective self-management is essential to optimizing health outcomes for people with chronic conditions. Consequently, Barlow and colleagues regard self-management as the means to bridge the gap between patient needs and the capacity of health and social care services to fulfill them.

Self-management Support

The role of the health care provider is to foster patient self-management skills by providing self-management support in the context of the patient-provider relationship. Glasgow et al. (2001) define self-management support as preparing "patients to understand their role in the process and to play an active, collaborative role in establishing goals that are both valuable and achievable" (p. 584-585). Since enhanced interpersonal connections with the health care provider foster self-management support, it follows then that optimal self-management requires a partnership between the patient, family, and health care provider. Despite the CCM's recommendation for strengthening clinical care by incorporating self-management support into the primary care encounter, Glasgow, Davis, Funnel, and Beck (2003), Hibbard (2009), Hibbard et al. (2004) and Wagner et al. (2001) cite evidence that self-management support is the least implemented of the six CCM elements. This suggests that primary care practices have yet to adopt practice redesign models that incorporate self-management support strategies that could improve patient self-management.

Patient Activation

Remmers et al. (2009) contend that patients with chronic conditions require more intense interactions with their health care providers and evidence demonstrates that patients who are more activated are better prepared to follow self-care strategies over the long term. Hibbard et al. (2004) used the term "patient activation" to conceptualize "readiness to engage in self-management" (Lubetkin, Lu, & Gold, 2010, p. 797), which further aligns activation with the development of self-management skills. Hibbard and Mahoney (2010) refer to patient activation as the individual's knowledge, skill, and

confidence for managing his/her own health and health care. Hibbard and Mahoney further define patient activation as "the degree to which the individual understands they must play an active role in managing their own health and health care, and the extent to which they are able to fulfill that role" (p. 377). Hence, knowledge, skills, and confidence are required for patients to effectively self-manage their own care process.

Patient Engagement

Hibbard, Greene, and Overton (2013) distinguish patient engagement as a broader concept that includes activation, interventions to increase activation, and patient behaviors, including preventive care and health promoting behaviors. Dentzer (2013) cites the IHI's definition of patient engagement as "actions that people take for their health and to benefit from care" (p. 202). Both patient engagement and patient activation are important concepts in achieving the Triple Aim, based on the body of evidence that "patients who are actively involved in their health and health care achieve better health outcomes, and have lower health costs than those who aren't" (Dentzer, p. 202). In summary, the concept of patient engagement represents the overarching strategy for achieving the Triple Aim, of which activation comprises one component.

Nurse-managed Health Centers

The over 200 U.S. nurse-managed health centers (Kovner & Walani, 2010) are primary care practices managed by advanced practice nurses in which nurse practitioners (NPs) provide the majority of direct medical services. As safety-net providers, nurse-managed health centers outreach to and engage underserved, vulnerable populations in primary care and public health initiatives (Kinsey & Miller, 2014) to improve access to care among at risk populations (Barkauskas, Pohl, Onifade, Tanner, & Pilon, 2011).

According to Kinsey & Miller (2014), nurse-managed health centers incorporate nursing models, "human caring, scientific knowledge about health and illness, and understanding of family and community characteristics, interests, assets, needs, and goals for health promotion, disease prevention, and disease management" (p. 463). In engaging individuals, families, organizations and communities, nurse practitioners apply this understanding of context, interests, and needs for health care to enhance the client's capacity for meeting personal, family, and community responsibilities and interests (Kinsey & Miller, 2014).

Nurse-managed health centers sponsored by academic health centers are clinical education sites for nurses and other health professions students' education (Kinsey & Miller, 2014). The Nurse-managed Health Clinic Investment Act of 2009, Senate Bill 1104 and House of Representatives Bill 2754 (111th Congress), amended Title III of United States Public Health Service Act (42 U.S.C. 241 et sez) defining a nurse-managed health center as:

> a nurse-practice arrangement, managed by advanced practice nurses, that provides primary care or wellness services to underserved or vulnerable populations and is associated with a school, college, university, or department of nursing, federally qualified health center, or an independent non–profit health or social services agency. (Library of Congress, 2009, p. 7).

Under the PPACA an additional eight million people have enrolled in Medicaid and third party insurance, including qualified health plans (Urban Institute, 2014), increasing the demand on primary care. Health reform legislation addressed this need by funding an increase in the nurse practitioner primary care workforce (Institute of

Medicine [IOM], 2011; Kinsey & Miller, 2014). Nurse-managed health centers are subject to the same governmental, payer, and health care quality standards as other ambulatory care providers (Kinsey & Miller, 2014). As access points for comprehensive primary health care, health promotion, and disease prevention services, using a holistic approach to health and illness (Hansen-Turton, Miller, & Greiner, 2009), nurse-managed health centers are uniquely positioned to play a significant role in achieving improved health outcomes aligned with the Triple Aim (AACN Policy Brief, 2013).

Esperat, Fiandt, McNeal, Heuer, and Denholm (2011) cite exemplars of nurse-led primary care innovations that use prevention and health promotion as cost effective chronic disease management approaches. Montalvo, Torrisi, Hansen-Turton, and Birch (2011) cite similar evidence of nurses providing leadership, engaging stakeholders, and developing and implementing evidence-based models to narrow the gap between preventive and primary care services. A study of nine nurse-managed health centers by Barkauskas, Pohl, Onifade, Tanner, and Pilon (2011) reported that overall, quality measures compared favorably with national benchmarks for breast and cervical cancer screening, diabetes care, and hypertension management, and demonstrated high quality in chronic disease care management. Nurse-managed health centers, therefore, have the opportunity to implement and evaluate the impact of innovative interventions to increase patient activation. This is particularly relevant for these centers, whose disproportionately uninsured and underinsured clients may be less likely to have sustained, long-term relationships with their primary care providers than their insured counterparts.

Patient Activation Research

While the concept of patient activation as predictor of health outcomes has been extensively studied, only more recent research has explored demographic, i.e. rural residents (Young et al., 2014), Latinos (Alegría, Sribney, Perez, Laderman, & Keefe, 2009), and the elderly (Chuback et al., 2012), and contextual factors (Becker & Roblin, 2008; Hibbard et al., 2008) as predictors of patient activation. Further research exploring an association between theoretical constructs and patient activation in underserved populations has the potential to yield additional strategies that may contribute to the evidence base for designing interventions to increase activation in populations that may have the lowest activation levels and therefore benefit the most from interventions to improve them. Therefore, one can propose that identifying theory-based methods to enhance activation may increase the likelihood of successful short-term and longer-range health outcomes.

Research findings on the association between patient activation, self-management skills, health behaviors, and improved chronic disease outcomes warrant further exploration of theory-based predictors of activation in vulnerable populations, such as those enrolled in nurse-managed health centers, that can guide interventions to enhance activation, because the opportunity to increase activation in this population can improve quality and advance the Triple Aim.

Self-determination Theory Constructs

One approach to identifying evidence-based methods of improving patient activation is to explore the relationship between health behavior theory constructs and patient activation. Self-determination Theory (Deci & Ryan, 2000) is a major broad-

based theory in the psychology of motivational processes (Ten Cate, Kusurkar, & Williams, 2011; Vansteenkiste & Sheldon, 2006) which focuses on the degree to which one's motivation towards engagement in activities, including health behaviors, are self-determined or controlled by external or internal pressures (Rouse, Ntoumanis, Duda, Jolly, & Williams, 2011). Fortier, Sweet, O'Sullivan, and Williams (2007) maintain that since patient autonomy for health behavior change is a central concept of SDT, the theory shows promise not only in explaining activation processes at the individual level (motivation), but also in identifying the effect of the person's perceptions about their interaction with their health care provider (autonomy support) on activation.

Ten Cate, Kusurkar, and Williams (2011) contend that SDT's basic tenet is that motivations that determine human behavior occur on a continuum ranging from extrinsic motivation to intrinsic motivation, reflecting the degree to which they result from external versus internal control and self-regulation. Furthermore, Ten Cate et al. maintain that SDT's constructs of autonomy support, autonomous motivation, and perceived competence, a set of psychological mechanisms, map the process by which previously external regulations become internalized to develop autonomous, self-determined behavior, establishing its utility as a theory of change to guide interventions. The highest form, intrinsic motivation (characterized by fully self-determined behavior), results in one freely engaging in an activity out of interest, inherent satisfaction, or caring about one's health and wanting to do all he or she can do to stay or be well. The natural developmental process of internalization changes externally motivated behavior to self-determined regulation, rather than external pressures, incentives and reinforcements influence (Ten Cate et al., 2011).

The construct of autonomous motivation refers to behavior characterized by experiencing a sense of volition, self-initiation, and personal endorsement of the behavior, resulting from internalization and self-regulation (Vansteenkiste & Sheldon, 2006). In the context of patient activation, autonomous motivation is taking an active role in managing one's health and health care out of interest and personal responsibility. Williams, McGregor, King, Nelson, and Glasgow (2005) define the construct of autonomy support as the extent to which "providers elicit and acknowledge patients' perspectives, support patients' initiatives, offer choice about treatment options, and provide relevant information while minimizing pressure and control" (p. 40). Autonomy support describes the patient's perceived respect and confidence displayed by the provider toward the patient taking an active role in his or her own health care in an autonomy-supportive context. The construct of perceived competence is defined as feeling effective in one's efforts and capable of achieving desired outcomes (Williams & Patrick et al., 2009).

Research employing interventions based on the SDT constructs of autonomy support, autonomous motivation, and perceived competence (Williams, Lynch, & Glasgow, 2007; Williams, McGregor, & King et al., 2005; Williams & McGregor et al., 2006) demonstrated that autonomy support leads to greater internalization of autonomy and perceived competence for health behaviors. Fortier, Williams, Sweet, and Patrick (2009) concluded that randomly controlled studies using autonomy supportive interventions that resulted in increased autonomous motivation and perceived competence confirmed that clinical interventions that increase autonomy support can facilitate autonomous self-regulation and perceived competence. Findings from these

studies suggest that two constructs— autonomy support and autonomous motivation— may likewise be relevant to enhancing patient activation and subsequently inform the development of interventions.

Since perceived competence describes feeling effective in one's efforts and capable of achieving desired outcomes (Williams & Patrick et al., 2009) and patient activation involves progressive competence in self-management abilities, the perceived competence construct would measure similar, albeit less specific, behaviors than those measured by activation. Therefore, perceived competence is not included in the model to be studied here, since it is deemed to overlap with the outcome of patient activation. Despite the significance of patient activation to self-management and the focus of SDT on autonomy support and autonomous motivation resulting in competence, no known studies have investigated the relationship between autonomous motivation, autonomy support, and patient activation.

Statement of the Problem

Researchers (Becker & Roblin, 2008; Hibbard, 2009; Hibbard et al., 2007) have established a consistent relationship between patient activation, self-management behaviors, and improved patient outcomes. Recent research efforts have focused on identifying patient and contextual factors that impact activation in various populations and determining the most effective interventions for increasing activation in patients. These past intervention demonstrations to improve patient activation have not adequately examined the utility of interventions focused on patients' autonomy support and autonomous motivation. Despite the relevance of patient activation to the Triple Aim, there is scant research examining patient activation in disadvantaged populations in

general, in nurse managed primary care populations in particular, and in relation to SDT constructs. The relationships between the autonomy support and autonomous motivation constructs and their effect on patient activation are unknown in a nurse managed health center population. This is an important area warranting exploratory study given the broad adoption of patient activation as a focus of chronic care improvement and the need for theory-based interventions to improve activation, particularly in underserved populations.

Purpose of the Study

The aim of this pilot study was to examine the utility of two SDT constructs – autonomy support and autonomous motivation- as predictors of patient activation in an underserved nurse-managed primary care clinic population. There are no previously known studies measuring patient activation in a nurse-managed health clinic serving a primarily uninsured population and in the context of SDT based constructs. While significant research has measured the concept of patient activation within primary care environments and has tested intervention strategies designed to enhance activation, there is a dearth of research on the effect of theoretically based interventions on patient activation. Likewise, there are no known studies exploring relationships between these two SDT constructs and patient activation. How the dimensions of autonomy support and autonomous motivation and patient activation measures apply to a nurse managed health center and to its underserved population are unknown. This study aimed to fill this gap by contributing to the body of knowledge that builds the evidence base for developing theory-based interventions to facilitate improvements in patient activation among the underserved in nurse managed health centers.

Significance of the Project and Justification for the Current Study

Because neither researchers nor nurse managed health center providers know the relationship between the SDT variables of autonomy support and autonomous motivation, or how they fit together to affect patient activation, it is important to the health behavior field in general and for evidence based practice in these setting to understand factors influencing patient activation. Evidence that autonomy support and autonomous motivation independently predict activation would expand the pool of strategies available for implementation by nurse-managed health centers to increase self-management.

This study aimed to contribute to the body of knowledge that builds the evidence base for developing theory-based interventions to facilitate improvements in patient activation among the underserved in nurse-managed health centers. This work has the potential to further theory-based primary care practice redesign integrating additional evidence-based interventions to enhance patient activation and provider-patient communication and engagement strategies in nurse-managed health centers. The opportunity also exists to educate current and future primary care providers on methods for integrating such interventions in their practices, including adopting practice and patient communication styles associated with enhancing patient collaboration, activation, and facilitating self-management-supportive strategies by other health care team members.

Outcome evaluations of SDT-based interventions to increase patient activation in nurse-managed health centers will contribute to the achieving the Triple Aim. Future studies can focus on evaluating evidence of the impact of such interventions using a

repeated measures research design that also include other instruments, such as the Agency for Healthcare Research and Quality's Consumer Assessment of Healthcare Providers and Systems (CAHPS, AHRQ, 2016).

Research Aims and Hypotheses

The specific aim of this pilot study was to examine the utility of Self-determination Theory constructs of Autonomy Support and Autonomous Motivation as predictors of Patient Activation in patients of two nurse-managed primary care clinics serving metropolitan and rural Maryland counties. Hypothesis One was: Controlling for demographic and clinic use variables, Self-Determination Theory constructs of Autonomy Support and Autonomous Motivation independently predict Patient Activation. Hypothesis Two was: Autonomous Motivation mediates the relationship between Autonomy Support and Patient Activation.

Summary

This pilot study, guided by the CCM and Triple Aim goals, explored the utility of two SDT constructs (Autonomy Support and Autonomous Motivation) associated with sustained behavior change in predicting Patient Activation in two nurse-managed health centers. Understanding factors influencing patient activation could guide primary care providers' assessments of activation and delivery of patient centered interventions to enhance activation, by providing evidence-based self-management support. Identifying and employing evidence-based interventions to improve activation is especially important among vulnerable populations in nurse managed health centers, who suffer disproportionate health disparities.

Definition of Terms

The following terms were central to the conduct of this study.

Autonomy Support: The patient's perception of the extent to which "providers elicit and acknowledge patients' perspectives, support patients' initiatives, offer choice about treatment options, and provide relevant information while minimizing pressure and control" (Williams, McGregor, & King et al., 2005, p. 40).

Autonomous Motivation: Patient behavior characterized by experiencing a sense of volition, self-initiation and personal endorsement of the behavior, resulting from internalization and self-regulation (Vansteenkiste & Sheldon, 2006).

Patient Activation: The individual's knowledge, skill, and confidence for managing his/her own health and health care and understanding "they must play an active role in managing their own health and health care, and the extent to which they are able to fulfill that role" (Hibbard & Mahoney, 2010, p. 377).

Self-management: "The individual's ability to manage the symptoms, treatment, physical and psychosocial consequences and life-style changes inherent in living with a chronic condition" (Barlow et al., 2010, p. 178).

Self-management Support: "The systematic provision of education and supportive interventions by health care staff to increase patients' skills, and confidence in managing their health problems, including regular assessment of progress and problems, goal setting, and problem-solving support" (IOM, 2003, p.57).

Nurse-managed Health Center (NMHC): "A nurse-practice arrangement, managed by advanced practice nurses, that provides primary care or wellness services to underserved

or vulnerable populations and that is associated with a school, college, university or department of nursing, federally qualified health center, or independent nonprofit health or social services agency" (Pub L 113-103 Amendment to Title III of the PHS Act (42 U.S.C 241 et sez) Nurse-managed Health Clinic Investment Act of 2009. Senate Bill 1104, Library of Congress, 2009, p. 7).

CHAPTER 2:

LITERATURE REVIEW

This literature review describes the origin and significance of the concept of

patient activation relative to self-management and improved health outcomes, its

definition and measurement, and the categories of research studies measuring activation.

SDT provides the theoretical framework for this study; hence, the subsequent literature

review focuses on the constructs of autonomy support and autonomous motivation and

research linking them to health behavior change. The format for the concept of activation

and the SDT constructs will describe the origin of the concept/construct, their definitions,

the state of the scientific research in the context of primary care, and the knowledge gaps

related to the relationship between autonomy support, autonomous motivation, and

activation.

The Concept of Patient Activation

The CCM concept of self-management, advanced by the PPACA and the Triple

Aim, is operationalized as Patient Activation. The concept of activation is grounded in

the self-management literature and has received renewed attention as one cornerstone of

primary care practice redesign advanced by the Chronic Care Model (CCM). Hibbard et

al. (2007) maintain measuring activation and using its assessments to guide the design

and implementation of interventions for improving chronic illness care will further

develop the CCM as a quality improvement model.

Origin of Activation in Self-management

Self-management is a common term in health promotion and health education

programs. A review of self-management literature by Lorig and Holman (2003) traced

the first use of the term self-management to Thomas Creer and colleagues' reference to pediatric asthma programs in the 1960's. The early work of Albert Bandura (1997), well-renowned Social Cognitive theorist, deemed the term self-management to indicate that the patient was an active participant in treatment. While earlier references reflect a narrower context of outcomes of chronic disease patient education programs, the current more broad application encompasses patient tasks and more recently, skills for managing health. This evolution is consistent with Lorig and Holman's assessment that self-management is a lifetime task for those with chronic illness.

Self-management requires knowledge, however Bodenheimer, Lorig, et al. (2002) distinguish between traditional patient education which defines problems and offers informal, technical skills, and self-management education which prepares patients to identify their problems, teaches problem solving skills, and provides techniques to help make decisions, define appropriate actions, and alter actions as they encounter changes in disease or circumstances. Bodenheimer, Lorig, et al. add collaborative care to self-management education in problem-solving skills, viewing them as two expressions of the partnership paradigm and two components of self-management.

Furthermore, community based individuals with chronic conditions assume primary responsibility for self-care in their own homes, independently, with family member or care provider assistance (Osbourne, Elsworth, & Whitfield, 2007). Bodenheimer, Lorig et al. (2002) contend that since patients with chronic illnesses self-manage their illnesses, self-management is inevitable; therefore, the focus then becomes on how they manage. Furthermore, while the old chronic disease paradigm considered health professionals the experts, Holman and Lorig (2000) maintain that the new chronic

disease paradigm considers patients with chronic conditions as their own principle

caregivers who seek consultation from health care professionals to support them in this

role. Early accounts of self-management emphasize individuals' behaviors and tasks

versus skill development, consistent with the narrower education focus. Battersby and

colleagues (2010) define self-management as:

> A set of tasks that includes developing knowledge of the conditions and
>
> treatments; medication management and adherence; monitoring of disease and
>
> symptoms; managing the effects of illness on physical, social, emotional and role
>
> functions; reducing health risks, preventative maintenance; and working
>
> collaboratively with health professionals. (pp. 561-562).

Barlow et al. (2002) maintain there is no gold standard definition of self-

management although they agree with Battersby et al. (2010) that self-management

consists of a constellation of behaviors. Clark et al. (1991) differentiate self-management

from self-care in defining self-management as the "day to day tasks an individual must

undertake to control or reduce the impact of disease on physical health status" (p.6).

These "at-home" management tasks and strategies occur with the collaboration and

guidance of one's physician and other health care providers (Clark et al., 1991).

The self-management literature chronicles the transition from emphasis on patient

engagement in a set of tasks primarily focused on managing illness to developing skills,

such as coping with psychosocial problems resulting from chronic disease and managing

daily living according to their social and financial conditions that enable them to live with

their chronic condition (Clark et al., 1991). Clark and colleagues (1991) consider

"sufficient knowledge of the condition and its treatment, performance of condition-

management activities, and application of the necessary skills to maintain adequate psychosocial functioning" (p. 6) requirements for successful-self-management. This reflects a shift from knowledge of the disease to confidence and skills in its management (Holman & Lorig, 2000; Wagner et al., 2001). This corresponds with Corbin and Strauss's (1988) perspective of self-management as helping patients maintain wellness in their foreground. Further articulating this point of view, Paterson (2001) references the "shifting perspectives" (p. 23) that patients with chronic disease have about their illness that entail switching between illness in their psychological foreground and wellness.

Corbin and Strauss (1988) describe self-management as comprised of three sets of tasks— medical management of the condition, maintaining, changing or creating new meaningful behavior or life roles, and dealing with the emotional sequel of a chronic condition, including learning to manage emotions such as anger, fear, frustration, and depression to manage their condition. Further elaborating on skills, Barlow et al. (2002) define self-management as:

> The individual's ability to manage the symptoms, treatment, physical and psychosocial consequences and life-style changes inherent in living with a chronic condition. Efficacious self-management encompasses the ability to monitor one's condition and to effect the cognitive, behavioural, and emotional responses necessary to maintain satisfactory quality of life. Thus, a dynamic and continuous process of self-regulation is established. (p. 178).

Clark and Gong (2000) add that "management by the patient involves conscious use of strategies to manipulate situations and thereby reduce the impact of the disease on the quality of life" (p. 573) as an example of such self-regulation skills.

Lorig and Holman (2003) expand Corbin and Strauss' (1988) emphasis on creating new behaviors and managing emotions, and not merely managing illness and conclude that self-management behaviors focus on managing patient perceived problems. Strategies for managing patient perceived problems have particular utility in the primary care context, reflected by Clark and Gong's (2000) assertion that "a patient is much more likely to be motivated to follow a practitioner's recommendations when the goal of management reflects their own interests and concerns" (p. 574). Hence, patients who self-manage not only have the ability to maximize their quality of life versus satisfice under the strain of illness, but are also more likely to be adherent with prescribed care actions. Table 1 summarizes Lorig and Holman's refinement of self-management attributes into five overarching self-management skills deemed necessary for patients to perform the three sets of self-management tasks identified by Corbin and Strauss (1988).

Table 1

Self-management Skills

Skill	Description
Problem-solving	Basic problem-solving skills- problem definition, generation of possible solutions, implementation and evaluation of results
Decision-making	Day to day, in response to changes in disease condition; requires formation of key messages to foster important decision-making, acquired through self-management education
Resource utilization	How to find and use resources- using the phone book, phone numbers, internet, library, community resource guides; contacting several resources concurrently
Forming patient/provider partnership	The patient must be able to accurately report disease symptoms, make informed choices regarding treatment, and discuss these with the care provider. The role of health provider is teacher, partner and professional manager, Help patient form partnerships with their health care providers.
Taking action	Implementing solutions and skill mastery (concept of self-efficacy)-learning how to change a behavior, making a short-term behavior-specific action plans and carrying them out, with confidence in executing the action plan

Lorig and Holman (2003) consider this emphasis on patient perceived problems and resultant self-tailoring, defined as "using self-management skills and knowledge and

applying them to oneself as appropriate," (p.2) as the essence of self-management. Ryan and Sawin (2009) concurring, regard self-tailoring as the sixth-self management task. This perspective that patients accept responsibility for self-managing conditions and use information from providers to solve their own problems is consistent with the concept of patient empowerment (Bodenheimer & Lorig et al., 2002). Feeling empowered may be attributable to a relative increase of internal motivation compared with external motivation for lifestyle change.

Given that individuals must learn principles for making specific behavior changes, decision-making, and problem solving in order to self-tailor, Lorig and Holman (2003) highlight the importance for self-management programs to build these competencies. The self-tailoring perspective refocuses self-management away from a series of tasks to mastery of a repertoire of skills, which will afford the patient more long-term benefits. Hence, Lorig and Holman view enhanced self-efficacy in performing skills as at least one of the mechanisms associated with improved health status as an outcome of self-management programs. Bodenheimer, Lorig, et al. (2002) cite the importance of the concept of self-efficacy, "the confidence that one can carry out a behavior necessary to reach a desired goal" (p. 2471), in self-management.

Despite extensive research evidence of the association between self-management and improved disease-specific health outcomes (Hibbard et al., 2004; Mosen, Schmittdiel, & Hibbard, 2007), Weingarten and colleagues (2002) concluded from a meta-analysis that patient education approaches to enhancing self-management had a moderate effect overall on health outcomes. These findings are consistent with those of Hibbard et al. (2007) who reported differences between the intervention group, who

attended a disease self-management course and the control group, were no longer significant after six months despite higher baseline activation in the control group. Hibbard (2009) interpreted these results to reflect the assumption of most self-management education programs that information will improve patients' knowledge and skills as well as the failure to both examine and measure patient capabilities for self-management prior to instituting programming. Furthermore, Hibbard, Greene, and Tusler (2009) recommend that facilitators use additional information about patient capabilities for self-management to tailor both self-management education and self-management support to the existing state of the patient's knowledge and skill in contrast to a "one size fits all approach."

The Role of Self-management Support Interventions

Bodenheimer, Wagner et al. (2002) maintain that self-management is primarily under the control of both healthy and chronically ill patients, therefore the health care provider's role is to instruct patients in the management of illnesses and to offer self-management support. This involves collaboratively helping patients and families acquire the skills and confidence to manage their chronic illness, provide self-management tools, including material and interpersonal resources, and to assess accomplishments and problems (Bodenheimer & Wagner et al., 2002). One way for providers to further increase patient self-management is to enhance provider capacity and expertise in the delivery of self-management support through interpersonal exchanges with the patient in the primary care setting. Successful accomplishment of this would further implementation of the CCM (Glasgow et al., 2003).

Bodenheimer (2005), based on a review of barriers to CCM implementation, recommends that primary care settings adopt three clinical practice redesign elements: "preactivating" patients prior to the clinic visit, planned visits with a care manager for individual or group education and medical management, and sustained face to face, telephonic and electronic follow-up by a care team. To link self-management support with the care delivery process Battersby et al. (2010) further propose integrating self-management support into each of the three primary care visit phrases by restructuring the primary care environment to deliver an enhanced pre-visit assessment and expanded post-visit options, in addition to the clinical encounter. Furthermore, based on structured reviews and meta-analyses of key principles for implementing self-management support in primary care, Battersby et al. identified 12 evidence-based principles for integrating self-management support into primary care. The first principle establishes the enhanced pre-visit assessment as a "Brief Targeted Assessment" of clinical severity, functional status, patient problems and goals, self-management behaviors, and barriers to self-management to guide self-management support (Battersby et al., 2010, pp. 561-562). Assessing activation could comprise the first data point in this assessment, which would implement Bodenheimer's recommendation for "preactivating" the patient. These steps can guide implementation of self-management support in primary care.

Despite the aforementioned emphasis of self-management support in the primary care context and practice redesign recommendations, Hibbard (2009) concurs regarding the lack of integration of self-management support into the care delivery process, which she attributes to providers' persistent reliance on disease management programs to fill that gap.

The Need for Theory-based Self-management Interventions

Anderson and Funnell (1999) assert that while most self-management education is theory based, interventions are not explicitly linked to general theories of behavior. Likewise, despite the availability of numerous strategies designed to engage and activate patients, Hibbard (2009) concludes that only a few have been effective and a uniformly accepted approach has yet to be widely adopted. It follows, then, that incorporating theory-based strategies could enhance both self-management education and self-management support efforts. Clark and Gong (2000) suggest two methods by which the health delivery system can adequately prepare patients for chronic disease management. The first is to adopt and adapt education programs that have proven value, which view patient self-management as a behavioral process based on one's ability to self-regulate and that apply theoretical foundations for understanding human behavior and motivation and what predisposes patients to manage disease. The second is to use theories of human behavior based on accepted principles of learning and motivation to foster disease management, including self-management support efforts. In the context of advocacy for integrating self-management support into the primary care setting (Battersby et al., 2010; Bodenheimer & Wagner et al., 2002; Hibbard, 2009), these recommendations provide the rationale for this study's investigation of the relationship between a health behavior theory that includes autonomy support and autonomous motivation constructs and activation. The process of assessing activation and framing interventions based on theories provides the opportunity to integrate self-management support into the primary care milieu. This is congruent with Hibbard et al.'s (2009) conclusion that support for

patient self-management is one of the possible main pathways by which disease management programs affect outcomes.

Further advancing the focus on the concept of self-management, more recent research literature reflects an overarching assessment of self-management across multiple disease categories and prevention efforts that can identify patient gaps in self-management, suggest self-management support needs, and guide evaluation of the effectiveness of interventions. The resultant identification of key self-management skills contributed to formulating the concept of activation and its subsequent measurement.

The Relationship of Patient Activation to Self-management and Health Outcomes

In contrast to self-management, the concept of patient activation has a more recent origin. Von Korff et al. (1997) propose that since patients are central to the CCM, they need skills, knowledge and motivation to participate as effective members of the health care team. Both Wagner et al. (2001) and Bodenheimer, Lorig et al. (2002) refer to the term "activated patient" in the context of the CCM. Incorporating patient self-management skills delineated by Lorig and Holman (2003), Hibbard et al. (2004) conceptualize an activated patient as one knowledgeable about "how to manage their condition, collaborate with health care providers, maintain health functioning, and access appropriate high quality care" (p. 110). Hibbard et al. (2004) consider patient activation essential to the development of effective self-management skills and behaviors that result in improved health and chronic disease outcomes. Likewise, Deen, Lu, Rothstein, Santana, and Gold (2011) agree with Hibbard et al. (2004) that activation is necessary for successful self-management and health promotion activities, and, more broadly, for greater patient engagement in overall health decision-making. Finally, Donald et al.

(2011) assert that activation is the core of self-management, further establishing the link between self-management and activation.

The term "patient activation" describes the individual's knowledge, skill, and confidence for managing his/her own health and health care and understanding that "they must play an active role in managing their own health and health care, and the extent to which they are able to fulfill that role" (Hibbard & Mahoney, 2010, p. 377). To address the need for an overarching measure of self-management, Hibbard et al. (2004) identified factors associated with self-management capacity, elucidated the concept of patient activation, and operationalized it as the Patient Activation Measure (PAM) and the PAM-13 (Hibbard, Mahoney, Stock, & Tusler, 2005).

Operationalizing Patient Activation for Instrument Development

It is widely accepted in the field of health care quality that the capacity to measure a phenomenon is a prerequisite to improvement (Hibbard et al., 2007). Given the importance of patient self-management in achieving health outcomes, Hibbard et al. (2004) recognized that the ability to measure patient activation then apply that information to increase the patient's capacity for self-management could enhance their self-management repertoire. Consequently, Hibbard et al. (2004) regarded assessment of patient activation as an important first step towards improving quality and outcomes of care. Hung et al. (2013) and Ryvicker, Feldman, Chiu, and Gerber (2013) concur that a valid and reliable instrument helps practitioners understand the variation in self-management ability and identify patients who could benefit from enhancing their self-management skills. Therefore, it is important for primary care teams to understand how

to assess patient activation levels to identify the assistance patients need to develop the
self-management skills that enable them to achieve an optimal state of self-management.

Lorig and Holman's (2003) classification of the five core self-management skills
(problem solving, decision-making, resource utilization, forming a patient provider
partnership, taking action) provided the framework for Hibbard et al. (2004) to further
examine the components of activation. Additional literature reviews by Hibbard et al.
(2004, p. 1008) contributed to the development and measurement of the concept of
activation, focusing on evidence that patients were more likely to have better health
outcomes if they were able to:

- self-manage symptoms/problems
- engage in activities that maintain functioning and reduce health declines
- be involved in treatment and diagnostic choices
- collaborate with providers
- select providers and provider organizations based on performance and quality, and
- navigate the health care system

Utilizing qualitative methods, Rasch analysis, and classical test theory
psychometric methods, Hibbard et al. (2004) further identified and clarified the relevance
of these six domains and refined the concept of activation. Vetting for consensus by two
expert panel rounds established beliefs, knowledge, and skills associated with the six
domains, which were further expanded to 18, each with subdomains. Final rankings
obtained via a second expert consensus round by two focus groups comprised of a
convenience sample of 19 chronically ill participants revealed four domains, which were
subsequently reduced to three (self-management, collaborate with provider, and maintain
function/prevent declines). The final product consisted of three specific domains

associated with patients' beliefs, knowledge, and skills; a matrix; and the following

conceptual definition:

> …those who are activated *believe* patients have important roles to play in self-
> managing care, collaborating with providers, and maintaining their health. They
> *know* how to manage their condition and maintain functioning and prevent health
> declines; and they have *skills and behavioral repertoire* to manage their condition,
> collaborate with their health care providers, maintain their health functioning, and
> access appropriate and high quality care. (Hibbard et al., 2004, p. 1010).

An expert panel then vetted an 80-item question pool incorporating these three

domains for face and content validity. Three rounds of cognitive testing, in which 20

respondents with chronic conditions evaluated the items for understanding, response

variability, and adequacy of response categories, reduced the number of items to 75.

Following pilot testing on a convenience sample of 100 chronically ill individuals aged

19-79, the resultant item pool underwent Rasch rating scale model analysis. Hibbard et

al. (2004) then created the preliminary 22-item unidimensional, interval level, probalistic

Guttman-like scale using ordinal data obtained from rating scale responses to survey

questions and Rasch measurement techniques. This scale was administered to

convenience sample (N= 486) of cardiac rehabilitation and health system employees, 76

percent of whom had one or more chronic diseases.

Survey administration findings confirmed that "the different elements of

knowledge, belief, and skill that constitute activation have a hierarchical order…"

(Hibbard et al., 2004, p.1016), suggesting that activation is developmental. The resulting

22-item Patient Activation Measure (PAM) instrument was administered via a random

digit dial telephone survey to a national probability sample (N = 1,515) age 45 and over.

Sixty-six percent of the sample was over 65 years of age, 79 percent had at least one

chronic condition, although the sample data was not reflective of national gender or race

distributions.

Comparing research results from the refined measure of the instrument to the

conceptual definition of activation, Hibbard et al. (2004) further identified four activation

stages experienced by patients during the process of becoming fully competent managers

of their own health. The stage domains and their activation score ranges and the

corresponding behaviors measured by the PAM are associated with behavior change

opportunities, as shown in Table 2. The factors in each stage represent domains

reflecting a gradual increase in self-assessed accomplishment of the specific competence,

indicated by the range of activation scores associated within each stage.

Hibbard and Greene (2013) refer to activation as a latent construct, because it is a

variable that cannot be directly measured. Activation is a developmental and hierarchical

concept, based on the instrument's design that measures where the individual falls on a 0-

100 interval level scale. The instrument further segments patients into one of four

activation levels along an empirically derived continuum, representing the degree of

activation (Hibbard et al., 2004). The distribution of survey items on the currently used

PAM-13 aligned with the four factors and their respective score ranges are further

detailed in Chapter Three, which describes the scoring of the measure.

Table 2

Activation Stages, Associated Behaviors, and Behavior Change Interventions

Activation Stage (PAM Score) (100 Point Scale)	Behaviors Characterizing the Stage	Behavior Change Interventions (Hibbard, 2009)
1. Beliefs about the importance of the patient role (≤ 47.0)	Do not believe they have an important role to play in their health; passive recipients of care Have an elementary knowledge about their condition and care Lack self-confidence in managing one's own health and focus on health care "Overwhelmed" and inadequately prepared to assume an active role in their own health (Hibbard et al., 2009)	Negotiate an action plan focusing on self-awareness and mindfulness of behaviors, role delineation and stress management , small behavioral action steps
2. Confidence and knowledge necessary to take action (47.1-55.1)	Believe their role is important in managing care May lack confidence and knowledge for active self-management role Lack basic facts or don't connect facts into larger understanding about their health or recommended health regimens Lack knowledge of medications and lifestyle changes Lack confidence and understanding of their own health or recommended regimen (Donald et al., 2011). Know when to seek help; Lack confidence in talking to health care providers	Assure that patients understand the basics of their condition, treatments, and their role in care Build self-efficacy
3. **Taking action**/enacting health behaviors (55.2-67.0)	Have the necessary knowledge for self-care; lack skills and confidence to carry through on all self-care requirements Begin to take action as self-managers May still lack skill and confidence to support new behaviors, maintaining lifestyle changes Know how to prevent future problems Handle symptoms on one's own (Hibbard et al., 2009)	Negotiate an action plan that focuses on supporting the initiation of new behaviors and the continuation of recently adopted behaviors
4. **Staying the course**, even under stress (≥ 67.1)	Have the knowledge, skill and confidence to significantly participate in their care Have adopted many of the behaviors to support their health, but may not be able to maintain them during stress or health crises (Donald et al., 2011; Hibbard et al., 2009)	Facilitate acquiring coping, problem-solving skills and gaining awareness of environmental and situational factors that undermine maintenance of behaviors

Early developmental activation involves beliefs about patient role and knowledge

about one's condition and treatment (Hibbard et al., 2004). Patients in Stage 1 are

"overwhelmed and unprepared to play an active role in their health" (Hibbard et al.,

2009, p. 354).

While Stage 2 patients display knowledge of medications and lifestyle changes and belief in the importance of active involvement in one's own healthcare, Hibbard et al. (2004) claim that "only a small amount of activation is needed to endorse these items" (p. 1014). However, they "lack knowledge and skills for self-management" (Hibbard et al., 2009, p. 354). Skills and confidence are characteristic of later development. Items at the midpoint of the scale involve confidence in the one's ability to identify when they need healthcare, that one can follow-through on medical recommendations and independently manage symptoms. Maintaining needed lifestyle changes, confidence in managing new situations, problems, and preventing chronic illness from interfering with one's life are at the top of the activation continuum, indicating the greatest activation (Hibbard et al., 2007). Those who score high on the activation assessment typically understand the importance of taking a pro-active role in managing their health and have the skills and confidence to do so (Hibbard et al., 2007).

Patients at the highest activation stage have mastered the ability and have the confidence to "stay the course under stress," including maintaining lifestyle changes, handling problems not just symptoms, under stress, and keeping their health problems from interfering with their health (Hibbard et al., 2004). The distribution of survey items on the currently used PAM-13 aligned with the four factors and their respective score ranges are further detailed in Chapter Three, which describes the scoring of the measure.

In summary, compared to constructs such as self-efficacy, which is predictive of a specific behavior, Hibbard et al. (2008) contend that stages of activation demonstrate that activation is a more global construct that includes self-efficacy, behavior, and knowledge.

Furthermore, research demonstrates that unlike self-efficacy, activation predicts a wide variety of health behaviors (Hibbard et al., 2007).

The PAM-13

The PAM assesses a broader range of the dimensions of activation than other more traditional methods of assessing activation (Hibbard et al., 2004 Kamajian, 2014) and self-efficacy (Greene & Hibbard, 2011). The PAM-13 assesses activation through the series respondent's answers to successive questions that gauge the person's self-concept as a manager of one's health care. Respondents indicate their level of agreement on a four point scale ranging from 1(*disagree strongly*) to 4 (*agree strongly*), with a 5 (*non-applicable*) response option (Skolasky et al., 2011). A sample question is "Taking an active role in my health care is the most important factor in my health and ability to function." The PAM-13 has been translated into different languages and has undergone reliability and validity testing in domestic and international studies. Psychometric properties of the PAM-13 demonstrate conceptual clarity and empirical development of the patient activation concept. Hibbard et al. (2004, 2007) report the instrument's strong psychometric properties, including Rasch person reliability and content, construct, and criterion validity established during instrument development and subsequent studies. Hibbard et al. (2004) established criterion validity of the 22-item PAM during the pilot study. Cohen's kappas for measured activation of 10 respondents compared with three expert independent judges classifications were .80, .90, and .90 (p<.001), indicating high content validity. Hibbard et al. (2004) found those with higher activation also self-reported significantly better health measured by the Short Form 8 (SF-8™) functional health survey (Optum.com, 2014), evidence of criterion validity. They were also more

likely to exercise regularly, eat more fruits and vegetables, follow a low-fat diet, not smoke, engage in consumeristic behaviors, and have significantly lower rates of doctor, emergency room visits and hospital stays, establishing construct validity of the PAM-22.

Other researchers evaluated the precision of the measure across demographic groups. Skolasky et al. (2011) conducted a cross-sectional analysis assessing the psychometric properties of the PAM-13 in 804 multimorbid adults. PAM-13 scores demonstrated construct validity with health behaviors, with a 10-point change in scores increasing the odds for physical activity, structured exercise, and medication adherence, 21, 16, and 13 percent, respectively. Physical activity was also positively associated with activation stage. Skolasky et al. tested Goodness of Fit of the observed data from PAM-13 administration using Bayesian Information Criterion and the four-factor structure, versus that of three, two or one for patient activation. Since none of the respondents agreed strongly with PAM-13 items 12 and 13, indicative of activation Stage 4, the highest level of activation, this confirmatory latent class analysis demonstrated that the three class model had the best fit and was statistically significant, establishing construct validity. Additionally, Skolasky et al. found a positive correlation between activation scores and stage and scores on the Patient Assessment of Chronic Illness Care (Glasgow et al., 2005) and the Primary Care Assessment Survey (Safran et al., 1998), which is evidence of criterion validity. In a test of criterion validity, Hung et al. (2013) established convergent validity of the PAM-13 with a 6-item self-management survey ($r \sim .4$), and divergent validity (r range = .007-.125, small) with the 13-item CAHPS.

In developing the PAM, Hibbard et al. (2004) established Rasch person reliability for the preliminary 21-item measure as .85 (real) to .87 (model), a Cronbach's alpha of

0.87, and test-retest reliability using standard error of measurement of 1.96, indicating the 95% confidence interval for estimated activation. The Rasch person reliability of the final 22-item instrument was 0.87 when tested in a national probability sample (N =1,515) of primarily white females. Hibbard et al. (2004) reported equal performance of the measure for those with and without chronic conditions, including different health status levels, and across several chronic conditions. Instrument reliability was stable across age groups, which suggested the instrument could be used to assess activation across a variety of subgroups. Hibbard, Mahoney, Stock, and Tusler (2005) reported slightly lower reliability of the PAM-13 compared to the 22-item PAM for those not chronically ill, 85 years and older, in poor health, and at lower income and education levels. They maintain that the lower reliabilities remain within the acceptable range. The PAM-13 had a Rasch person reliability of .81 (real), with the score accounting for 92 percent of the 22-item PAM when it was regressed on the 22-item PAM (Hibbard et al., 2005). Alegriá, Sribney, Perez, Alderman, and Keefe (2009) and Skolasky et al. (2011) each reported Cronbach's alphas of 0.83 for the PAM-13, compared with a higher alpha of 0.95 reported by Becker and Roblin (2008).

PAM-13 mean activation scores across studies reviewed ranged from 39.6 to 69.3, with a range of standard deviations between 10.0 and 16.7 are summarized in Table 3. Rask et al. (2009) in an uninsured minority primary care clinic population and Hung et al. (2013) in a rural population reported a relatively larger range of scores in Stage 4 activation (a ceiling effect) than in other levels. As a result, Hibbard and colleagues are examining a 5-level model, which would add some high end items to the scale to cover more of this possible trait (Hung et al., 2013) and add more precision to the higher end of

the activation dimension (Hibbard & Cunningham, 2008). In contrast, Skolasky et al. (2011) reported a ceiling effect of activation scores ranging from 55.2-67 (Stage 3) in multimorbid older adults, while Mosen, Schmittdiel, and Hibbard (2007) reported the lowest scores among older adults.

Table 3

Distribution of Activation Scores across Activation Stages from Studies

Study /N	Population/setting	Mean (SD)	% Stage 1 Activation (0-47)	% Stage 2 Activation (47.1-55.1)	% Stage 3 Activation (55.2-67)	% Stage 4 Activation ($\geq$ 67.1)
Chuback et al. (2012) N = 2,341	Clinic patients integrated delivery system	58.0 (13.3)	17.7	24.1	36.4	21.9
Deen et al. (2011) N = 252	Community health center patients	58.92 baseline	31	19	18.3	31.7
Hibbard & Cunningham (2008) N = 17,800	2007 Health Tracking Household Survey	63.7-66.9 (by age)	6.8	14.6	37.2	41.4
Rask et al. (2009) N=287	Urban public hospital diabetic clinic	69.3	7.6	9.6	20.7	62.2
Lubetkin et al. (2010) N=527	Adult community urban health center	63.7	16	15.8	27	41.2
Lubetkin et al. (2014) N=460	Inner-city diverse ambulatory care	64.4 (16.7)	12	18	32	38
Mosen et al. (2007) N= 2,224	Health plan program members	56.8 (10.0)	10.3	37.2	22.7	14.3
Skolasky et al. (2011) N = 855	Multimorbid older adults	56.6 (12.9) range 16.5-100	18	29.1	35.7	17.2
Ryvicker et al. (2012) N = 249	Elderly urban home care patients	53.2 (13.6)	31.7	13.7	41.8	12.9

Importance of Assessing Patient Activation

Hibbard et al. (2005) corroborate with Bodenheimer, Wagner et al. (2002) and Battersby et al. (2010) that supporting patients in their role as self-managers is an essential element of chronic illness care. Recent changes in health care financing and the

trend towards innovative care delivery models justify the need for more knowledgeable patients and caregivers capable of assuming a more active role in their care to optimize their health care (Ryvicker et al., 2013). Information about patient capabilities to assume self-management can facilitate clinicians to encourage patient engagement in their care (Hibbard et al., 2007). Given a body of research findings (Mosen et al., 2007; Von Korff et al., 1997) that consistently demonstrated that engaged, informed, confident and skilled patients are more likely to perform activities that promote their own health, Remmers et al. (2009) agree with Hibbard et al. (2007) regarding the value of assessing activation. Hibbard et al. (2005) advocate for integrating quality of care measurement into the care delivery process by obtaining baseline measures targeted for improvement against which improvement can be measured.

Hibbard's approach was consistent with the Institute of Medicine Summit on the Institute of Medicine *Crossing the Quality Chasm* (IOM, 2001) recommendations for designing measurement methods, which included three major areas. The first is to focus on the patient experience and patient outcomes. The second is to measure intermediate outcomes, including knowledge and skills for self-management, to improve the care of individual patients and assess quality across groups of patients. The final recommendation is to longitudinally measure what happens to patients over time to understand how care impacts patients' experiences, self-management capacity, quality of life, health and function.

Research findings (Becker & Roblin, 2008; Hibbard et al., 2007) that more activated patients were more likely to engage in self-management behaviors suggest that improving activation levels and sustaining such gains is a viable quality improvement

approach. Whereas patient activation may have a role in decreasing health disparities, Hibbard and Cunningham (2008) and Hibbard et al. (2008) recommend the need to further establish the feasibility and results of assessing activation in clinical settings that provide care to less advantaged populations, such as lower income and minorities need.

The utility of measuring patient activation for interventions. Patient activation is the entry point on a continuum of engagement, enhanced self-management, and improved health outcomes; therefore, it is important for health care providers and health care delivery systems to support patient activation as an intermediate outcome. Ryvicker et al. (2013) acknowledge the growing interest in tools that help identify patients who could benefit from additional self-management support for both chronic illness management and prevention, as well those to help tailor behavioral interventions to the patient's level of self-management readiness.

Since each activation stage reveals insight into an array of health-related characteristics, including attitudes, motivators, behaviors, and outcomes, Hibbard et al. (2004) contend that the PAM's probabilistic hierarchy of item difficulty provides useful information about gaps and related behavior change opportunities, including what type of intervention is needed to increase activation specific to where the person is on the continuum. Ryvicker, Peng, and Feldman (2012) add that "the underlying premise of the PAM is that treatment, education and behavioral interventions can be tailored to a patient's activation level to engage patients more effectively in managing their health" (p. 1578). Hibbard et al. (2007) summarize the connection between activation and intervention:

These stages of activation provide insight into possible strategies for supporting

activation among patients at different points along the continuum. The apparent

developmental nature of activation suggests strategies for increasing activation

can be tailored to the state of activation of an individual patient. The measure has

the potential of providing a guide to economical interventions targeted to a

patient's needs by precisely identifying the stage of activation with a brief

questionnaire. (p. 1445).

Hibbard (2009) describes tailoring based on activation stage as encouraging realistic

behaviors specific to activation level and tailoring support to activation stage.

Battersby et al. (2010) suggest that health care providers could set appropriate

goals aligned with the patient's baseline activation data. This allows them to

systematically work with patients toward incremental increases in activation by assisting

them to close gaps that prevent them from being fully engaged in their health and

healthcare. Battersby et al. compare this progression to Bandura's (1997) Social

Cognitive Theory construct of self-efficacy, since small successes resulting from such

interventions can increase confidence and skill for patient self-management.

As an additional consumer activation strategy, health care providers can

customize discussions with patients based on review of patient responses to their PAM

assessments (Hibbard, 2009). Using a "visual scan" discussion process, the provider

scans the patient's PAM survey responses then elicits the patient's perspective about what

occurs as they try to manage his condition. Hibbard (2009) cites anecdotal evidence that

the resulting discussion "supports patient self reflection, awareness, and problem solving,

and helps to identify impediments to engaging in productive health behaviors" (p. 20S).

Augmenting the traditional individual health risk level applications of patient activation information, Hibbard et al. (2005) claim its population management utility for delivery systems where it can be used to intervene early with patients whose self-management skills are inadequate, to prevent them from becoming part of a high-risk group.

In summary, assessment of activation provides information about the patient's stage of activation and suggests specific patient behaviors linked to the stages that need to change to increase activation. "Clinicians able to effectively support activation in their patients, and take fuller advantage of the patient as a key team member, could potentially deliver more effective and efficient care (delivering outcomes for less costs)" (Hibbard et al., 2007, p. 1446). Most relevant to this research proposal, Hibbard et al. (2007) acknowledge that because activation data will not propose methods for facilitating behavior changes, other theoretically guided methods are needed to develop targeted interventions. Hence, Hibbard et al. (2007) assert that the identification and testing of stage-specific theoretically guided interventions was a significant gap in the efforts to improve patient activation. Furthermore, based on research findings of activation stages in specific populations, it may be necessary to tailor interventions to both to activation stages and population characteristics. This is particularly important for nurse-managed health centers, whose vulnerable populations could benefit from improved health care delivery processes and patient outcomes resulting from interventions that address population-specific determinants.

Patient Activation Research

The PAM-13 (Hibbard et al., 2005), an abbreviated version of the PAM (Hibbard et al., 2004), is currently used to assess patient activation. At least 85 studies have

documented the PAM's ability to measure patient activation and to predict a range of

behaviors, even with wide demographic and socioeconomic variability (Kamajian, 2014).

Research has demonstrated a direct correlation between increased patient activation and

improved levels of self-care. A review of research literature cited by Kamajian (2014)

established the utility of activation in the following health care delivery improvement

activities:

- assessing which patients are prepared and able to self-manage
- segmenting an enrolled patient population and directing more resources to the low activated patients for more efficient resource utilization
- tailoring support and education to facilitate increase in activation among those at lower activation levels
- tracking the impact of interventions and tailored support on increasing patient activation levels

Additionally, this body of research has generated data regarding activation's

association with self-management and improved health outcomes, its ability to predict

health outcomes, and its changeability, including results of tailoring intervention to

activation levels. Of particular interest in this current study is research regarding

population-specific determinants of activation, since investigations of this nature have the

potential to generate additional information that may prove useful in tailoring

interventions. The following sections summarize activation research across these

categories, which used the PAM-13 unless otherwise specified.

Studies of activation as a predictor of health outcomes. Numerous studies

have demonstrated that activation stage predicts health behaviors and subsequent health

outcomes. Earlier studies used cross-sectional telephone surveys (Mosen et al., 2007)

and secondary data analyses methodologies (Alegriá et al., 2009; Remmers et al., 2009),

compared with more recent cross-sectional studies conducted in primary care settings

(Rask et al., 2009). As a measure of self-management capacity, early activation studies focused on establishing relationships between activation and concurrent self-management behaviors, clinical indicators (medication adherence, quality of life, physical and mental functioning), and future health outcomes (Mosen et al, 2007). Subsequent studies aimed to investigate if the degree of activation significantly impacted proximal patient self-management behaviors— doctor-patient communication (Alegriá et al., 2009) and more distal health outcomes. In these studies, patient activation was the independent variable predicting a range of behaviors, including healthy behaviors (diet and exercise), disease-specific management behaviors (monitoring blood sugar levels), and consumeristic behaviors such as accessing services (Hibbard et al., 2004, 2005). In general these studies demonstrated the association between higher activation stages and more active preventive health behaviors (regular exercise and diet adherence) and self-rated physical and mental health (Greene, Hibbard, & Tusler, 2005; Mosen et al., 2007; Remmers et al., 2009).

In a cross-sectional survey of chronically ill patients (Mosen et al., 2007) those with higher activation scores (PAM-22) were more likely to perform self-management behaviors and self- reported greater medication adherence and quality of life, and physical and mental functioning. A secondary data analysis of the second wave of a stratified random telephone PEW/RWJF 2008 Hispanic Health Care Survey of patients with a doctor visit that year (Alegriá et al., 2009) found that U.S. born Latinos with higher activation scores had mean doctor-patient communication scores 61 points higher than those with lowest scores, compared with 24 points higher for the foreign born. Based on findings consistent with those of a previous study by Alegriá et al. (2008) that

established activation as a skill that can be taught to reduce racial and ethnic disparities, an additional recommendation was to include activation as a method to increase engagement.

Remmers et al. (2009) were the first to report an independent association between patient activation and future health-related measures, based on a cross sectional retrospective analysis of secondary data of randomly selected diabetic adults. Activation (PAM-22) scores predicted three diabetes clinical outcomes and all cause discharges. Patients with higher scores were significantly more likely to experience better future outcomes. Remmers et al. identified the need for future research to determine methods for increasing activation scores, the comparative effectiveness and resource intensiveness of PAM score-based verses other interventions, and to establish usability of the PAM in clinical care settings.

Activation scores significantly predicted emotions in everyday life and in managing health, accounting for 21 percent and 20 percent of the variation in positive and negative emotions, respectively, in a cross-sectional study by Hibbard and Mahoney (2010). Higher activation levels predicted more confidence in emotions related to managing health and specific health goals. Rask et al. (2009) conducted the first systematic assessment of activation in a convenience sample of an indigent population of minority and primarily uninsured urban hospital diabetes clinic patients. Higher activation scores were correlated with higher rates of self-care behaviors and diabetes management, but not with knowledge of diabetic-specific lab parameters. Activation did not predict differences in health care utilization six months post initial survey. Since the majority of the patients were at the highest stage of activation, the authors suggested the

need to develop modified activation measures to further distinguish readiness for self-management among indigent populations.

Donald et al. (2011) identified a gap in the literature of a clear link between activation for self-management and health services utilization. A cross-sectional survey measured the association between frequent attendees with a primary care provider (more than 12 visits in 12 months) by chronic condition (diabetes, pre-diabetes, cardiovascular disease), demographics, illness duration and severity, and psychological functioning variables. Activation stage and primary care visit frequency were inversely related, although only those with cardiovascular disease at the lower two activation stages had more frequent visits compared to those at the highest stage. Thus, the authors concluded that the more complex disease management requirements of diabetes might necessitate more visits irrespective of activation stage.

In multivariate linear regression models patient activation was related to 12 of 13 patient health outcomes in four areas of health (prevention, unhealthy behaviors, clinical indicators, and costly utilization) in the expected direction in a cross-sectional study in four primary care clinics (Greene & Hibbard, 2011). For every 10-point increase in patient activation, the predicted probability of having an emergency department (ED) visit, obesity, or smoking was one percentage point lower, while the likelihood of having a breast cancer screen or clinical indicators (e.g. for diabetes, hypertension, cholesterol, or triglycerides) in the normal range was one percentage point higher. The authors concluded that based on the relationship between activation and a broad range of health-related outcomes, future studies should examine the effectiveness of interventions to support patient activation.

Ryvicker et al. (2012) examined whether activation, demographic variables, and clinical factors predicted home care patients' hospitalization and emergency department use in adjusted models. A dichotomous measure compared the two lower stages (1 and 2) with the two higher stages (3 and 4) of activation. Activation did not significantly predict hospitalization or ED use. Race was a significant predictor, with non-Whites more likely than Whites to be hospitalized and medium income patients more likely to have an ED visit than the lowest income group.

Young et al. (2014) examined the association between patient activation and adherence to asthma medications and disease control in a low-income rural asthmatic population, randomly selected for recruitment in a cross-sectional telephone survey. While the majority of patients were at the highest stage of activation, the least activated patients had lower mean medication adherence and asthma control scores than those at highest activation stage. Multivariate linear regression analysis demonstrated significant positive associations between Stage 2 activation and adherence and asthma control and Stage 3 activation and asthma control. Because the patients at Stage 4 did not report the highest adherence and asthma control, the authors suggested that patients could be overconfident or have difficulty maintaining behaviors over time or during stress, which is consistent with the activation matrix. The authors recommended further study of patient activation and its effect on health care in rural communities.

Studies that demonstrate activation can be changed. When activation is studied as an outcome itself, examining research evidence that demonstrates it can be modified using specific interventions is important to achieving an array of more distal targeted disease improvement outcomes. Randomly controlled clinical trials are the best

source of evidence for determining activation's changeability and prediction of subsequent health behavior change. These studies used repeated measures of activation at baseline and at least one other time point post intervention, to test the significance of the change. Earlier activation research (Hibbard et al., 2007) established that patient activation was a useful tool for improving health outcomes by documenting evidence that activation was changeable and directly linked to behavior change. Subsequent research by Hibbard and Cunningham (2008) and Greene and Hibbard (2011) established the feasibility of developing and implementing interventions designed to enhance activation. These studies validated the role of patient activation in efforts to improve patient self-management and confirmed a strong relationship between activation and a broad range of health-related outcomes. Subsequent hypotheses that improving activation has the potential to affect multiple morbidities focused on investigating the impact of strategies to improve activation on a range of health indicators and health outcomes.

A randomized controlled intervention trial of chronic disease patients (Hibbard et al., 2007) used repeated measures at three time points to evaluate the effectiveness of the Chronic Disease Self Management Program intervention. There were significant changes in activation levels and 11 out of 18 self-management behaviors, with positive sustained change in activation for the intervention group at six months. Since activation in the control group also increased over the baseline over the study period, the authors concluded that the intervention was not effective in increasing activation in the intervention group over those gains in the control group. Because the intervention had previously demonstrated mixed results in improving activation in other studies, the authors suggested the need to identify the most effective interventions for increasing

activation, as well as factors that may stimulate spontaneous activation. Furthermore, Hibbard et al. (2007) suggested that different interventions might be required for patients to progress from Stages 1 to 2 and from Stages 3 to 4.

Intervention studies involving primary care practice enrollees provide useful information about the feasibility of assessing activation in health care settings and using data to guide interventions. In a pre-visit patient activation intervention to build patient question formulation skills prior to attending their community health center physician visit by Deen et al. (2011), post-intervention activation scores were significantly increased, with the greatest increase in the lowest scores.

A longitudinal randomized control trial by Ryvicker et al. (2013) compared the effects of two organizational interventions on change in activation scores and hypertension (HTN) outcomes in black home care patients over a 12-month period. Goals for this augmented patient-centered self-management intervention, grounded in activation principles (patient-centered goal setting and coaching) to improve HTN management, aligned with the patient's ability with progression towards incremental achievements, which over time were posited to steadily increase confidence and skill for effective self-management. There were no significant changes in activation scores for both the basic and the tailored patient centered activation interventions. There was great variability in activation scores, which averaged a decrease of .07 over the 12-month period with a change score range of -58.3 points to 50.1 points. In the multivariate model, lower baseline activation scores were the strongest predictors of activation score increase, while lower health literacy, older age, and lower income were significant predictors of lower activation scores. Findings on age and incomes were consistent with

those of Hibbard and Cunningham (2008). Overall change in activation was not associated with HBP control. Since this study measured activation over a 12-month period, compared to 6 months in studies by Hibbard et al. (2007) and Hibbard et al. (2009), the authors concluded that the evidence on whether longitudinal improvements in activation are associated with improved health outcomes is mixed. However, there is a higher probability that history and other intervening factors related to chronic conditions might impact activation.

In summary, while these studies suggest the changeability of activation, results are inconclusive about whether such changes are sustained over the longer term.

Studies tailoring intervention to activation levels. Ensuing studies established that baseline measures of patient activation could guide interventions to increase activation, promote specific health behaviors, and improve future health outcomes. Hibbard and Tusler (2007) investigated the likelihood of adoption of health behaviors based on different stages of activation, mapping disease specific responses to diabetes, heart disease, high cholesterol, and asthma/chronic obstructive pulmonary disease (COPD) behaviors of phone survey respondents were to activation stage. Spearman's rho correlations between activation stage and disease-specific behaviors established the basis for future intervention studies using "next steps approaches" to tailoring interventions to activation level.

In a review of the evidence of the contribution of patient activation, Hibbard et al. (2013) summarize studies contributing to the emerging evidence that interventions that tailor support to the individual's level of activation and that build skills and confidence result in increased patient activation. Overall, patients at lowest levels of activation

experienced the greatest change in activation post intervention, indicating that they benefit most from the intervention.

A 6-month quasi-experimental pre-post design study (Hibbard et al., 2009) tailored telephonic coaching support based on assessment of activation to determine the relative benefit of the intervention compared with the usual generalized disease management approach. Coaches encouraged behaviors based on what was realistic at each activation level, asking patients to do what they felt confident and able to succeed at, facilitating confidence in their ability to manage their own health, based on self-efficacy (Bandura, 1997). Compared to the control group, the intervention group had statistically significant increases in activation scores, adherence, and health services utilization in all but two clinical indicators. Mean activation scored increased 4.6 points in the intervention group, compared to 1.4 points in the control group. Hibbard et al. (2009) interpreted these findings to demonstrate that increased patient activation leads to an increased ability and desire to more successfully manage one's conditions, further validating that increased activation involves progressive self-efficacy in self-management. Furthermore, results established that tailoring coaching to activation level and employing a repeated measures design to track progress could demonstrate improved outcomes. Hibbard et al. (2009) suggest that tailoring by allocating more time to patients with lower activation scores improves efficiency by directing resources to patients requiring the most support.

Studies of determinants of activation. Aforementioned studies conducted in primary care settings demonstrated that primary care practices have a stake in identifying and delivering practical interventions to increase activation. Another line of research

involving determinants of activation provides insight into potentially modifiable patient factors that may be amenable to intervention. These study designs of determinants of activation tend to be cross-sectional convenience samples.

Becker and Roblin (2008) conducted a retrospective, observational study using a cluster randomized design based on a practice climate assessment. The role of physician trust as a mediating variable between practice climate and patient activation in a primary care patient panel was examined, with patients with three different diagnoses nested in 16 teams of 241 providers. Significant positive associations between practice climate and patient trust in their primary care physicians (covariates) and between patient trust and activation suggested that practice climate is a determinant of patient activation. These results imply that supportive trustworthy interactions changed the traditional physician-patient power dynamic, resulting in patients assuming a more active role in their health.

Cunningham, Hibbard, and Gibbons (2011) compared activation levels of Blacks, Whites, and Hispanics in a subsample of adults responding to the patient activation measure questions fielded in the 2007 Health Tracking Survey. Other variables measured were age, gender, educational attainment, family income, health insurance status, U.S. or foreign-born status, measures of perceived health, prevalent health conditions, and unmet health needs. Multivariate analysis controlled for socioeconomic status (income and education), demographics (age, gender) region of the country and metropolitan versus nonmetropolitan status. Findings that relative to Whites, Black, and Hispanic activation levels were the lowest, including low activation levels among Hispanic immigrants, were interpreted to reflect issues related to acculturation.

In one of the first studies examining patients' perspectives of their primary care experiences, Wong, Peterson, and Black (2011) conducted a cross-sectional random digit dial survey of a stratified sample of Canadian adults. The study examined whether activation differed between those chronically ill and non-chronically ill, in the context of the relationship between patient characteristics and experiences with primary care (primary care access, utilization, responsiveness, interpersonal communication and satisfaction) and activation. In the bivariate analysis, activation had the highest correlations with scales measuring "Eliciting Concerns" and "Compassionate, Respectful." Linear regression models examined the association between each independent variable and its association with activation, controlling for potential confounders (age, sex, marital status, ethnicity, education, and self-reported health). Adjusted model chronically ill activation scores were significantly associated with enough time with the doctor, eliciting concerns, patient-centered decision making, whole person care, and satisfaction with a usual source of care and with a family doctor. For the non-chronically ill, only unhurried care was significantly associated with activation. Results suggested that patients rely on their relationship with their care provider in addition to self-management knowledge; hence, primary care experiences are important correlates of activation. A strong connection with a place of care was considered to be more important than the model of care for the chronically ill, while the quality of interpersonal interaction may be most important for others. A significant recommendation relevant to the proposed study was the need for further investigation of how primary care can most effectively improve patient activation.

A cross-sectional study by Lubetkin, Wu, and Gold (2010) compared activation scores of a convenience sample of three inner city low income minority health center patients to those of the general population. Males and those with higher education, higher self-rated health, and adequate health literacy were more activated, compared with other groups. Compared with the general U.S. population, more health center patients were at the lower activation level. Since English-speakers scored higher than Spanish-speakers, with instrument administration in both languages, the authors recommended further examination of the reliability and validity of the Spanish version of the PAM-13 and inclusion of cognitive testing to clarify concepts and domains of activation among Spanish-speakers.

A subsequent cross-sectional study by Lubetkin, Zabor, Brennessel, Kemeny, and Hay (2014) compared activation scores among English-, Spanish-, and Haitian-Creole-speaking patients, using surveys in respondents' respective native languages. Age, gender, race, ethnicity, education, and income were not associated with activation. Controlling for acculturation, activation was lower for Spanish-speakers and Haitian Creole-speakers compared with English-speakers. This study emphasized the need for further exploration of the effects of language and culture on activation and further examination of the beliefs and informational needs of the common U.S. ethnic groups.

Alexander, Hearld, Mittler, and Harvey (2012) conducted a cross-sectional random digit dial survey of chronically ill patients with data from the 2008 Area Resource File that examined the association between patient perceptions of role relationships with their physicians and levels of activation. Independent variables included the quality of the interpersonal exchange with physician, fairness in treatment

process, out of office contact, and treatment goal setting. Significant study findings from multivariate regression analysis were that patient-physician role relationships (exchange, fairness, out of office contact) were associated with higher activation level, although goal setting was not. Availability of a regular physician was associated with lower activation levels, which was inconsistent with findings from Hibbard and Cunningham (2008). Researchers recommended that efforts to increase activation address roles and relationships between provider and patient, since they can shape behavior and attitudes of patients that either support or discourage activation.

Chuback et al. (2012) conducted a prospective cohort study of elderly diabetic and cardiac patients to understand the natural history of activation and factors that affect its change over time, measured at baseline and one year later. Age and self-reported health status were the only strong predictors of activation change between stages, adjusting for baseline activation. Recommendations highlighted the importance of reevaluating activation and conducting analyses using activation as an exposure, a covariate, and an outcome to assess it at the relevant time point.

In a secondary analysis of 2007 Health Tracking Survey and the 2008 Area Health Resource file data Chen, Mortensen, and Bloodworth (2014) examined the association between contextual factors and self-reported activation levels among depressed patients. Higher income, native born, usual source of care at a physician's office, and availability of community mental health centers predicted higher patient activation in the multiple linear regression model. Race, ethnicity, health status, and census data were the only covariates associated with activation. Results identified the importance of the primary care setting to a sustained relationship between patients and physicians in enhancing

engagement in mental health care. The authors underscored the need to intervene in low income and immigrant populations.

Analysis of data from the Health System Change's 2007 Health Tracking Household Survey (Hibbard & Cunningham, 2008) found an association between the following variables and activation level— age, income, education, health insurance, and Latino ethnicity. Alegría et al. (2009) measured age, gender, education, income, language of interview, and health insurance as demographic variables, and used health status a covariate. Alexander et al. (2012), Chen et al. (2014), and Chuback et al. (2012) assessed baseline health status. Hibbard et al. (2008) found higher activation levels in chronically ill versus well individuals. Self-reported health status was highly associated with activation in some studies, but not in others.

These aforementioned studies demonstrate the stability of the construct of activation and its measurement, its capacity to predict future health outcomes, and its changeability. In reporting findings associated with testing and confirming the reliability of the activation measure, Hibbard et al. (2004) stress the need to identify and use evidence-based interventions to increase activation. Greene and Hibbard (2011) recommend that future work examine the effectiveness of interventions to support patient activation. Donald et al. (2011) advocate for continued efforts to improve activation for self-management in chronic care. Based on study results investigating tailoring interventions to activation stage, Hibbard and Mahoney (2010) reiterate that the association of activation with a relatively full range of health behaviors and multiple health outcomes justifies the need to investigate the mechanisms and processes by which increased activation occurs.

Furthermore, activation study results underscore the importance for providers to understand what skills, knowledge, beliefs, and motivators are required for consumers to become activated in order to develop "effective interventions and educational programs" to increase individual and patient population activation (Hibbard & Mahoney, 2010, p. 377).

Hibbard and Mahoney (2010) propose that health behavior theories may assist with framing interventions and evaluation of their effectiveness. Greene and Hibbard (2011) contend that activation refers to "one's the knowledge, skills, beliefs, and confidence for managing health and health care—a broader underlying construct than prior measures such as locus of control, self-efficacy, and readiness to change" (pp. 520-521). Hibbard and Mahoney further describe one's belief about their ability to manage their health as part of their self-concept. Thus, one's activation stage may reflect one's self-assessment as managers of their own health, with the PAM measuring one's self-management self-concept (Hibbard & Mahoney, 2010). Therefore, while self-efficacy based interventions may improve self-management skills and confidence, this construct does not explain the motivation and internalization dimensions of activation. Alternatively, findings of Alexander et al. (2012), Becker and Roblin (2008), and Wong et al. (2011) highlight aspects of the patient provider relationship and care context that may further contribute to explaining patient activation.

Self-determination Theory (SDT)

Effective chronic disease management requires preparation of both the patient and the context of care for their respective collaborative roles (Lorig & Holman, 2003). Clark and Gong (2000) cite the importance of theories of human behavior based on learning

and motivation principles in designing evidence-based patient self-management education and for preparing providers to form effective partnerships with patients for optimum disease management. Clark and Gong specify self-regulation as the process by which patients who self-manage learn which strategies are effective in response to situations in order to decrease the impact of disease on daily life. Based on evidence review, they determined that effective self-management required patients to have sufficient confidence to engage in a high degree of decision-making independent of health professional consultation. Furthermore, Clark and Gong contend that when self-management goals reflect the patients' interests and concerns, the patient is more likely to follow a practitioner's advice. Congruent with Hibbard and Mahoney's (2010) emphasis on the social context, Clark and Gong recommend that providers use techniques, such as patient-centered communication, to develop partnerships with patients. Hence, assessing the relationship between the SDT constructs of autonomy support and autonomous motivation and activation can provide information about the capacity of both the patient and care context for effective self-management.

Overview of Self-determination Theory

Brewer and Rimer (2008) contend that since most behavior is outside conscious control, planning and intention require one to have an accurate idea of future goals, which they term "affecting forecasting." Since most individuals are not adept at anticipating future responses to health outcomes and other life changes, they advocate for theories to consider processes outside of conscious awareness, such as SDT. As the only theory of human motivation that assumes humans have a need for autonomy (Fortier et al., 2007), SDT is based on research findings that when people are more autonomously motivated

they feel more competent to accomplish relevant health outcomes (Williams et al., 2006).

Vansteenkiste and Sheldon (2006) trace the origin of SDT to Deci's (1971) research that

demonstrated that external contingencies, rewards, deadlines, and pressures undermine

voluntary task persistence, rather than support it, which contradicted the prevalent

contemporary behavioristic principles, such as those of Skinner (1974). "The theory is

meant to specify the fundamental causes, processes, and outcomes of human thriving, in

particular by conceptualizing the nature of "optimal motivation," and the general

conditions that support or undermine such motivation", according to Vansteenkiste and

Sheldon (p.64). Vansteenkiste and Sheldon cite Deci, Koestner, and Ryan's (1999)

review of subsequent research that confirmed that externally motivated participants felt

controlled by external factors and did not enjoy the task, rather than experiencing their

task engagement as self-initiated, autonomous, or self-chosen.

SDT proposes that three basic innate human needs (autonomy, competence, and

relatedness) must be satisfied for one to be internally motivated and to achieve optimal

growth and well-being (Fortier et al., 2009), reflecting the natural human growth and

development tendency (Ten Cate et al., 2011). As described by Ryan and Deci (2000),

autonomy reflects the need to feel volitional in one's actions, to fully and authentically

endorse one's behaviors, and to cause one's own behaviors; competence is the need to

feel effective in one's efforts and capable of achieving desired outcomes; and relatedness

involves the need to feel connected and understood by others. Ng et al. (2012) emphasize

that given the importance of satisfying these psychological needs for health and optimal

functioning, SDT identifies the contextual and personal factors— a supportive health care

climate, high level of autonomy causality orientation, and intrinsic life aspirations— for

optimizing need satisfactions. Of particular relevance to patient activation, an autonomy

supportive context fosters satisfaction of the three basic human needs of autonomy,

relatedness, and competence (Ng et al., 2012).

SDT is based on the metatheoretical belief about positive human nature, which

views the person as possessing a powerful potential for change. Vansteenkiste and

Sheldon (2006) specify that "the client is an active, growth oriented organism who has a

natural tendency towards personal development and change, and that every client has

strong inner resources to realize such change" (p. 64). SDT provides a framework for

explaining why one engages in specific behaviors and focuses on the degree to which

one's motivation towards engagement in activities, such as health, are self-determined or

controlled by external or internal pressures (Rouse et al., 2011). The premise of SDT is

that behavior change will occur and persist if it is autonomously motivated (Williams,

Rodin, Ryan, Grolnick, & Deci, 1998). Carroll, Fiscella, Epstein, Sanders, and Williams

(2012) further elaborate that patients will engage in behavior change when they

experience internal motivation (rather than external control), social support for behavior

change, and perceived competence with skills to effect the change and overcome barriers,

three components which converge within SDT. Of particular importance to sustained

behavior change is that autonomously regulated behavior is more stable and enduring and

has more positive effects on human well-being than controlled regulation (Ryan & Deci,

2000). Because the effectiveness of most community based health interventions depends

on adherence to self-care activities, including adoption of positive healthy life-style and

compliance with medical regimens (Fortier et al., 2009), SDT constructs addressing

motivation and autonomy supportive environments as precursors to competence are well suited to inform and guide efforts to improve activation.

Evidence confirming SDT's model of change. SDT was empirically confirmed in experimental studies in the 1980's (Deci et al., 1999) and in the 1990s in field studies in the education, business, sports, unemployment, and parenting domains (Deci & Ryan, 2000) involving outcomes including learning, optimal performance, persistence, and positive mood and has been tested in health care and health promotion contexts for more than 20 years (Vansteenkiste & Sheldon, 2006). SDT constructs have been used to predict health behaviors and to develop and test the effects of interventions to improve outcomes in health related domains. These include alcohol treatment (Ryan, Plant & O'Malley, 1995), weight loss (Williams, Grow, Freedman, Ryan, & Deci, 1996), exercise and diet (Williams, Freedman & Deci, 1998), smoking cessation (Williams & Deci, 2001; Williams, Gagné, Ryan, & Deci, 2002), and medication adherence (Williams, Rodin, Ryan, Grolnick, & Deci, 1998), further confirming SDT's model of change.

Ng et al. (2012) used metanalysis and structural equation modeling to confirm results of model testing in health care settings by Williams, Minicucci, et al. (2002) and Williams, McGregor et al. (2006). The SDT model of change focuses on an autonomy supportive health care climate, individual differences in autonomy, perceived competence, and autonomous self-regulation. Williams, McGregor et al. (2006) refer to the resultant sequence by which autonomy support, autonomous motivation, and perceived competence influence a health behavior as the "SDT process model of health behavior change." Figure 2 depicts the graphic of this model, in which the patients'

perception of providers' autonomy support leads to change in autonomous motivation, subsequent change in felt competence, and change in behavior and health indicators.

Autonomy Support		Autonomous Motivation		Perceived Competence		Health Behavior/ Outcomes
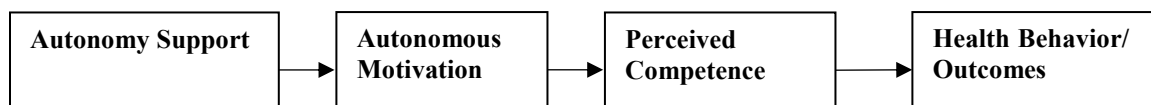
Figure 2. SDT Process Model of Health Behavior Change

SDT claims that supporting autonomy will motivate people to do well (Vansteenkiste & Sheldon, 2006). Based on studies using these constructs in the context of the patient-provider relationship (Carroll et al., 2013) in the weight loss (Williams, Grow, Freedman, Ryan, & Deci, 1996) and diabetes self-management (Williams, Freedman, & Deci, 1998) domains, autonomy support and autonomous motivation constructs may predict patient activation.

The construct of perceived competence and self-efficacy. A third SDT construct, perceived competence, assumes patients will be more adherent when they feel competent to carry out prescribed regimens (Rouse et al., 2011). Theoretical constructs from other theories, such as self-efficacy (Social Cognitive Theory; Bandura, 1997), which address cognitive concepts related to behavior change (efficacy, competence, and perceived readiness for change), are similar to those of perceived competence (Fortier et al., 2009). Although self-efficacy is closely related to perceived competence (Fortier et al., 2009), Williams, Freedman, and Deci (1998) argue that perceived competence represents a general variable used to explain an overall feeling of being capable of managing a disease, whereas self-efficacy is related to a specific behavior being assessed (Hibbard et al., 2008). Experiences that enhance self-efficacy involve past performance, physiological states, observation, and verbal persuasion (Fortier et al., 2009). The perceived competence construct refers to competence for engaging in a healthier behavior

or adhering to a regimen. The Perceived Competence Scale (PCS) assesses participants'

feelings of being able to continue a treatment regimen, using four questions consisting of

statements about one's self-perception of being competent, capable, and able to engage in

the regimen (Williams, Ryan, & Deci, 2014), concepts similar to those used to measure

activation.

The transtheoretical model (Prochaska & DiClemente, 1983) addresses

perceptions of efficacy, competence, and readiness to change. Its two primary

components are stages of change (readiness for behavioral change) and processes of

change, including strategies to progress through stages (Fortier et al., 2009). Fortier et al.

(2007) extend the concept of perceived competence to feeling capable of attaining

important health outcomes. Fortier et al. (2009) cite Markland's (1999) conclusion from

study findings of perceived competence in an exercise setting, that feeling competent

alone is not sufficient to promote optimal motivation or the persistence of a behavior.

Fortier et al. (2009) claim that "motivation and the persistence of behavior occur only

when perceived competence is accompanied by the perception of autonomy" (p. 159).

Therefore neither of the aforementioned theories addresses the individual's interest in

performing a behavior or how the social environment may influence such interest,

compared with SDT. This is particularly relevant in the health behavior change field,

which emphasizes the importance of persistence of healthy behaviors associated with

quality of life, as well as quality improvement efforts in primary care to improve health

outcomes. Furthermore, autonomy distinguishes SDT from other theories of motivation

(Fortier et al., 2009).

Patient activation (knowledge, beliefs, and confidence in taking action) measures a broader range of competence for engaging in self-management behaviors compared with both the self-efficacy and the SDT perceived competence constructs (Greene & Hibbard, 2011). Hence, since the dependent variable in this research proposal, Patient Activation, is a measure of competence in managing one's health and health care, and since the SDT perceived competence construct is deemed to measure a similar, albeit more narrow, domain than activation, this construct is not included in the analytical model. In accordance with the SDT process model of change in the proposed study, patient activation is the health outcome.

The SDT Constructs

Effective self-management requires one to manage the symptoms, treatment, physical and psychosocial consequences, and life-style changes inherent in living with a chronic condition (Barlow et al., 2002). Given the SDT model of change, assessing the relationship of autonomous motivation and autonomy support is relevant to identifying predictors of patient activation, which can be applied in designing theory-based interventions to enhance activation. Because the aim of this study is to identify the potential utility of constructs to design interventions to improve activation, this literature review focuses on research of interventions designed to enhance autonomous motivation and autonomy support in health care.

The construct of autonomous motivation. Motivation is the most complex of the three SDT constructs. Ryan and Deci (2000) view motivation to occur along a self-determination continuum ranging from non-self-determined (controlled self-regulation) to fully self-determined (autonomous self-regulation) and spanning extrinsic and intrinsic

motivations. The extrinsic and intrinsic motivations are further subcategorized into five types of behavioral regulations and associated locus of causalities along the motivation distinctions between controlled and autonomous self-regulations. These intentional motivations are further classified into controlled (external and introjected) and autonomous (identified, integrated, and intrinsic) regulation composites depicted by Ten Cate et al. (2011) and Vansteenkiste and Sheldon (2006), based on Ryan and Deci (2000).

Autonomously motivated behavior is characterized by the experience of a sense of volition, self-initiation and personal endorsement of the behavior, whereas controlled behavior occurs when one feels pressure to behave by some interpersonal or intrapsychic force. While an amotivated state in which individuals lack intention or desire to perform a behavior is also possible (Rouse et al., 2011), it is rarely measured in health contexts (Self-determination Theory, 2014) and the subscale is not included in some versions of the autonomous motivation measure, including the Treatment Self-Regulation Questionnaire (TSRQ). Table 4 summarizes Ryan and Deci's (2000) hierarchy of the five types of intentional motivations, progressing from primarily extrinsic to intrinsic, cross walked with controlled and autonomous regulation composites illustrates these associated behavior characteristics.

Vansteenkiste and Sheldon (2006) describe the extrinsic motivation continuum, comprised of the first four types of regulations, as reflecting the extent that individuals have internalized socially valued tasks with little intrinsic appeal. Conversely, intrinsic motivation results in autonomously motivated behavior, in which one experiences volition, self-initiation, and personal endorsement of the behavior (Williams, Freedman et al., 1998). Thus, intrinsically motivated behavior involves engaging in "the activity for

its own sake… because the activity is inherently enjoyable, satisfying, or challenging"

(Vansteenkiste & Sheldon, p. 67).

Table 4

Intentional Motivations Hierarchy

Type of Intentional Motivation	Regulation Type and Composite	Behavior Characteristics
Extrinsic	Controlled self-regulation External Regulation Fully external locus of causality	Least autonomous (self-determined) behavior Guided by extrinsic regulations, satisfies demands Behavior results from tangible and intangible rewards, external reinforcement or social pressure, or to avoid punishment. (Rouse et al., 2011; Vansteenkiste & Sheldon, 2006). e.g. Conforming to a rule that one does not accept as valid, because of punishment (Ten Cate et al., 2011)
Extrinsic	Controlled self-regulation Introjected regulation Somewhat external locus of causality	A partially-self-integrated form of extrinsic motivation Person is motivated by internal pressures and compulsions, [guilt, shame, and anxiety (Vansteenkiste & Sheldon)], to foster internal self-worth, or gain social approval (Rouse et al.). Not truly accepting behavior as one's own. Motivational forces originate within the individual, but external to the self (Vansteenkiste & Sheldon, referencing Deci & Ryan, 1995) because they are not freely endorsed by the person (e.g. accepting a rule made by others).
Extrinsic	Autonomous self-regulation Identified regulation Somewhat internal locus of causality	One endorses or accepts an intrinsic motivation or intention, while not resisting an unpleasant task (Vansteenkiste & Sheldon). Engagement results from understanding, acceptance, and valuing the benefits of its performance (Rouse et al.) Behavior is more autonomous and self-determined, resulting in persistence (Ten Cate et al., 2011).
Extrinsic	Autonomous self-regulation Integrated regulation Fully internal locus of causality	Behavior is consistent with other life goals, including physical and mental health (Vansteenkiste & Sheldon). External regulation of behavior is internalized as autonomous self-regulation (Ten Cate et al.; e.g. connecting rules to own norms and values).
Intrinsic motivation	Autonomous self-regulation Intrinsic regulation Fully internal locus of causality	"inherent interest in the activity at hand" (Rouse et al.), irrespective of operationally separate consequences.

Vansteenkiste and Sheldon refer to Ryan and Deci's (2000) view of intrinsic

motivation as automatically self-determined, since the person's full capacities are

willingly engaged in a self-catalyzing chain of activity. The term autonomous motivation

encompasses autonomously motivated behavior, which includes the three types of

autonomous self-regulations, ranging from the least integrated (identified), to integrated, to the most integrated intrinsic regulation composite.

According to Williams, Patrick et al. (2009) "people feel autonomous when they regulate their behavior volitionally (with the experiences of choice and reflective endorsement), whereas people feel controlled when they experience pressure or coercion to act in particular ways" (p.485). In summary, one feels autonomous because the behavior is important to them, rather than being coerced by others to engage in it. Because humans experience natural tendencies for growth and development by acquiring knowledge, skill, and habits through observation of others, Ten Cate et al. (2011) describe an internalization process by which learned behavior becomes one's own style. While prompting by an external factor may result in one initiating a behavior, Ten Cate et al. acknowledge the natural tendency for growth may change external regulation into a more self-determined regulation. Internalization is linked to the need for autonomy, since humans strive to integrate behavior to self-regulate it (Ten Cate et al., 2011). Significant others can affect internalization, by either exerting control through pressures, rules, demands, which leads to more introjected motivation, or rewards; or fostering the competence, autonomy, and relatedness, which can increase autonomous motivation.

Primary care interventions that might increase autonomous motivation are based on methods used to stimulate motivation related to self-regulated learning among medical students, such as fostering volition, agency and choice, as opposed to those that result in controlling motivations through regulations, requirements, pressures and external rewards (Ten Cate et al., 2011). Other interventions include encouraging patients that others rely on their self-management and to reflect on the benefits related to feeling more control

over one's health behaviors. Using technology to connect patients and providers can also facilitate autonomy (Williams, Lynch, & Glasgow, 2007).

The practical importance of the distinction between autonomously motivated behavior and controlled behavior is that only autonomous motivation is expected to result in long-term persistence and adherence required for patients to maintain a behavior sufficiently to control a disease or health outcome (Rouse et al., 2011). Williams, Grow, Freedman, Ryan, and Deci (1996) propose that since SDT differentiates between autonomous and controlled forms of motivation, it is useful in predicting sustained participation in treatments and maintenance of health behavior change. A meta-analysis by Levesque et al. (2006) confirmed that autonomous motivation is associated with positive health and behavioral outcomes, including adherence to medication regimens, and weight-loss, while controlled forms have been linked to treatment non-adherence and poorer health and well-being. Pelletier, Fortier, Vallerand, and Briere (2001) demonstrated an association between higher autonomous exercise motives and adherence. Hence, one can propose an association between autonomously motivated behavior and higher activation levels, which are indicative of greater confidence to self-manage. Furthermore, Rouse et al. (2011) cite the importance of environments that support development of autonomous regulations for optimal physical and psychological health.

Autonomous Motivation measurement. The 15-item Treatment Self-Regulation Questionnaire (TSRQ), comprised of two subscales (autonomous and controlled motivation), measures motivation for engaging in or changing a health behavior with responses on a seven-point likert scale, ranging from 1 (*not at all true*) to 7 (*very true*; Levesque et al., 2007). Versions of these 15-item scales, available in the Health Care

Self-Determination Theory Packet (Williams, Ryan, & Deci, 2014), have been used to assess motivation for healthy behaviors (diabetic diet, exercising regularly, smoking cessation, drinking responsibly). An eight item abbreviated version of the exercise TSRQ (Williams, Freedman et al., 1998) consists of two 4-item subscales measuring autonomous (items 2, 4, 6, 7) and controlled reasons (items 1, 3, 5, 8) for engaging in a health behavior (Williams, Ryan, & Deci, 2014). A sample autonomous motivation response is "Because I personally believe it is the best thing for my health" (Item 2). A controlled motivation response is "Because I would feel guilty or ashamed of myself if I did not manage my health and health care activities" (Item 1).

The TSRQ, modeled on self-regulation questionnaires (Ryan & Connell, 1989) and adapted from the questionnaire used in an alcohol treatment program (Ryan, Plant, & O'Malley, 1995) assessed patients' autonomous and controlled reasons for continuing in a weight loss program (Williams et al., 1996). This 9-item scale used a series of stems followed by reasons varying in the degree representing autonomous motivation, measured on a five point scale ranging from 1 (*not true*) to 5 (*very true*). Current TSRQ versions assess self-regulation using a question, consisting of a "stem, followed by a health behavior and several reasons that vary in the degree to which they reflect autonomous motivation, developed by Ryan and Connell (1998).

Lévesque et al. (2007) established construct validity of the 15-item TSRQ across four sites and three different health behaviors, diet, exercise, and smoking (N = 2,731). Exploratory factor analysis identified four factors reflecting autonomous motivation, introjected regulation, external regulation, and amotivation in each of the 15-item TSRQs for diet, exercise, and tobacco use. Williams et al. (1996) established construct validity

of the 9-item TSRQ, using principal components analysis with varimax rotation for the

weight loss study participants sample at time 2 (N= 94). Two clear factors were

identified, called controlled reasons and autonomous reasons, with six items loading on

controlled reasons (eigenvalue =3.21) and three loading on autonomous reasons

(eigenvalue = 1.84). All item loadings were greater than .50 on their primary factor, and

no cross-loadings were greater than .24 (Williams et al., 1996). This study also

established criterion validity by correlating the autonomous subscale at time 2 with the

General Causality Orientation Scale (GCOS; Deci & Ryan, 1985; r =.38, p <.001) score

and the Health Care Climate Questionnaire (HCCQ; r = .38, p< .001).

In the same study, the 9-item TSRQ subscales had a Cronbach's alpha reliability

of 0.79 for controlled reasons and 0.58 for autonomous reasons at time 2 (Williams et al.,

1996). Williams, Freedman et al. (1998) adapted the 8-item version from Williams et

al.'s (1996) weight loss study. Cronbach's alpha's measured at three time points in this

diabetic study were 0.81, 0.83, and 0.85 for autonomous reasons and 0.86, 0.80, and 0.85

for controlled reasons (Williams, Freedman et al., 1998). Fortier et al. (2007) reported

alpha reliabilities of a 6-item autonomous motivation subscale of 0.78 and 0.82 at

baseline and 6 weeks, respectively. Williams, Niemiec, Patrick, Ryan, and Deci (2009)

reported Cronbach's alphas of 0.85 at baseline and 0.89 at six months for the 6-item

TSRQ autonomous motivation smoking cessation subscale, and Cronbach's alphas of

0.87 at baseline and 0.92 at six months for the TSRQ for medication use. Alpha

reliability for 6-item TSRQ autonomous motivation subscale for medication use in a

diabetes study was 0.88 (Williams & Patrick et al., 2009).

Table 5 summarizes the autonomous and controlled motivation scores, means, and standard deviations from studies using the TSRQ to measure various health behaviors and health conditions. Scale versions differ in the number of items, resulting in nonequivalent score ranges. Calculating subscale scores separately, rather than reporting overall composite scores for the subscales used, and using the average of the item means make further comparisons across versions of the instrument and its subscales difficult.

Table 5

Summary of Autonomous Motivation Scores and Means from TSRQ Studies

Study/N	Population/setting	#scale items (subscales)	Mean (SD) /Repeated measure
Levesque et al. (2007) N = 817	Exercise at 2 sites	15 (both subscales)	38.18 [a] (6.36) Site 1 32.53 (1.00) Site 2
Williams & Freedman et al. (1998) N = 126	University affiliated treatment center diabetics	8 (both subscales)	autonomous 26.0[a] (3.2) T1/ 25.8[a] (3.3) T2/ 25.3[a] (3.7)T3 controlled 18.9[a] (6.8) T1/19.2[a] (6.1)T2/ 19.1[a].(6.5)T3
Williams & Gagne et al. (2002) N = 239	Smoking cessation	5 (autonomous subscale only)	6.38[b] (1.00)
Fortier et al. (2007) N = 61	Exercise	6 (both subscales)	6.48[b] (.58)

Note: [a] score mean, [b] item mean

The construct of autonomy support. The premise of SDT is that one develops and maintains more autonomous motivation and feels more competent (Williams, McGregor, & King et al., 2005) to the extent that significant others are autonomy supportive (Williams, Freedman et al., 1998). Rouse et al. (2011) view autonomy support as a framework for understanding how significant others can support behavioral change. The construct of autonomy support refers to the extent to which significant others in one's social context are autonomy supportive, e.g. health care "providers elicit and acknowledge patients' perspectives, support patients' initiatives, offer choice about treatment options, and provide relevant information while minimizing pressure and

control" (Williams, McGregor, & King et al., 2005, p. 40). The reasons for engaging in a behavior will become more self-determined or autonomous over time in an autonomy supportive environment (Rouse et al., 2011), based on the SDT premise that autonomous supportive contexts foster satisfaction of the three basic human needs of autonomy, relatedness and competence. Vansteenkiste and Sheldon (2006) emphasize that "the task of the clinician is to evoke and strengthen this inner resourcefulness, facilitating the natural change process that is already inherent in the individual, rather than trying to impose motivation or "install" a change process via the use of externally controlling strategies" (p.66).

In health care, autonomy support is closely related to a client centered perspective orientation, hence Williams, Freedman et al. (1998) view this construct as a provider orientation related to patient centeredness. While the relational style of autonomy support is similar to that of patient empowerment (Anderson & Funnel, 1999) and motivational interviewing (Miller & Rollnick, 2002), autonomy support differs from patient-centeredness because it specifies explicit human needs to guide a clinician's behavior. For example, the autonomy supportive practitioner supports patient's perceived competence by individualizing structure according to the patient's needs and supports autonomy by facilitating the patient's own choices for action, after considering their feelings, values, and options (Williams, McGregor, & King, et al., 2005). Autonomy supportive providers present information about outcomes most likely to result from the patient's behavior and include information about what has helped other patients. In contrast, motivational interviewing is a directive, patient-centered counseling technique in which practitioners minimize behaviors that are likely to elicit patient resistance.

Autonomy support differs from patient-centeredness and motivational interviewing in that it provides information that helps patients make clear, informed choices about treatment and supports them in reaching their goals (Williams, McGregor, & King et al., 2005).

Ten Cate et al. (2011) cite Williams and Deci's (2001) early descriptions of autonomy supportiveness that include provider communication skills, such as acknowledging a patient's feelings or perspective, providing a menu of options or choices, minimizing control or pressure, and encouraging active decision-making and goal setting for health. Subsequent research has expanded the repertoire of autonomy support strategies to include more explicit techniques such as supporting patient's initiatives, and avoiding being controlling or judgmental (Williams, McGregor, & King et al., 2005), active listening, respectful collaboration, and thorough support of the patient (Fortier et al., 2007).

Fortier et al. (2009) summarize autonomy supportive interventions used in five randomly controlled trials that demonstrated autonomous motivation targeted health behaviors and health outcomes. Consistent with the theoretical mechanism of change in autonomous motivation through autonomy support (mediation), interventions training health care providers to act in an autonomy supportive manner focused on the following provider behaviors:

- Eliciting and acknowledging the patient's perspective
- Offering a clear rationale
- Providing information in a non-judgmental manner
- Supporting patient initiative for change, or for not changing
- Eliciting patient values and how changing unhealthy behavior may affect them
- Minimizing control, and
- Providing effective options for change

Fortier et al. (2007, p. 173) mapped autonomy supportive styles to the three psychological needs of relatedness, autonomy, and competence that must be satisfied to enhance autonomous motivation, shown in Table 6. While some interventions target both relatedness and autonomy, this model considers only those that target competence to have a direct effect on both autonomous motivation for exercise, exercise behavior change, and its maintenance– the health outcome. Hence, since Fortier et al. (2007) consider autonomous motivation as the outcome, this model of change differs from the traditional SDT model of change in which competence is the outcome.

Table 6

Autonomy Support Interventions Mapped to Basic Needs

Intervention Components	Basic Need Satisfied as Direct/Indirect Effect on Autonomous Motivation	Direct vs. Indirect Effect (through Autonomous Motivation) on Behavior Change/Maintenance
Act in a warm and caring way	Relatedness	Indirect
Express empathy	Relatedness	Indirect
Acknowledge, support patients' perspectives, feelings and values	Relatedness, Autonomy	Indirect
Avoid judgment or blame	Relatedness, Autonomy	Indirect
Values interview	Relatedness & Autonomy	Indirect
Involve patients in decision-making, solution-finding process	Autonomy	Indirect
Minimize control and pressure	Autonomy	Indirect
Maximize patients' choices	Autonomy	Indirect
Provide a rationale for suggestions	Autonomy	Indirect
Allow patients to overtly express the pros and cons of changing behavior	Autonomy	Indirect
Tailor advice and support	Autonomy	Indirect
Help to clarify outcome expectations	Competence/ Self-Efficacy	Direct, Indirect
Normalize feelings, behaviors, and experiences	Competence/ Self-Efficacy	Direct, Indirect
Assist in realistic goal setting	Competence/ Self-Efficacy	Direct, Indirect
Assist in building skills and developing coping strategies	Competence/ Self-Efficacy	Direct, Indirect
Provide positive feedback	Competence/ Self-Efficacy	Direct, Indirect

Williams, Gagné, Ryan, and Deci (2002) suggest that primary care interventions that might increase autonomy support could include teaching providers communication methods that portray minimal pressure, judgment, and control, such as acknowledging and taking the perspective of the patient into consideration when planning care, providing relevant information and opportunities for choice, and encouraging acceptance of personal responsibility for healthy behavior and choices. Other examples include role-playing interactions in which the provider asks the patient what they want to achieve, respecting their priorities, encouraging questions, responding to questions in a meaningful way, and avoiding judgment on past behavior (Ten Cate et al., 2011). Providers can also be instructed on methods for providing verbal and nonverbal cues indicating their acknowledgement and respect for patients' priorities and motivations.

Autonomy Support measurement. The 6-item Modified Health Care Climate Questionnaire (mHCCQ; Williams, McGregor, & King et al., 2005) measures the patient's perception of clinician autonomy support on a 7-point Likert scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). The term "nurse practitioner" was substituted for the term "doctor." A sample question was "I feel that my nurse practitioner has provided me choices and options."

The mHCCQ is a validated psychometric instrument with demonstrated association with behavior change in smoking cessation, weight loss and maintenance, and exercise (Carroll et al., 2012). Williams et al. (1996) developed the 15-item HCCQ to measure the patient's perception of clinician autonomy support in a study of motivational factors of weight loss (Cronbach's alpha = 0.92). Williams and Deci (2001) reported a Cronbach's alpha of 0.96 in a smoking cessation study.

Williams et al. (1996) established construct validity of the original 15-item HCCQ via factor analysis of responses from a sample of primary care patients (N = 276) prior to the weight loss study. The single 15-item factor solution had an eigenvalue = 9.87, with all factor loadings greater than .55. The HCCQ was significantly correlated with the Autonomy Orientation score of the General Causality Orientations Scale (GCOS; Deci & Ryan, 1985; r = .28, p <.05) and powerful others Health Locus of Control (HLOC; Wellston, Wellston, & Deville's, 1978; r = .22, p < .05), evidencing concurrent validity with other scales measuring similar behaviors.

To reduce redundancy, Williams, Freedman et al. (1998) selected five items judged most representative of autonomy support from the original fifteen to comprise the abbreviated version of the scale for a diabetes study. Factor analysis of the five items conducted on 1,183 patients who completed the questionnaire across various studies, resulted in a one-factor solution (eigenvalue =3.0, with all factor loadings above 0.74), establishing construct validity. The Cronbach's alpha for the 5-item scale was 0.84, with a 0.95 correlation with the 15-item version. The alpha reliability of the 5-item scale in the diabetes study was 0.80, with a correlation of 0.91 with the full scale, which Williams, Freedman et al. (1998) interpreted to indicate that the 5-item modified scale was an adequate version of the HCCQ.

Williams, McGregor, King et al. (2005) further established construct validity and reliability in developing the 6-item mHCCQ in primary care offices, reporting scale reliability of 0.93 for the 15-item version and 0.91 for the six-item version. Results of confirmatory factor analysis using the six items on the baseline assessment of a computer-assisted autonomy support intervention for diabetic patients (Williams et al.,

2007) were that "the single factor solution demonstrated adequate fit (CFI = 1.00, IFI =

1.00, TLI = .99)," with all standardized loadings greater than .70 (p. 730). Williams et al.

(2007) reported Cronbach's alpha's of 0.92 and 0.93 for the mHCCQ, a baseline alpha of

0.92 and alpha of 0.93 at six months, with a range of total item correlations from 0.70 to

0.83. Fortier et al. (2007) reported Cronbach's alpha's ranging from 0.86 to 0.89 across

three measurements. Williams, Patrick et al. (2009) reported a Cronbach's alpha of 0.95.

Williams, Deci, and Ryan (2014) reported a less favorable average Cronbach's alpha of

0.82 for the 6-item scale across multiple studies.

mHCCQ item scores can range from 1 to 7, with overall composite score ranges

from 6 to 42. The autonomy support score for each respondent was calculated by

summing the individual item scores. Higher scores represent higher levels of clinician

autonomy support reported by patients (Carroll et al., 2012). Table 7 summarizes the

mean autonomy support scores and means from studies using the mHCCQ.

Table 7

Summary of Autonomy Support Scores and Means from mHCCQ Studies

Study/N	Population/setting	# HCCQ items (version)	Item Mean (SD)	Score Mean (SD)
Williams, Patrick et al. (2009) N = 2,973	Phone survey to diabetics	6 (mHCCQ)	5.57	33.30
Williams, McGregor, King et al. (2005) N = 634	Primary care practices	6 (mHCCQ) 15 (HCCQ)	5.98[b] (0.99) 5.87[b] (0.80)	Not reported
Williams, Rodin et al. (1998) N = 126	Structured interview of prescription medication users	15 (HCCQ)	11.4	75.30
Carroll et al.(2013) N=326	Clinician-patient intervention exercise communication	6 (mHCCQ)	3.75 (baseline) 3.88 (post)	Not reported
Williams, Freedman et al. (1998) N = 126	University affiliated treatment center diabetics	6 (mHCCQ)	Not reported	29.0 (5.2)

Note: [a] score mean, [b] item mean

Addressing the provider's role in lending autonomy support and enhancing motivation by implementing practice changes to improve patient centeredness, provider communication, and patient engagement in the patient-provider relationship complements interventions that focus on increasing patient competence and self-management skills. It follows therefore, that since autonomy support enhances autonomous motivation, these two constructs may enhance activation. Furthermore, autonomous motivation may mediate the relationship between autonomy support and patient activation. These propositions provide the rationale for the proposed study.

Research Studies of Autonomy Support and Autonomous Motivation

These studies primarily tested the SDT theoretical model of change based on interventions designed to enhance autonomy support or competence using pre and post intervention repeated measures of the constructs. Since most studies examined the relationships between autonomy support, autonomous motivation, and perceived competence, and clinical or health behavior outcomes, this review incorporates studies using perceived competence when it was measured in conjunction with perceived autonomy support and autonomous motivation, because of its similarity with activation, the dependent variable.

Studies of autonomy support. Health behavior interventions have established that the construct of autonomy support is modifiable (Carroll et al., 2013). Vansteenkiste and Sheldon (2006) cite study findings from applications of SDT to health domains (Williams & Gage et al., 2002) that have demonstrated that "people who experience their practitioners as being autonomy supportive benefit the most from treatment" (p.64).

A prospective cohort study of self-glucose monitoring diabetic patients in a diabetes treatment center by Williams, Freedman et al. (1998) examined whether patient's perceptions of autonomy supportiveness of their diabetes care provider improved glucose control. Perceived autonomy support from staff was related to significant increases in patient autonomous motivation, which were related to significant increases in perceived competence and significant decreases in glucose values over 12 months. These findings supported the prediction that diabetics whose health care providers are autonomy supportive would be more motivated to take action to regulate their glucose levels and would feel more capable of regulating their glucose levels, resulting in improved glucose control. Williams, Freedman et al. cite evidence from previous studies of other health conditions that demonstrated that providers who exhibit more autonomy supportive behaviors in relating to patients can significantly affect patients' autonomous motivation towards engaging in behaviors that improve various health conditions, such as medication and regimen adherence, participation in weight loss programs, and smoking cessation programs.

Randomly controlled studies using autonomy supportive interventions summarized in this section resulted in increased autonomous motivation and perceived competence, confirming that clinical interventions that increase autonomy support can facilitate autonomous self-regulation and perceived competence (Fortier et al., 2009). Halvari and Halvari (2006) found greater autonomy support, autonomous motivation, and perceived competence following 60 minutes of autonomy supportive counseling in addition to usual dental care. These changes mediated the large effect in reducing dental plaque and gingivitis over seven months. In a randomized controlled trial (Fortier et al.,

2007) on the effect of intensive autonomy supportive physical activity counseling versus brief autonomy supportive counseling, the intervention group demonstrated higher autonomy support and autonomous self-regulation at six weeks and engaged in more physical activity at three months, compared to the control group.

A longitudinal randomized smoking cessation induction trial (Williams & Niemiec et al., 2009) using repeated measures (baseline, six, 30 months) of autonomous motivation, measured by the 12-item TSRQ (six questions each for smoking cessation and medication use) and perceived competence, measured by the Perceived Competence Scale (PCS), found more prolonged tobacco abstinence at 24 months post intervention and duration for the intervention group. The intervention group met with counselors four times over six months, discussing their health in an autonomy supportive and perceived competence supportive manner, with the goal of long-term (24 months) abstinence. Additional results included greater medication use and increased autonomy support, autonomy, and competence, compared with community care. These study findings confirmed Deci and Ryan's (2000) proposition that SDT predicts one will be most effective in initiating a healthy-lifestyle program when they feel autonomous and competent to do so. Structural equation modeling determined that change in perceived competence fully mediated the outcome, smoking abstinence.

Carroll et al. (2013) conducted a two-arm randomized controlled intervention study, in which thirteen family medicine clinicians at two urban community health centers were randomized into early and delayed communication training groups. The clinicians were trained in the 5A's (Ask, Advise, Assess, Assist, and Arrange) for physical activity counseling, informed by SDT and patient-centered communication. In the

exploratory analysis, changes in patients' perceptions of autonomy and perceived competence (mediators of the primary outcome) were measured at baseline, post intervention, and at six months. The mHCCQ (Williams, McGregor, & King et al., 2005) measured autonomy support for exercise and the PCS for physical activity measured perceived competence. Mean autonomy support at post-intervention compared to baseline was statistically significant and six-month scores remained elevated compared to their baseline, although they did not significantly differ from those post-intervention. There was no significant change in perceived autonomy support for physical activity between the post intervention and six-month time points, although perceived autonomy supportiveness remained elevated at six months.

Williams, McGregor, King et al. (2005) evaluated the relationship between clinician autonomy support and patient competence and glycemic control and depressive symptoms. Structural equation modeling was conducted, using data from baseline surveys of Type 2 diabetic patients of 31 primary care physicians participating in a randomized controlled trial testing the impact of a diabetic self-management program. Autonomy support had significant direct effects on perceived competence and patient satisfaction and significant indirect effects through perceived competence on glucose control and depression. Correlations between autonomy support and blood glucose control and patient satisfaction were interpreted to indicate that autonomy support helps patients' motivational needs more than patient satisfaction. Furthermore, once motivational needs are supported, patient competence and autonomy may lead to health behaviors that improve health outcomes. The authors recommend that further research develop and test interventions to improve health care provider autonomy supportiveness,

consistent with health care system changes that encourage patients to assume responsibility for health outcomes, including chronic disease management.

Studies of autonomous motivation. While a number of the previously described studies also tested the effect of autonomy support on autonomous motivation, additional studies of autonomous motivation are described. Williams et al. (1996) examined whether autonomy orientation and the degree of autonomy supportiveness predicted autonomous motivation for weight loss and weight loss maintenance in a convenience sample of severely obese patients in a six month weight loss program. Results of repeated measures confirmed that participants' autonomy orientation and autonomy support of the interpersonal climate by the staff predicted autonomous motivation for weight loss. Participants who exhibited more autonomous motivation attended the program more regularly, lost more weight, and maintained greater weight loss over a two year period at follow-up than those demonstrating controlled motivation. Furthermore, Williams et al. (1996) suggest the utility of these findings, given that past studies highlighted difficulty with facilitating and maintaining health promoting behavior change.

Williams, Gagné, and colleagues (2002) examined the effects of an autonomy supportive style of physicians trained in the 4-A's model (Ask, Advise, Assist, Arrange) versus a controlling style for smoking cessation at 30 months. Each physician received the same number of patients randomized for counseling with each experimentally manipulated style. In the autonomy supportive style, the physicians gave advice as information rather than direct external pressure to change. In the controlling condition, the physicians asked the patients to quit. The 5-item TSRQ autonomous motivation

subscale measured autonomous motivation. Perceived competence was measured pre intervention and at six, 12, and 30 months post intervention. Autonomy support was rated from audiotapes. In the structural equation model, autonomous motivation only marginally predicted perceived competence for quitting, although it contributed to the structural equation modeling model fit.

Williams, Patrick et al. (2009) examined perceived autonomy support from health providers, autonomous motivation for medication use, and perceived competence for diabetes self-management and quality of life in diabetic patients. Autonomy support and autonomous motivation for medication use were positively related, and autonomous motivation was positively related to perceived competence for diabetes self-management, quality of life and medication adherence. Although investigations of autonomous motivation and autonomy support were primarily intervention studies, these studies measured similar demographic variables (age, gender, education, race, income) as those in patient activation studies and also included variables that measuring illness type.

In summary, findings from these health studies demonstrated that autonomy support enhances autonomous motivation and perceived competence, endorsing the basic SDT model of change that patients' perception of providers' autonomy support changes autonomous motivation, and perceived competence, resulting in changes in health behaviors and health indicators. Most relevant to the proposed study is the effect of autonomy supportive approaches by health care providers on the patients' willingness to engage in specific behaviors and on their motivation to carry them out over the long term.

This study will investigate whether these constructs of autonomy support and autonomous motivation have a similar relationship with the concept of patient activation

for self-management activities as an overarching behavior outcome in a nurse-managed

clinic for the underserved. Since no studies of activation, autonomy support, or

autonomous motivation have been conducted in nurse-managed health centers, exploring

the patients' perspectives about themselves and their nurse practitioner relative to their

activation will yield a previously untapped perspective and contribute to the health

behavior and primary care knowledge bases.

CHAPTER 3:

RESEARCH METHODS

Aim and Hypotheses

The specific aim of this pilot study was to examine the utility of Self-determination Theory constructs of Autonomy Support and Autonomous Motivation as independent predictors of Patient Activation in patients in a nurse managed health center for the underserved in two metropolitan and two rural Maryland counties. The main research hypothesis that was tested in this investigation was: Controlling for demographic and clinic use variables, the constructs of Autonomy Support and Autonomous Motivation independently predict Patient Activation in a nurse managed clinic population. Based on the SDT model of change in which autonomy support increased autonomous motivation, hypothesis number two was: Controlling for demographic and clinic use variables, the construct of Autonomous Motivation mediates the relationship between Autonomy Support and Patient Activation. In addition to the two SDT constructs (predictor variables) the analytical model represented by Figure 3 controlled for significant demographic variables (age, self-identified race, gender, education, insurance status, income, and clinic location rural/urban) and examined clinic use factors (clinic duration, nurse practitioner duration, and clinic use reason (chronic vs. acute/well) as covariates.
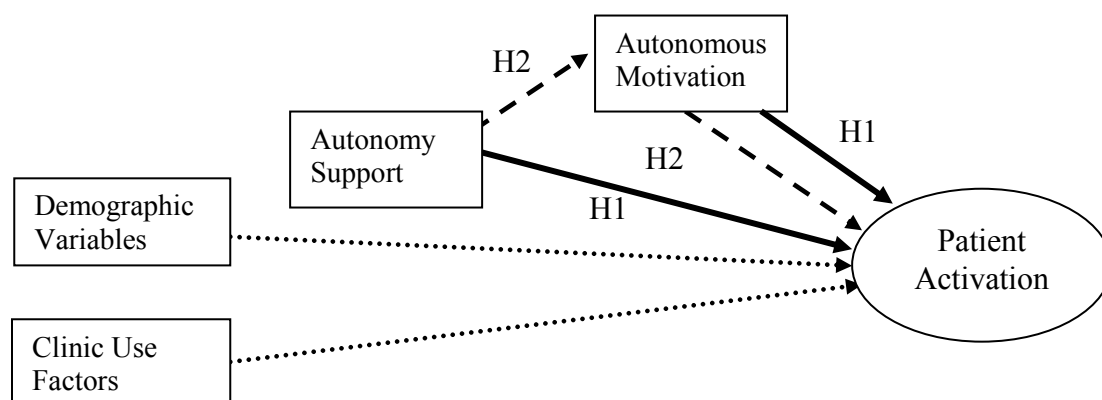
Figure 3. Analytical Model
The solid arrows represent hypothesis 1, the dashed arrows represent hypothesis 2 (mediation), and the dotted line arrows represent the covariates.

Power Analysis and Sample Size Estimation

Hierarchical multiple linear regression was conducted with the constructs of Autonomy Support and Autonomous Motivation to predict Patient Activation (a continuous score) to test hypothesis number one. Using Autonomy Support and Autonomous Motivation as predictors, seven demographic variables and three primary care use factors as covariates, (12 predictors), the sample size estimate was calculated *a priori* in G-Power. The minimum sample size needed to power the study was 127, based on linear multiple regression (Fixed Model; R^2 increase; F-Test) at an alpha significance level of .05, medium effect size of 0.15 (0.5 per Cohen) and .80 power (Bannon, 2013; Hinkle, Wiersma, & Jurs, 2003).

Description of the Study Population and Eligibility Criteria

IRB approvals were obtained from both University of Maryland College Park and University of Maryland Baltimore (Appendix A). Using a cross-sectional research design, study data were collected from a convenience sample of 130 English-speaking adult (age 18 and older) patients enrolled in two nurse-managed primary care mobile

clinics for the underserved. Low income, primarily uninsured and underinsured, ethnically and culturally diverse populations, including immigrants, comprised the patient panels of both clinics. The sampling frame, based on the combined fiscal year 2014 patient census of the two clinics, consisted of 1,189 unduplicated patients who received 1,338 nurse practitioner (NP) visits. In fiscal year 2014 approximately 400 established patients (including non-English-speakers) either received ongoing management of acute or chronic conditions or less frequent preventive care.

During this time the urban clinic census was 772 patients, approximately 85 percent of whom were Latinos, approximately 90 percent of whom were non-English proficient and required the assistance of an interpreter during the visit due to difficulty understanding written and spoken English. The rural clinic census was 417 patients, 95 percent of whom were English speaking, who received 511 NP visits in fiscal year 2014. Since non-English-speaking patients required interpreter services for clinic procedures, and based on questionable validity of the Spanish PAM-13 translations reported by Alegriá et al. (2009), non-English speaking patients were excluded from this study. Therefore the sampling frame was limited to the portion of the 400 established patients who were English-speaking and who had a return clinic visits during the study timeframe, who were therefore eligible to participate in the study.

Patients ranged in age from 18 to 78 years and included healthy adults receiving preventive services (health screenings, including pap smears, mammograms, and annual physicals), those receiving routine diagnoses and treatment of episodic acute care (colds, allergies, other symptoms), and those with chronic health conditions (diabetes, pre-diabetes, obesity, hypertension, asthma) requiring chronic disease management and

treatment. Patients varied in degree of chronic illness and risk factors, with various

trajectories of diagnoses and treatment for chronic illnesses and stability, resulting in

more or less frequent clinic visits.

Inclusion criteria for the study were: currently enrolled English-speaking patient

in either of the two clinics, at least 18 years of age, with at least two nurse practitioner

primary care visits prior to completing the survey, receiving routine or follow-up care

(including health maintenance visits), and ability to read and provide informed consent in

English. Patients were excluded on their initial visit encounter (as a newly enrolled

patient), if they were unable to provide written informed consent due to a language

barrier, or exhibited limited literacy or cognitive concerns, based on care manager

assessment of knowledge of diagnoses, previous patient interaction, and clinical

judgment.

Description of the Study Site

Data were collected over seven months on two State of Maryland Governor's

Wellmobile Program mobile clinics operated by the University of Maryland School of

Nursing (UMSON). The dual missions of this community partnership model of nurse-

managed primary health care are to provide primary and preventive health care services

to geographically underserved communities and uninsured individuals across the state

and to serve as principle training sites for the UMSON that will expand student learning

opportunities in the care of underserved populations. Each clinic was outfitted with two

patient exam rooms and an intake area. The urban clinic had been in continuous

operation since 1994, while the rural clinic began services in 2012. Both clinics

scheduled a range of 10 to 12 patients a day, four days a week. The urban clinic rotated

among five community sites and the rural clinic rotated among three sites on a weekly schedule. The outreach worker scheduled new and returning patient appointments by phone and in-person. The appointment schedule identified whether the patient required an interpreter to be present during the clinic visit. The rural clinic accepted new and returning patient walk-ins, while the urban clinic accepted walk-ins of enrolled patients only. Scheduled patients received reminder calls prior to the appointment date to decrease "no-show" occurrences.

An advanced practice nurse practitioner, certified to treat somatic conditions, prescribe medications, order and interpret diagnostic tests, and provide health behavior counseling; an advanced practice nurse care manager; and a bilingual outreach worker staffed each clinic. On alternate days, two nurse practitioners, in the practice for 18 months and six months, respectively, staffed the urban clinic, which also included a social worker and a driver. The rural clinic nurse practitioner was the sole provider since the clinic opened and incrementally built the patient panel. Hence, the two patient panels varied in the degree of both clinic and nurse practitioner intensity and duration, as well as unique established patient revisit frequencies. The number of annual visits compared with the census included both new and revisits for newly admitted patients and return visits by established patients admitted in previous years. Fiscal year 2014 urban clinic nurse practitioner visits declined over two different three-month periods when the clinic was staffed only one day and three days a week. Full staffing resumed in the urban clinic in September 2014.

Pilot Testing Instrument

The 38-item on-line Survey Instrument (Appendix B) was administered to six

community members representative of the rural and urban medically underserved

populations who responded to the pilot study recruitment flyer (Appendix C) and script

(Appendix D). The survey was developed using Qualtrics. Pilot study participants

signed paper informed consents (Appendix E). In addition to the survey, nine additional

questions (Appendix F) elicited respondents' feedback to assess the usability of the

survey administration method and instructions for completing the instrument. Six

questions addressed ease and comfort of responses in an on-line format, ease of

understanding instructions and questions, ease of selecting and entering responses, and

any need for assistance during instrument administration. Two questions elicited

recommendations for improving survey instructions and delivery format. The final open

ended question sought comments about the survey and its administration. Pilot study

participants were compensated $20 for completing the survey according to the above

described procedures.

All pilot survey participants elected to complete the survey on-line; no one asked

for assistance or asked a question prior or during survey administration. Open-ended

usability survey responses ranged from "no problems," "fine," "understandable" (3) to

"some of the wording is too hard" (3). Recommendations included using simpler terms

for participants if the survey were be delivered in Spanish, adding more terms to

correspond to number ranges of the autonomous motivation and autonomy support

instrument items, and whether there would be a Spanish option. Since the survey

consisted of questions from three reliable and valid surveys, neither the questions nor the

response options were modified for the actual study. Potential concerns regarding

directions and item wording were addressed prior to the survey by informing patients that

they could ask questions during the survey and of the option to have the survey read to

them. There were no recommendations for revision of the survey administration

instructions or clarification of instructions for completing the survey items.

Recruitment

The sampling scheme involved recruiting every English-speaking established

patient returning for a clinic visit on each day of each clinic's operation between April 13,

2015 and November 5, 2015. Two methods (recruitment flier, directly approaching

returning patients) were used to recruit potential study subjects. A recruitment flyer

(Appendix G) with the following information was posted in each clinic's reception area

to inform returning patients of the opportunity to participate in the study:

- Eligibility to participate- a returning English-speaking patient, 18 years or older
- Study purpose- to assist those providing care to better understand clinic patients' view of their interaction with their nurse practitioner and managing their health
- How the study information will be used- to help the clinic staff develop ways to improve patient care and health care provider education
- Where the study will take place- in a private clinic exam room
- What they will be asked to do- answer a computer-based 38-item questionnaire in English that will take approximately 30 minutes to complete; they will receive assistance in logging into the survey
- Participation is voluntary- participation will not affect care received in the clinic
- Privacy- responses will be anonymous and be kept confidential
- What they will receive- $15. in cash after completing the survey
- Where to get additional information- speak to the nurse care manager to discuss participation

The urban clinic care manager was a masters' certified research nurse,

experienced in conducting pilot research with the clinic's Latino population. The rural

clinic nurse care manager was a doctorally prepared certified community health nurse.

Since the care managers also provided patient education and care management, they were

familiar with the patients' language and reading levels and were able to evaluate the

patients' ability to complete the survey. Using the daily appointment schedule in the

reception area that designated patients as "returning" or "new," the care managers,

functioning as research assistants, approached all returning eligible English-speaking

patients individually. They followed the standardized recruitment script (Appendix H),

inquired if they could answer any questions, and if the patient was interested in

participating in the study. Care managers informed patients of the option to complete the

survey on the day of their regularly scheduled appointment after the clinic visit or within

a two week time-frame after the visit, during the clinic's normal operating hours.

The anticipated participation rate was 80 percent of the possible English-speakers

across both clinics, based on a recruitment rate of over 80 percent reported by Lubetkin et

al. (2014) in a study in a primary care clinic for the underserved. It was projected that as

many as 150 to 170 English-speaking patients would need to be approached in order to

recruit 127 participants.

Of the 143 English-speaking patients screened for participation, seven were

assessed to lack sufficient English comprehension to take the survey in English. Another

six refused due to lack of interest or time. One hundred and thirty patients agreed to

participate in the study, a 96% participation rate. Based on procedures outlined by

Lubetkin et al. (2010), non-participants were recorded on the recruitment log by date to

avoid re-recruitment of those who declined participation or were screened ineligible.

Those declining participation had the option to complete a voluntary anonymous refusal

survey (Appendix I) which gathered the following demographic information- age, gender, race/ethnicity, and education level. Only five of the six patients who declined participation completed the survey, providing only a limited comparison of English speaking study participants with non-participants, as shown in Figure 4—Study Sampling Flow Chart. The completed nonparticipant paper surveys were returned to the office and assigned a study ID for comparative data analysis.

Consent process. Patient recruitment and consent took place in a private exam room in the clinic. One-hundred and thirty patients consented to participate in the study. The duplicate results of a second survey from a patient who consented and answered the survey twice were excluded from the sample. Care managers reviewed the consent form (Appendix J) with patients to assure their understanding and informed them of the option of assisted online administration in lieu of self-administration. Patients received a copy of the signed paper consent form.

Instrument administration. The 38-item Survey Instrument (Appendix B) was administered in Qualtrics, a web-based password-protected survey tool that collects data and uses transport layer security (HTTPS) encryption for transmitted data. One hundred and twenty one respondents completed the survey on the same day of the visit, while nine returned within two weeks. One hundred and nineteen (92%) completed the survey in Qualtrics, and eleven (8%) elected assisted on-line administration. Thirty respondents (25%) of those who self-administered in Qualtrics requested care manager assistance.

Participants accessed the survey on one of two laptop computers in private exam rooms in each clinic. One hundred and seventy randomly generated unique "survey user IDs" permitted individual log-in access the survey. Hosting the survey user ID provided

equal access to the pool of IDs across both sites and precluded associating user IDs with study sites. A unique survey user ID allowed multiple respondents to complete the survey concurrently. Once used, that unique survey user ID could no longer be used to access the study. The care managers selected a survey user ID from a web-based list-serve, marked it as used, recorded it on the paper receipt, and gave it to the participant to access the survey. The respondent clicked on the internet survey link to enter the survey user ID to access the survey. Once Qualtrics was accessed, the unique survey user ID was associated with a participant "study response ID" embedded in the Qualtrics program, assuring that the researchers assisting with survey were blinded to the study response ID and individual respondents' survey results.

The care managers assisted with entering the survey user ID computer login and as needed. The participant viewed the Welcome Page and read the purpose of the study. To account for variation in recall related to timing of survey completion relative to the nurse practitioner visit, patients selected they were taking the survey on the day of the visit or within two weeks of their last visit. Patients were instructed to base their responses on their most recent nurse practitioner visit experience. Respondents were prompted for unanswered questions and were able to return and enter a response to previously unanswered questions. All survey questions included "refused/do not know" or "not applicable" response options.

Procedures were based on methods used by Lubetkin et al. (2010) in a similar patient activation study in an underserved health clinic. Technical assistance for survey completion was limited to verbal cues for general computer use and progressing through the on-line survey program, as requested, and reading survey questions, but not

interpreting questions or response options, or assisting with responses. Care managers read the questions and responses to the patient and recorded their responses in Qualtrics during the interview for patients who requested assisted on-line administration. No patient was as unable to complete the survey on-line, based on physical constraints or lack of familiarity with computer usage.

After completing the survey questions, the respondent notified the care manager, who recorded assistance provided with survey completion (e.g. reading directions, questions) or survey administration via interview. Once the data was saved in Qualtrics, the care manager printed the documentation of survey completion and the patient's receipt of the $15 cash participation incentive, linked to the survey user ID (Appendix K). Documentation of completion, receipt of incentive, and the original consents were stored in a locked file and submitted to the study office weekly. Cash incentives were kept in a locked box and were returned to the office weekly for reconciliation with documentation of survey completion.

Qualtrics data is hosted by third party data centers certified by the American Institute of Certified Public Accountants (AICPA) and comply with Auditing Standards Board Statement on Standards for Attestation Engagements No. 16 (SSAE-16 SOC II; Qualtrics, 2014). This type 2 SSAE 16 report certifies the validity of the company's controls (e.g. data protection, encryption, cloud services computing security; A-lign.com, 2014).

Description of the Study Variables, the Instruments, and their Characteristics

The demographic and clinic use factor items and the three instruments (mHCCQ, TSRQ, PAM-13) comprised the 38-item survey instrument (Appendix B) administered in Qualtrics.

Patient Activation

The dependent variable, Patient Activation, was measured using the Patient Activation Measure-short form (PAM-13; Hibbard, et al. 2005), a Guttman-like scale with a measurement continuum that yields continuous scores. A modification in item terms subsequent to initial instrument development replaced the term "health condition" with the more inclusive term "health," which facilitates instrument administration in clinic populations with non-chronic as well as chronic conditions. This study used the Non-Chronic Condition Version of the PAM-13 from the 2007 Center for Studying Health System Change Health Tracking Household Survey (Hibbard & Cunningham, 2008), replacing the term "doctor" with "nurse practitioner." The Insignia Health Non-Copyright License Agreement (Appendix L) to administer the PAM-13 and apply the Rasch scoring program was obtained under a doctoral student licensing package from Insignia Health (2014).

The Rasch measurement model used to create the unidimensional, interval level, probalistic Guttman-like scale calibrates item difficulty on the measurement scale in terms of response probabilities, indicating "how much of the measured variable a respondent must exhibit in order to endorse the item" (Hibbard et al., 2004, p. 1011). The calibration indicates the amount of activation required for a patient to have a .5 probability of responding "agree to an item" (Hibbard et al., 2004). PAM scale

construction is based on the concept of parameter separation, in which the calibration of the items is independent of the activation levels of the specific respondents being measured (Hibbard et al., 2004). Each PAM-13 item has a calibrated scale location ranging from 38.6 to 53 on a theoretical 100-point scale (Hibbard et al., 2005). Each item's standard error of measurement represents the precision with which the item's scale location has been estimated, while the precision of each respondent's estimated scale location is their standard error of measurement (Hibbard et al., 2004). Hence, Rasch methods capture the construct, its content, and structure from the patient's, rather than the researcher's perspective (Hibbard, 2009).

The Rasch analysis used to develop the PAM-13 empirically determined its unidimensionality (Hibbard & Greene et al., 2008). A respondent's item selection is based on item fit statistics that indicate how much responses to an item deviate from the model's expectations (the standard error of measurement). Infit and outfit statistics refer to item fit and item discrimination statistics, respectively. Hibbard et al. (2004) differentiate between infit and outfit.

> Infit is an information-weighted residual and is most sensitive to item fit when the item's scale location is close to the respondent's scale location. Outfit is more sensitive to item fit for items with a scale location that is distant from the respondent's scale location. (p. 1012).

Hibbard et al. (2004) interpret item-fit values between .5 and 1.5 to represent unidimensionality and response variability for useful rating scale measurement. Input and output statistics (0.92 - 1.05) for the PAM-13 were within the acceptable (0.5 - 1.5) range, approximating those of the 22-item version (0.72 - 1.4; Hibbard et al., 2005). The

calibrated scale derived from progressive item difficulty (Hibbard et al., 2005) associates each of the 13 items with one of four discrete activation stages. Table 8 illustrates the alignment of survey items with item calibrations and cut-off points (on a scale ranging from *0 - 100*) with the four activation stages. The item numbers represent the item sequence in the instrument. The item calibrations differentiate between the factors – *beliefs, confidence and knowledge*, *taking action*, and *staying the course*, and represent the four stages of activation.

Table 8

PAM-13 Items Aligned with Activation Stage and Item Calibration and Cut-off Points

Activation Stage	Item Calibration	PAM-13 Item Number
1. Believes Active Role Important	39	2. When all is said and done, I am the person who is responsible for my health.
Score ≤ 47.0	41	1. Taking an active role in my own health care is the most important factor in determining my health and ability to function.
2. Confidence and Knowledge to Take Action	42	4. I am confident that I can take actions that will help prevent or minimize some symptoms or problems associated with my health.
Score 47.1-55.1	43	3. I know what each of my prescribed medications does.
	44	6. I am confident that I can tell when I need to go get medical care and when I can handle a health problem myself.
	44	5. I am confident I can tell my health care provider concerns I have, even he or she does not ask.
	45	7. I am confident that I can follow through on medical treatments I need to do at home.
	47	8. I understand the nature and cause of my health problems.
3. Taking Action	50	9. I know the different medical treatment options available for my health conditions.
Score 55.2-67.0	51	10. I have been able to maintain the lifestyle changes for my health that I have made.
	51	11. I know how to prevent further problems with my health.
4. Staying the Course under Stress	52	12. I am confident I can figure out solutions when new situations or problems arise with my health (condition).
Score ≥ 67.1	53	13. I am confident that I can maintain lifestyle changes like diet, and exercise even during times of stress.

Responses to each of the 13 items were exported from Qualtrics into the Rasch

Scoring Excel Spreadsheet (Appendix M), an excel data base file. This scoring

methodology requires responses to at least 10 of the 13 items for the Rasch scoring

program to calculate a valid score. Summed responses yield a raw score between 13 and

52 (Hibbard et al., 2005), creating each respondent's activation index (Chen et al., 2014).

Then the empirically derived Rasch calibration table linearly transforms curvilinear (logit

metric index) summated raw scores into a continuous scale of activation scores ranging

from 0-100 (Hibbard et al., 2004). Adherence to this methodology is required to obtain

accurate scores. Finally, the program uses scores calculated according to the calibration

metric, which acts like a "ruler", to segment each patient into one of four activation

stages (categorical variables) along an empirically derived continuum (Insignia Health,

2014). Higher scores indicate higher activation stages (Chen et al., 2014), which are

associated with higher levels of preventive health behaviors, preventive care, and

increased self-management (Becker & Roblin, 2008; Hibbard et al., 2004, 2005; Hibbard

& Tusler, 2007; Mosen et al., 2007). Hibbard et al. (2009) interpret a 4-point difference

in scores between patients as having practical meaning. This study used the activation

score, a continuous variable, consistent with studies by Hibbard et al. (2005) and Hibbard

(2009).

Autonomous Motivation

The 8-item abbreviated version of the exercise Treatment Self-Regulation

Questionnaire (TSRQ; Williams, Freedman, & Deci, 1998), comprised of autonomous

and controlled subscales, measured the independent variable Autonomous Motivation.

The instrument was adapted by substituting the term "manage my health and health care

activities" as the target health behavior. The lead statement in the exercise version, "The reason I would exercise regularly," was replaced by the term "The reason I would manage my health and health care activities." The term "exercise regularly" at the end of questions one and five was replaced with the term "manage my health and health care activities." G. C. Williams, co-author of the instrument, verified that this adjustment was reasonable and granted permission for its modification (personal communication, October 6, 2014).

For this study, the autonomous motivation composite score was created by first reverse scoring the controlled motivation subscale (controlled reasons, items 1, 3, 5, 8), then summing these item with the autonomous motivation subscale responses (autonomous reasons, items 2, 4, 6, 7), as shown in the Survey Codebook (Appendix N). Reverse scoring the controlled reasons assigned lower values to responses to controlled reasons at the top of that subscale than to autonomous reasons at the top of that subscale before summing them to create the autonomous motivation composite score. Higher scores indicate motivation that demonstrates more autonomous than controlled regulation, taking into consideration the relative autonomous versus controlled tendencies.

Autonomy Support

The 6-item modified Health Care Climate Questionnaire (mHCCQ; Williams, McGregor, & King et al., 2005) measured the independent variable Autonomy Support. The mHCCQ measured the patient's perceptions of the degree of their nurse practitioner's autonomy supportiveness (versus controllingness).

Other Independent Variables

The covariates in the model included demographic variables selected based on previous studies (Alegriá et al., 2009; Hibbard & Cunningham, 2008; Hibbard & Mahoney, 2010; Wong et al., 2011) in which they were either highly correlated with activation, significant predictors, or covariates of activation when it was a dependent variable. These included age (Ryvicker et al., 2012), gender (Chuback et al., 2012), income (Ryvicker et al., 2012), insurance status (Chen et al., 2014), education (Ryvicker et al., 2012), race/ethnicity (Chuback et al., 2012), and rural/urban residence (Young et al., 2014). Demographic variables describe the study population, inform the discussion, and identify areas of future study. They also frame the utility of significant findings that may guide care approaches for other similar populations.

Other independent variables included as covariates in the model were clinic use factors (clinic patient duration, nurse practitioner duration, clinic use reason). Based on knowledge of the clinic's patient panels, these variables were potential covariates in explaining activation in this nurse-managed health center. Consistent with studies that controlled for significantly correlated demographic variables in the regressions, based on bivariate analyses, significantly correlated covariates were controlled for in the multivariate analysis. Both demographic and clinic use variables are categorical variables.

Data Analysis

Data Preparation

Survey data recorded in Qualtrics were downloaded into IBM SPSS version 23 and labeled according to the Survey Codebook (Appendix N). During data collection, the

care managers provided incomplete demographic and clinic use information based on that day's clinic intake data. Data were prepared for analysis in the following manner, according to procedures outlined by Bannon (2013).

Data were examined for missing responses prior to coding and scoring. Missing data for each item on the three surveys were examined using the frequencies from descriptive statistics. For key variables of autonomy support, autonomous motivation, and activation, the number of missing items on each instrument per study participant was calculated. Four mHCCQ (autonomy support) and four TSRQ (autonomous motivation) surveys had incomplete items. While only 105 PAM-13 surveys had responses for all 13 items, all but three had valid scores, since they met the minimum 10 item valid response threshold. One respondent had both an invalid PAM-13 survey and an incomplete mHCCQ survey, reducing the overall number of cases with valid survey data on all three instruments to 120 out of 130 respondents (8% missing).

Options considered for managing missing TSRQ and mHCCQ survey data included computing respondents' scores based on the items with responses, irrespective of survey completeness; imputation; eliminating the case outright; or eliminating only cases from the regression analyses only if they were missing a significantly correlated data point with the dependent variable. No cases were eliminated *a priori*. Scoring the mHCCQ and TSRQ with a reduced number of individual item responses could result in lower respondent scores for each measure compared to those of other respondents who completed all the items. Imputation of PAM-13 scores was not an option, since valid scores were calculated within the Rasch scoring data file for all cases meeting the minimum requirement for completion of 10 of 13 items. Accepting scores based on

reduced mHCCQ and TSRQ items and imputation methods could skew the data, introducing potential bias (Field, 2013). It was elected to conduct the univariate, bivariate, and multivariate analyses on the entire sample of 130, using listwise deletion of cases with a missing data point. This is an acceptable method due to the relatively small amount (less than 10%) of missing data values (Bannon, 2013). The number of cases dropped in the three separate multiple regression analyses varied, based on missing data only for those measures significantly correlated with activation.

Data Coding, Creation of Dummy Variables, and Scoring

Data were coded in SPSS according to the Survey Codebook. The categorical variable "Insurance Status" was reverse coded 0 (*no*) and 1 (*yes*). Since most Latinos did not identify with a race, the categories of race and ethnicity were collapsed and recoded into a dummy variable titled "race self-identified," consisting of four categories "White," "Black," "Latino," and "Other," with "White" as the reference category.

Each of the three continuous variables, autonomy support, autonomous motivation, and patient activation, were scored as described in the respective instrument sections. The mHCCQ was scored by summing the scores of the six individual items to create a composite score. Since 57% of the autonomy support composite scores equaled 42 (the top of the scale), it was recoded into a dichotomous variable —"Does the study participant perceive NP autonomy support?" The four TSRQ controlled motivation items (1, 3, 5 and 8) were reverse coded and then summed with the four autonomous motivation items to create the composite autonomous motivation score. Responses to the PAM-13 questions were downloaded from Qualtrics into the Rasch scoring data file (Appendix M), which calculated the activation scores. Scores were then entered into

SPSS as activation scores. The newly created continuous variables were relabeled as scores in the SPSS database.

Data Analysis Procedures

First, data screening and checks for the regression assumptions were conducted. Next, descriptive statistics for the independent and dependent variables were conducted. Data were analyzed using univariate (descriptive statistics); Spearman's rho, and Pearson's r, and One-Way ANOVA (bivariate analysis); and hierarchical multiple linear regression to test the hypotheses. Unless otherwise indicated, the tests were two-tailed, with significance equal or less than .05.

Descriptive statistics (univariate analysis) were conducted to examine the characteristics (distributions) for each study variable. For autonomy support, autonomous motivation, and patient activation, which are continuous variables, the mean, median, mode, standard deviation, and range were calculated. For categorical variables-demographic variables (age, gender, race/ethnicity, income, education, health insurance status), and primary care use variables (clinic patient duration, duration with current nurse practitioner, clinic reason) the sample number and frequencies percent (N, frequencies, %) were calculated to describe the characteristics of the study population. Descriptive statistics of non-participants were calculated to examine if nonparticipants differed significantly from participants with respect to age, gender, self-identified race, and education.

Psychometrics of the three psychosocial measures were performed using Cronbach's alpha prior to data analysis to assess and establish internal reliability of the TSRQ, the mHCCQ, and the PAM-13 in this nurse-managed health center population.

First, an exploratory hierarchical multiple linear regression was conducted with block entry using all the variables in the model. Demographic variables were entered in block one, clinic use variables were entered in block two, and the theoretical constructs were entered in block three. In order to determine which of the independent variables would be entered into the final regression model, bivariate analysis was conducted to examine the relationship between each independent variable and the continuous dependent variable, activation. Three hierarchical multiple linear regressions were conducted to answer the first hypothesis. Based on these regression results, the second hypothesis was not tested. However, six additional individual hierarchical multiple linear regressions were conducted to more explicitly understand the significant results of the first hypothesis. A post-hoc power analysis was conducted to document the actual power of the study.

The next chapter will describe the results of these analyses and of the hypotheses testing.

CHAPTER 4:

RESULTS

This study examined relationships among demographic, clinic use variables, and two Self-determination Theory constructs, Autonomy Support of the nurse practitioner and the patient's Autonomous Motivation with Patient Activation, as a measure of patient self-management. This chapter reports the results and discussion for the following hypotheses.

1. Hypothesis One: Controlling for demographics and clinic use variables, Autonomy Support and Autonomous Motivation independently predict Patient Activation in a nurse-managed health center population.

2. Hypothesis Two: Autonomous Motivation mediates the relationship between Autonomy Support and Patient Activation.

The Study Sampling Flow Chart, shown in Figure 4, compares the demographics of the English-speaking patients recruited and screened and those who refused participation and agreed to complete the voluntary refusal survey, resulting in the final sample, displayed in Table 11. Of the 143 English-speaking patients screened for participation, seven did not meet the inclusion criteria due language issues and thus did not complete the refusal survey. Five of the six who declined participation completed the refusal survey, hence the differences in demographics between those who participated and those who refused is based only on the information from the completed refusal surveys. The comparative percentages are based on the 135 of the 136 screened and the 130 study participants
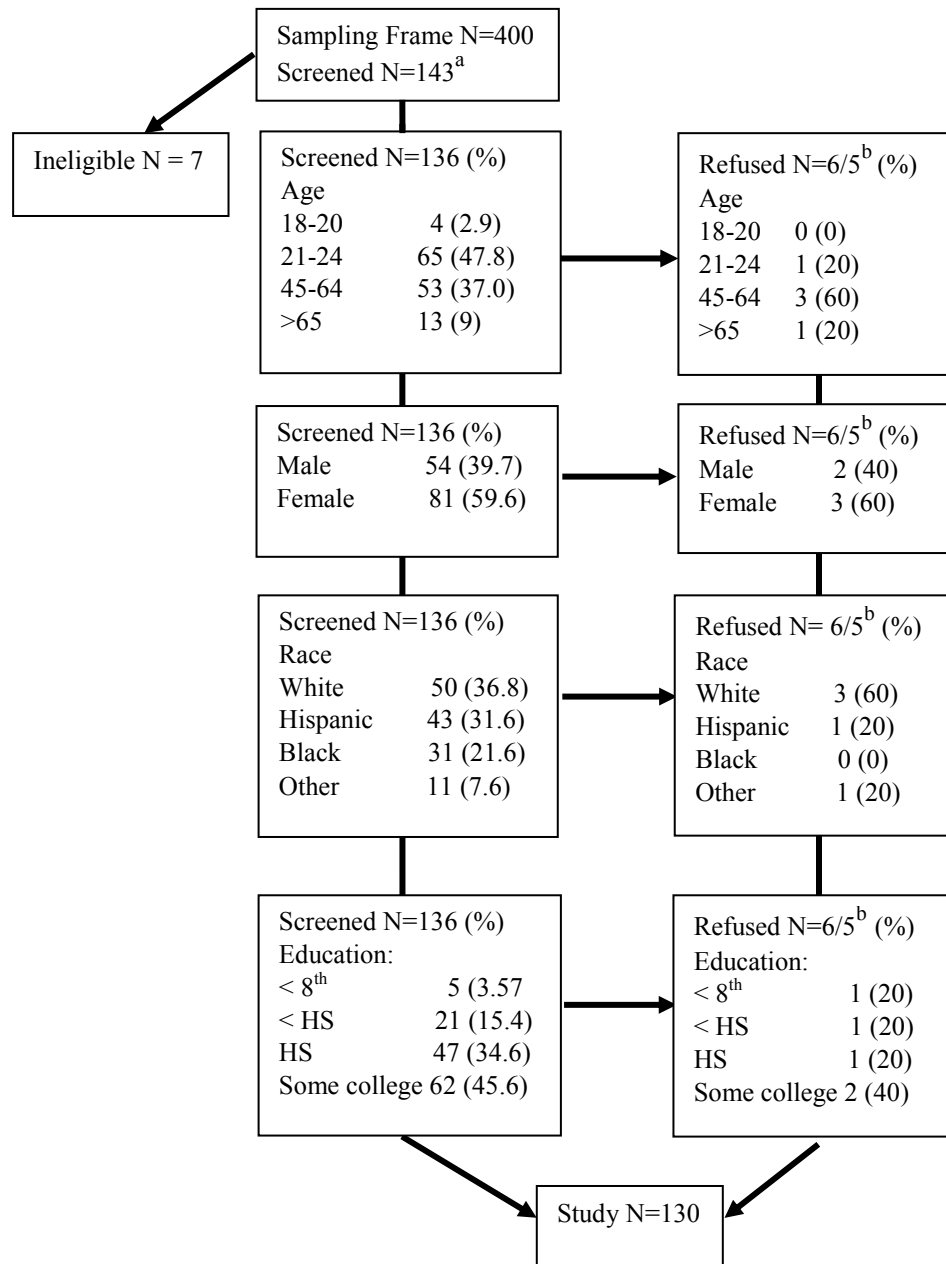
Figure 4. Study Sampling Flow Chart
[a]Based on English-speakers only and [b]those who completed the refusal survey.

Checks of Data Integrity

Prior to data analysis, all continuous variable data were screened for abnormal

means or standard deviations. Checks of data integrity were conducted on the three

continuous variable scores (autonomy support, autonomous motivation, patient

activation) to assure the data was appropriate for multiple linear regression, a parametric test that assumes a normal distribution (Bannon, 2013). In order to have valid results for linear regression analyses planned for this study, certain assumptions had to be upheld: normality, independence of errors, linearity of the relationship between the predictors and dependent variable, homoscedasticity of residuals, no multicollinearity, and no significant outliers or influential points (Field, 2013).

Normality

In order to maximize the accuracy of the statistical tests and regression model, normality of the data was examined both descriptively and statistically. On visual examination of the histograms of the three continuous variables, the shapes were not consistent with normal distributions. Next, the following statistical procedures were conducted to assess normality—descriptive statistics (mean, standard deviation, standard error of the mean, median and mode) and the Kolmogorov-Smirnov Test and the Shapiro-Wilk Test (Bannon, 2013) to evaluate skewness and kurtosis of the three constructs, as shown in Table 9. Logarithmic data transformations of the continuous variables autonomous motivation and patient activation were conducted to assess robustness of the variables to violations of the assumption of normality.

Table 9

Skewness and Kurtosis Statistics for Continuous Study Variables

Variable	Kolmogorov-Smirnov		Shapiro-Wilk		Skewness	Kurtosis
	Statistic	Sig.	Statistic	Sig.	Statistic (*SE*)	Statistic (*SE*)
Autonomy Support	0.3076	0.000	0.558	0.000	-3.676 (0.216)	18.518 (0.428)
Autonomous Motivation	0.128	0.000	0.942	0.000	0.767 (0.216)	0.196 (0.428)
Activation	0.130	0.000	0.938	0.000	0.656 (0.215)	-0.342 (0.427)

Kolmogorov-Smirnov and Shapiro-Wilk test statistics were significant (p =.000) for each of the three continuous variables, indicating non-normal distributions. Because the Kolmogorov-Smirnov and Shapiro-Wilk tests are rigorous (Bannon, 2013), the ratios of the value of skewness and kurtosis relative to the standard error of each were calculated for each continuous variable. Ratios of two or less indicate scores are approximately normally distributed. Autonomy Support was negatively skewed (-3.676), with a standard error of .216, resulting in a ratio of -17.02 (greater than 2). The kurtosis of autonomy support was 18.518, with a standard error of .428, resulting in a ratio of 43.26 (greater than 2). Due to the high negative ratio of skew to standard error for autonomy support, the even higher ratio of kurtosis to standard error, and a distribution pattern of scores in which 72 of the 126 surveys (57%) had the highest possible score of 42, Autonomy Support was recoded into a dichotomous variable. It was renamed "Does the study participant perceive NP autonomy support?" with the highest score of 42 defined as 1 (*yes*), and all other scores defined as 0 (*no*). This approach addressed the assumption of normality for the autonomy support variable.

Autonomous Motivation was positively skewed (.767), with a standard error of .216 and a ratio of 3.55 (greater than 2). The kurtosis was .196, with a standard error of .428, resulting in a ratio of .458 (less than 2). The dependent variable Patient Activation was also positively skewed (.656), with a standard error of .215 and a ratio of 3.05. The kurtosis was -.342, with a standard error of .427, resulting in a ratio of -.801 (less than 2).

As an additional assumption check, following the bivariate analysis, exploratory logarithmic data transformations of the two remaining continuous variables—

Autonomous Motivation and Patient Activation—were performed. According to Bannon

(2013), log transformation can address a distribution of scores that is non-normal due to a

significantly positive skew, by moving the numbers to the right tail of the distribution.

This makes the distribution approximately normal by reducing the positive skew.

Following the recommendations by Bannon, an exploratory hierarchical multiple linear

regression analysis was conducted using the transformed autonomous motivation and

patient activation variables, the dichotomized autonomy support variable, and the

significantly correlated covariates location and insurance status. The significance levels

of the predictor coefficients were the same for the log-transformed variables and the

original variables entered into the final regression models shown in Table 17. With all

four independent variables in the model, the regression model predicting activation was

significant $F(4, 115) = 6.949$, $p < .001$, with an R^2 of 0.195 and an adjusted R^2 of 0.167.

The log-transformed model explained 19.5% of the variance of patient activation.

Autonomy Support was the only independent predictor of Patient Activation $B = 0.69$,

$SE(B) = 0.16$, $\beta = 0.364$, $p < .001$.

Bannon (2013) suggests that if the regression model using the transformed

variables yields similar statistical significance when the normal distribution assumption is

met, then one could consider using the variable in the original form to preserve data

fidelity, since the regression model is considered robust to the violation of the assumption

of normality. Therefore, although Autonomous Motivation and Patient Activation

violated the stringent assumption of normality, the regression model was considered

robust to the violation of normality, since the significance levels of the correlation

coefficient (Autonomy Support, $p \leq .001$) were the same when Autonomous Motivation

and Patient Activation were entered in either their original form or log-transformed in the hierarchical multiple linear regressions. Hence, it was decided that the continuous variable distributions would not be transformed for the bivariate and multivariate analyses, based on the exploratory results of the initial transformed variable analyses. In addition, the Central Limit Theorem (Field, 2013) purports that as sample size increases beyond 30 the sampling distribution tends toward a normal distribution with the sample mean equaling the population mean.

Outliers

Scores that are outliers can cause bias in regression results. Because all three continuous variables were not normally distributed, the impact of outlier scores was assessed. While responses on each instrument included the highest possible scores, autonomy support was dichotomized, since 57% of the scores were at the top of the range. A filter variable was created for Autonomous Motivation outlier scores. After eliminating one score of 50, two of 53, and one of 56 (the upper range), the Kolmogorov-Smirnov and Shapiro-Wilk statistics remained significant. While the ratio of skewness to standard error decreased from 3.55 to 2.23, the ratio of kurtosis to standard error increased from .458 to -1.68 (and became negative). A filter variable was created for activation scores. After eliminating eight scores of 100 at the top of the range, the Kolmogorov-Smirnov and Shapiro-Wilk statistics remained significant. While the ratio of skewness to standard error decreased from 3.05 to 1.97, the ratio of kurtosis to standard error increased from -.801 to -1.50, becoming increasingly negative. Since none of the scores were outside the possible ranges for each of the instruments and deleting

these cases could reduce variability as well as the sample size, no scores were eliminated from the analyses based on outlier evaluation.

Linearity

A linear relationship is assumed between two continuous variables in regression analysis, so a graph was generated in SPSS to assess the relationship between the continuous independent variable Autonomous Motivation and the dependent variable Patient Activation. The bivariate scatterplot shown in Figure 5 illustrates that these two variables are not strongly linearly related.
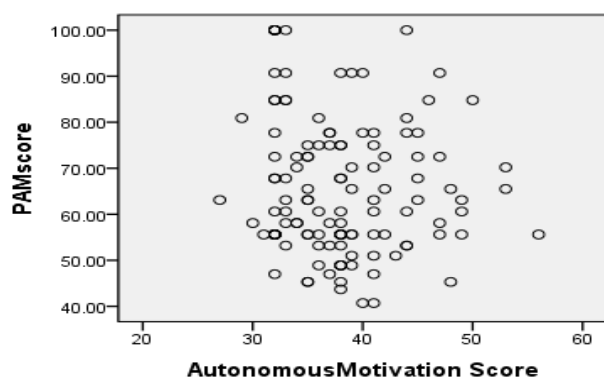
Figure 5. Scatterplot of Autonomous Motivation and Patient Activation

Multicollinearity

Because of the potential that multiple predictors would be entered into the regression model (Bannon, 2013) multicollinearity was first checked by conducting individual bivariate correlations using Spearman's rho (11 categorical predictor variables, including autonomy support, and the sole continuous predictor variable autonomous motivation). Highly correlated variables can lead to misrepresentation of the true relationship between each predictor and the dependent variable. In cases of high multicollinearity, the regression model may indicate neither predictor is significantly related to the dependent variable when they both are. Only those predictors with

collinearity at .05, .01, and .001 significance levels are included in Table 10. It is

important to note that there were no significant correlations between the Autonomous

Motivation and Autonomy Support constructs or between Autonomous Motivation and

any of the covariates.

Table 10

Covariates and Predictor Variables with Significant Collinearity

Independent Predictors	Correlation coefficient	Sig.
Age x Gender	-.180*	.041
Age x Education	.197*	.025
Age x Clinic Reason	.256**	.003
Gender x Race (self-identified)	.201*	.022
Race x Location	.677***	.000
Race x Insurance	.513***	.000
Race x Clinic Duration	.173*	.049
Location x Insurance	.602***	.000
Location x Clinic duration	.237**	.007
Location x Autonomy Support [a]	.198*	.027
Clinic Duration x NP Duration	.670***	.000
Clinic Duration x Clinic Reason	.218*	.013

Note: Correlations are Spearman's Rho unless noted. [a] Variable dichotomized, based on 124 cases, [*] $p \leq .05$, ** $p \leq .01$, *** $p \leq .001$, two-tailed, based on 130 cases

None of the correlations were in the high range (> .80-.90) that could lead to

untrustworthy standard errors of b coefficients, limited R size, or incorrect weighting of

predictor importance, so the variables meet that diagnostic standard for non-

multicollinearity. Thus, one could assume that these predictors would not present

multicollinearity problems when used together in the regression model (Bannon, 2013).

Multicollinearity was also examined via the variance inflation factor (VIF) and

tolerance statistics, to see if any strong linear relations were identified among the

predictors. Next, multiple linear regression was conducted with all the independent

variables as predictors and activation as the dependent variable to obtain collinearity

statistics. All the tolerances were above the 0.2 (range = 0.340-0.927) and all the VIFs were below 10 (range = 1.10-1.31), indicating there was no cause for concern regarding multicollinearity (Field, 2013). The VIF indicates if a predictor is strongly correlated with other predictors in the regression model. The tolerance statistic is the reciprocal of the VIF. Clinic Duration (VIF = 2.942) and NP Duration (VIF = 2.613) were the only two variables exceeding the rigorous VIF cutoff point of 2.5, indicating neither variable should be entered in a regression model (Bannon, 2013).

Homoscedasticity

The assumption of homogeneity of variance refers to the assumption that the regression residuals have similar variances at each level of a predictor variable. The residual or error represents the unexplained variance after conducting a regression model (Bannon, 2013). Homoscedasticity was tested statistically with Levene's test of homogeneity, using the one-way ANOVA procedure in SPSS for each independent variable and the dependent variable. There was no violation of homoscedasticity in any of the analyses of the categorical independent variables, hence homogeneity of variance was assumed for these potential predictors. However, Levene's test was significant for both constructs. For autonomy support (dichotomized) the Levene's statistic was 7.382 (p = .008). For autonomous motivation the Levene's statistic was 2.534 (p =.003). Since both test statistics were significant at less than the .05 level, both constructs exhibited heteroscedasticity, violating the regression assumption.

Independence of Errors

To ensure that for any two pieces of data, the residual terms (errors) were independent or uncorrelated, a Durbin-Watson test was conducted to examine whether

adjacent residuals were correlated, with a value near 2 indicating lack of correlation between the residuals. There was independence of residuals, as assessed by a Durbin-Watson statistic of 1.834 in the second (final) regression analysis. This statistic ranges from 0 to 4, with an acceptable range of 1.50-2.50, so a value near 2 is generally accepted as evidence that there is independence of errors as represented by the residuals (Field, 2013).

Reliability

All three instruments exhibited reliability in this nurse-managed clinic sample, further confirming reliability of the data. The Cronbach's alpha's for the mHCCQ was 0.89 (N = 126); 0.89 for the PAM-13 (N = 105), based on cases with responses to all 13 items; and 0.80 for the TSRQ (N = 126).

Rather than violate the assumption of normality with a variable that did not even approximate a normal curve, Autonomy Support was recoded as a dichotomous variable. Nevertheless, Autonomous Motivation and Patient Activation were allowed to violate strict criteria of normality due to their distribution curve which roughly approximated the shape of a normal curve. The assumptions of linearity and homoscedasticity were not met for Autonomous Motivation and Patient Activation. While the data in its original raw form did not meet the strict criteria for these assumptions, these violations were not so egregious as to invalidate the linear regression model findings.

Robust is a characteristic describing a model's, test's or system's ability to effectively perform while its variables or assumptions are altered, so a robust concept can operate without failure under a variety of conditions. For statistics, a test is claimed as robust if it still provides insight to a problem despite having its assumptions altered or

violated (M. Q. Wang, personal communication, July 7, 2016). In general, being robust means a system can handle variability and remain effective. Because of the statistical robustness of linear regression models, they will typically provide estimates that are reasonably unbiased and efficient even when one or more of the assumptions is not completely met, and can be considered valid.

Given the above adjustments to coding and/or judgements made about the size of effects from violations of strict variable assumptions on results, the variables as ultimately coded were deemed adequate for the types of analyses to be conducted. The next section describes the results of the analyses of the hypotheses.

<div align="center">Descriptive Statistics</div>

Categorical Variables

Descriptive statistics were examined for all sample participants by each variable. While data were collected on 130 participants, a total of ten cases with missing scores on the autonomy support, autonomous motivation, or patient activation instruments were excluded listwise in the final linear regression analysis. Hence, the final linear regression results with the two significantly correlated covariates (insurance status and clinic location) and the constructs (Autonomy Support and Autonomous Motivation) with Patient Activation are based on the scores of 120 participants. First, the numbers and percentages of respondents for each of the categorical demographics variables, shown in Table 11, and clinic use variables and the dichotomized theoretical construct autonomy support, shown in Table 12, were examined for all the 130 participants.

Table 11

Descriptive Statistics of the Sample Demographic Categorical Variables

Variable	Participants	$N = 130$ n (%)
Age		
18-20	4	(3.1)
21-44	64	(49.2)
45-64	50	(38.5)
65 or older	12	(9.2)
Gender		
Male	52	(40)
Female	78	(60)
Self-identified Race		
White	47	(36.2)
Hispanic	42	(32.3)
Black	31	(23.8)
Other [a]	10	(7.7)
Annual Household Income		
Less than $31,460	103	(79.2)
$31,461 to $49,999	24	(18.5)
$50,000 or more	3	(2.3)
Education Level		
Less than 8th grade	4	(3.1)
Less than High School	20	(15.4)
Completed High School	46	(35.4)
Some College or more	60	(46.2)
Location		
Central Maryland	62	(47.7)
Eastern Shore	68	(52.3)
Insurance Status		
Uninsured	93	(71.5)
Insured [b]	37	(28.5)

Note: [a] includes Asian Pacific Islander, Indian, mixed, and other; [b] Medicare, Medicaid, commercial or other

Analysis of the demographic variables in Table 11 revealed that the majority of study participants were relatively young, between 21 and 44 years old, while those who refused to participate tended to be 45 years of age older. Both the study sample and those who refused were 60% female. While Whites comprised only slightly more than 36% of the study sample, 60% of those refusing to participate were White. Although Latinos

comprised the major racial/ ethnic group served by the Wellmobile, only 32% of the

survey participants were Latinos. This was a result of the exclusion criteria, whereby the

participant had to be able to take the survey in English in order to participate. Those with

some college were the highest represented education category (46%) in this sample,

while an additional 36% completed high school. Combined, approximately 82% of the

participants had completed at least a high school education. Of those who refused, 40%

completed some college or more, while one each completed high school, had less than a

high school education, or had less than an eighth grade education. Only one urban

patient refused to participate, compared with five from the rural clinic.

Table 12

Descriptive Statistics of the Sample Clinic Use Categorical Variables

Variable	Participants	$N = 130$ n (%)
Clinic Duration		
Less than 3 months	45	(34.6)
3 months to less than 6	15	(11.5)
6 months to less than 1 yr	9	(6.9)
1 yr to less than 2 yrs	26	(20.0)
2 yrs or more	35	(26.9)
NP Duration		
Less than 3 months	63	(48.5)
3 months to less than 6	17	(13.1)
6 months to less than 1 yr	10	(7.7)
1 yr or more	40	(30.8)
Clinic Reason		
Well Care	76	(58.5)
Chronic Care	54	(41.5)
Autonomy Support [a]		
No	54	(42.9)
Yes	72	(57.1)

Note: [a] based on 126 valid scores, variable recoded as dichotomous

      Analysis of the two clinic use variables— clinic duration and NP duration— in

Table 12 demonstrated that while the largest percentage of patients (46.9%) received care

from the clinic for a year or more (combining the two highest clinic duration categories),

only 30.8% had a year or more experience with their nurse practitioner. In comparison,

the highest frequency (48.5%) of patients reported having received care from the same

nurse practitioner for three months or less. Slightly more than half (58.5%) of the sample

indicated that preventive care or treatment of acute illness was the primary reason for

coming to the clinic, while the remainder were under treatment for chronic or ongoing

conditions.

Continuous Variables

Next, the means, standard deviations, and reported score ranges were examined

for the continuous variables Autonomy Support, Autonomous Motivation, and Patient

Activation, as shown in Table 13. Results are presented for Autonomy Support prior to

recoding as a dichotomous variable.

Table 13

Descriptive Statistics of Continuous Variable Scores (N = 130)

Variable (N)	N (# Missing)	Mean	SD	Min/Max Score	Median	Mod	Poss. score range
Autonomous Motivation	126 (4)	38.13	5.66	27/56	38.0	32.0	8-56
Autonomy Support [a]	126 (4)	39.72	4.518	9/42	42.0	42.0	6-42
Activation [b]	127 (3)	66.24	15.11	40.7/100	63.1	55.6	0-100[b]

Note: [a] prior to recoding variable as dichotomous, [b] Scored with a the PAM-13 scoring excel file, with responses to 10 of 13 items comprising a valid score.

Examination of continuous variables revealed that although autonomous

motivation and patient activation were not normally distributed, there was a good

distribution of scores. The autonomy support score mean of 39.72 was higher than

results of 33.3 reported by Williams, Patrick et al. (2009) and 29.0 by Williams et al.

(2009) for diabetic patients. However, since autonomy support scores were significantly skewed and not normally distributed, this continuous variable was dichotomized based on the maximum possible score (42) and the remaining scores from 9 to 41.

Scores for autonomous motivation and patient activation were well distributed across the scale, reflected by one score of 56 and seven scores of 100 on these instruments, respectively. Mean scores for both autonomous motivation and patient activation were above the midpoint range and positively skewed. The composite autonomous motivation score was the sum of the reverse-scored controlled subscale items and the autonomous subscale scores. The mean autonomous motivation score was 38.13, with a range between 27 and 56.

The scoring of the activation measure is unique. The PAM-13 measures where the individual falls on a 0-100 interval level scale, then further categorizes patients into one of four activation levels along an empirically derived continuum, representing the degree of activation (Hibbard et al., 2004). The mean activation score was 66.24, with a relatively large spread of values (SD = 15.11).

Bivariate Analysis

Bivariate correlation relationships between all independent and covariate variables, categorical, and continuous independent and covariate variables, and the interval level dependent variable were examined, with the exception of the categorical variable self-identified race. Spearman's rho was used to test the association between the ordinal and dichotomous variables (gender, age, clinic location, income, education level, insurance status, clinic duration, NP duration, clinic reason, autonomy support) with activation. Pearson-product moment correlation was used to test the association between

the continuous independent variable autonomous motivation and activation (Bannon, 2013). One-way ANOVA with Bonferroni correction was conducted to test the association between self-identified race (a dummy-coded categorical variable) and activation. Independent variables and covariates that were significantly correlated (p ≤.05) with activation were included in the multivariate analysis (Bannon, 2013).

The correlations for the demographic and clinic use variables were based on the valid activation scores of 127 of the 130 study subjects. However, four different cases were missing scores on either the autonomy support and autonomous motivation scales, resulting in 126 cases with valid scores for each of these two predictors. One of the four cases had both missing autonomy support and activation scores. As a result, the bivariate correlation between Autonomy Support and Patient Activation was based on 124 cases, while that between Autonomous Motivation and Patient Activation was based on 123 cases.

As shown in Table 14, results of the bivariate correlations were that two demographic variables insurance status and clinic location were the only significantly correlated covariates. The One-way ANOVA with Bonferroni for self-identified race and activation was non-significant $F(3, 123) = 1.986$, $p= .120$). Since no clinic use variables were significantly correlated with activation from the bivariate analysis, no other covariates were entered into the hierarchical multiple regression model. While Autonomy Support was highly correlated with Patient Activation, the other construct, Autonomous Motivation ($r = -.109$, $p =.230$) was not.

Table 14

Bivariate Correlation of Study Independent and Covariate Variables with Activation (n =

127[a])

Variable	Correlation coefficient	Sig.
Age	.017	.848
Gender	.134	.133
Income	.051	.571
Education	.020	.826
Location	.243**	.006
Insurance Status	.196*	.027
Clinic Duration	-.005	.959
NP Duration	-.073	.414
Clinic Reason	-.019	.832
Autonomy Support [b]	.370***	.000
Autonomous Motivation [c]	-.109	.230

Note: Correlations are Spearman's Rho unless noted. [a] based on 127 cases. [b] Variable dichotomized, based on 124 cases. [c] Pearson r, based on 123 cases. $*p \le .05$, $** p \le .01$, $*** p \le .001$, two-tailed.

Multivariate Analysis

Hypothesis One

As a preliminary anlaysis, hierarchical multiple linerar regression with block entry was conducted to test the theoretical model including all the variables as potential predictors. The overall model explained a significant amount ($R^2 = .317$, Adjusted $R^2 = .145$) of variation in the outcome $F(24, 95) = 1.841$, $p < .05$. The adjusted R^2 was markedly decreased compared to the unadjusted statistic. Autonomy Support was the only statistically significant predictor coefficient, $B = 11.503$, $SE(B) = 2.808$, $ß = 0.385$, $p < .05$, indicating that none of covariates and the other theoretical construct contributed significantly to predicting activation.

To elicidate the initial findings regarding hypothesis one, three additional hierarchical multiple linear regression analyses were conducted, regressing bivariate

correlates of activation and the two independent variables as predictors. The correlation

matrix in for the independent and covariate variables used in the regressions shown in

Table 15 was based on the significant bivariate correlations from Table 14, with

Autonomous Motivation added because it was the other theoretical construct. Rather

than eliminate cases *a priori,* the final number of cases in these analyses were determined

by the significantly correlated covariates and independent variables with activation

entered into the regression model.

Table 15

Correlation Matrix for Independent and Covariate Variables in the Regressions (n = 120)

Variables	Location	Insurance Status	Autonomy Support	Autonomous Motivation	Activation
Activation	.210*	.198*	.391***	-.097	--
Location	--	.582***	.181*	.018	--
Insurance Status	--	--	.111	-.115	--
Autonomy Support	--	--	--	.020	--
Autonomous Motivation	--	--	--	--	--

Note: Correlations are Pearson's r, * $p \leq .05$, ** $p \leq .01$, *** $p \leq .001$, one-tailed, based on 120 cases

In regression one of the dependent variable Patient Activation, the theoretical

predictor, Autonomous Motivation, was entered into the regression model along with the

two demographics (location and insurance status), to control for them. Autonomy

Support, which was significantly correlated with Patient Activation, was not included in

the first regression to determine the amount of variance in Patient Activation explianed

by the two significantly correlated covariates (location and insurance status) and the

theoretical construct Autonomous Motivation and whether Autonomous Motivation

contributed significantly to predicting Patient Activation. The overall model shown in

Table 16 explained a significant amount of variation in the outcome $F(3, 119) = 2.714$, p < .05, although it explained only 6% ($R^2 = .064$, Adjusted $R^2 = .040$) of the outcome variable variance. None of the predictor coefficients were statistically significant, indicating that none of these three independent variables contributed significantly to predicting activation in this sample.

Table 16

Hierarchical Multiple Linear Regression One: Location, Insurance Status, and

Autonomous Motivation on Activation

Variable	*B*	*SE B*	ß	t	Sig.	R^2 Change
Location	4.788	3.284	.161	1.458	.147	.046
Insurance Status	3.038	3.616	.093	.840	.403	.008
Autonomous Motivation	-.269	.236	-.102	-1.137	.258	.010

Note: DV: Activation, $R^2 = 0.064$, Adj $R^2 = .040$, two-tailed, based on 123 cases

Next, a second regression was conducted with the full model including both independent variable theoretical constructs, Autonomous Motivation and Autonomy Support and the two covariates location and insurance status. The regression model predicting activation shown in Table 17 was significant $F(4, 115) = 6.779$, $p < .001$, with an R^2 of 0.191 and an adjusted R^2 of 0.163. This model explained 19% of the variance in activation in this nurse managed health center sample. However, similar to the results from the first regression, none of the coefficients for location, insurance status, or Autonomous Motivation were statistically significant. The R^2 change increased to .191, with .131 attributable to the significantly correlated construct of Autonomy Support. In the full model, Autonomy Support was the only independent predictor of Patient

Activation B = 10.949, SE(B) = 2.543, ß = 0.367, $p < .001$. The second regression was

selected as the final analysis, because it tested the full model.

Table 17

Hierarchical Multiple Linear Regression Two: Location, Insurance Status, Autonomous

Motivation, and Autonomy Support on Activation

Variable	B	$SE\ B$	ß	t	Sig.	R^2 Change
Location	2.926	3.101	.099	.943	.347	.044
Insurance Status	2.850	3.357	.089	.849	.398	.009
Autonomous Motivation	-.248	.220	-.096	-1.137	.258	.008
Autonomy Support	10.949	2.543	.367	4.307	.000***	.131

Note: DV: Activation, R^2 = 0.191, Adj R^2 = .163, *** $p < .001$, two-tailed, based on 120 cases

A third hierarchical multiple linear regression was conducted entering location,

insurance status, and Autonomy Support as the only independent variables because

Autonomous Motivation showed no significance as a predictor. The results shown in

Table 18 confirm those of the second regression.

Table 18

Hierarchical Multiple Linear Regression Three: Location, Insurance Status, and

Autonomy Support on Activation

Variable	B	$SE\ B$	ß	t	Sig.	R^2 Change
Location	2.395	3.117	.080	.768	.444	.047
Insurance Status	4.142	3.361	.127	1.232	.220	.012
Autonomy Support	10.530	2.554	.347	4.122	.000***	.117

Note: DV: Activation, R^2 = 0.176, Adj R^2 = .156, *** $p < .001$, two-tailed, n=124

The third regression model predicting activation remained statistically significant

$F(3, 120) = 8.552$, $p < .001$, although the overall model R^2 decreased from 0.191 to 0.176

and the adjusted R^2 decreased from 0.163 to 0.156. Autonomy Support remained the only

significant predictor of activation B=10.530, SE($B)$ = 2.554, ß =0.347, p <.001 uniquely

explaining 17.6% of the variance in the activation model. Thus, this model in the third

regression explains more than 17% of the variance in Patient Activation in this nurse

managed health center sample.

Examination of the differences between the R^2 changes for Autonomy Support

between the second and third regressions reveals that while the R^2 for Autonomy Support

decreased slightly from .131 to .117 (difference of .014) with the removal of Autonomous

Motivation, the R^2 changes for both location and insurance status increased by .003 each.

The Correlation Matrix for Independent and Covariate Variables in the Regressions in

Table 14 further explains these findings. The correlation coefficient between location and

insurance status (r =.582, $p \leq$ .001) is statistically significant ($p \leq$ .001). The correlation

coefficient for these two variables is greater than that between Autonomy Support and

Patient Activation (r =.391, $p \leq$ .001). These findings suggest there may be sufficient

multicollinerarity between the two demographic variables location and insurance status to

make neither variable independently significant in predicting the outcome variable in the

models.

Thus, controlling for significantly correlated covariates, Autonomy Support was

the only independent predictor of Patient Activation in this nurse managed health center

patient population. Hence, hypothesis one is only partially supported, since while

Autonomy Support is an independent predictor, Autonomous Motivation does not predict

Patient Activation.

Given that the results of the linear regressions indicated that Autonomy Support

was the only construct to independently predict Patient Activation and that there was not

a significant bivariate correlation between Autonomous Motivation and Patient Activation, Hypothesis Two: Autonomous Motivation mediates the relationship between Autonomy Support and Patient Activation could not be tested. Therefore, this hypothesis could neither be accepted nor rejected.

Additional Exploratory Analyses

Based on findings that Autonomy Support was highly correlated with Patient Activation, understanding how the individual items on the autonomy support scale relate to the dependent variable activation may be instructive about potential opportunities in clinical practice to change activation and possibly improve self-management behavior. Since Autonomy Support was dichotomized in the overall regression model, this approach examined the relationship of the individual items scores as continuous variables in the activation model.

Pearson correlation coefficients were computed between each item (continuous measure) and the dependent variable activation. The correlations shown in Table 19 were based on the valid activation scores of 127 of the 130 study subjects and 129 cases with responses to the autonomy support items (one completed none of the items), 126 of whom had complete scores. One of these cases had missing items on the autonomy support scale and also did not have a valid activation score. Hence, as each correlation was conducted between individual autonomy support items and Patient Activation, only cases missing a score on that item were eliminated from the analysis. This reduced the number of valid results for each analysis to 125 and 126. Therefore, all available responses to items were included in the separate bivariate and the subsequent multivariate

analyses. The bivariate correlation for Item 5 was not statistically significant at the .05 level, while correlations for the other five items ranged from $p \leq .05$ to $p \leq .001$.

Table 19

Bivariate Correlation Matrix: Individual Autonomy Support Items with Activation (n = 127)

Question	Correlation coefficient	Sig.	N
1. My NP provided choices and options.	.204	.011*	126
2. I Feel Understood by my NP.	.226	.006**	125
3. My NP conveys confidence in my ability to make changes.	.174	.026*	126
4. My NP encourages me to ask questions	.242	.003**	125
5. My NP listens to how I want to do things.	.110	.111	125
6. My NP tries to understand how I see things before suggesting a new way of doing things.	.320	.000***	125

Note: Correlations are Pearson r, $*p \leq .05$, $** p \leq .01$, $*** p \leq .001$, two-tailed.

Six separate hierarchical multiple linear regressions were conducted, regressing each of the six autonomy support scale items, with location and insurance status as covariates, on activation. A regression was also conducted on Item 5, although it was not significantly correlated with Patient Activation, to assess the influence of the covariates at the item level. Individual item regression results for each of the six items are presented separately, from the most significant to the least significant predictor, based on the contribution of the item to the predictive model. For the regressions of items 1, 2, 3, 4, and 6, each autonomy support item was the only significant predictor of activation.

The sequence of survey items is hierarchical, with attributes culminating in the complexity of Item 6. This item, "My nurse practitioner tries to understand how I see things before suggesting a new way of doing things," had the highest statistical significance $F(3, 121) = 7.694$, $p < .001$, $B=5.355$, $SE(B) = 1.368$, $\beta = 0.327$, $p < .001$.

This item alone explained 16% of the variance of activation $R^2 = .160$, Adjusted $R^2 = .139$) in the regression model in Table 20, compared with the dichotomous Autonomy Support variable reflecting all the items, which explained 17.6% in regression three in Table 18, only a slightly higher amount of variation.

Table 20

Hierarchical Multiple Linear Regression: Location, Insurance Status, and Autonomy Support Item 6 on Activation

Variable	B	SE B	ß	t	Sig.	R^2 Change
Location	3.010	3.120	.100	.965	.337	.042
Insurance Status	5.486	3.409	.167	1.609	.110	.012
Q 6. My NP ties to understand how I see things before suggesting a new way of doing things.	5.355	1.368	.327	3.915	.000***	.106

Note: DV: Activation, $R^2 = 0.160$, Adj $R^2 = .139$, *** $p \leq .001$, two-tailed, n=125

Item 4, "My NP encourages me to ask questions," had the second highest statistical significance in the regression model $F(3, 121) = 5.568$, $p < .001$, $B = 4.039$, SE$(B) = 1.424$, ß $= 0.244$, $p < .01$ in Table 21. Item 4 explained 12% of the variance of activation in this nurse-managed health center $R^2 = .121$, Adjusted $R^2 = .100$.

Table 21

Hierarchical Multiple Linear Regression: Location, Insurance Status, and Autonomy Support Item 4 on Activation

Variable	B	SE B	ß	t	Sig.	R^2 Change
Location	3.176	3.2110	.106	.989	.325	.051
Insurance Status	5.689	3.501	.173	1.625	.107	.012
Q 4. My NP encourages me to ask questions.	4.039	1.424	.244	2.837	.005**	.058

Note: DV: Activation, $R^2 = 0.121$, Adj $R^2 = .100$, ** $p \leq .01$, two-tailed, n=125

As shown in Table 22, Item 2, "I feel understood by my NP," had the third highest statistical significance $F(3, 122) = 5.097$, $p < .05$, $B = 4.084$, SE$(B) = 1.495$, $ß = 0.234$, $p < .01$. Item 2 alone explained 11% of the variance of activation in this nurse-managed health center $R^2 = .111$, Adjusted $R^2 = .090$.

Table 22

Hierarchical Multiple Linear Regression: Location, Insurance Status, and Autonomy

Support Item 2 on Activation

Variable	B	SE B	ß	t	Sig.	R^2 Change
Location	3.627	3.201	.120	1.133	.260	.045
Insurance Status	5.086	3.508	.154	1.450	.150	.012
Q 2. I feel understood by my NP.	4.084	1.495	.234	2.732	.007**	.054

Note: DV: Activation, $R^2 = 0.111$, Adj $R^2 = .090$, ** $p \leq .01$, two-tailed, n=126

Item 1, "My NP provided me with choices and options," had the fourth highest statistical significance $F(3, 122) = 4.593$, $p < .01$, $B = 4.043$, SE$(B) = 1.646$, $ß = 0.211$, $p < .05$, shown in Table 23. Item 1 alone explained 10% of the variance of activation $R^2 = .101$, Adjusted $R^2 = .079$ in this nurse-managed health center.

Table 23

Hierarchical Multiple Linear Regression: Location, Insurance Status, and Autonomy

Support Item 1 on Activation

Variable	B	SE B	ß	t	Sig.	R^2 Change
Location	3.778	3.218	.125	1.174	.243	.045
Insurance Status	4.883	3.524	.148	1.385	.168	.012
Q1. My NP provided me with choices and options.	4.043	1.646	.211	2.457	.015*	.044

Note: DV: Activation, $R^2 = 0.101$, Adj $R^2 = .079$, * $p \leq .05$, two-tailed, n=126

Item 3, "My NP conveys confidence in my ability to make changes," was the last statistically significant model $F(3, 122) = 3.969$, $p = .010$, $B = 2.833$, SE$(B) = 1.371$, $ß =$

0.179, $p < .05$, shown in Table 24. Item 3 alone explained less than 9% of the variance of

activation in this nurse-managed health center $R^2 = .089$, Adjusted $R^2 = .067$.

Table 24

Multiple Linear Regression: Location, Insurance Status, and Autonomy Support Item 3

on Activation

Variable	B	SE B	ß	t	Sig.	R^2 Change
Location	3.988	3.239	.132	1.231	.221	.045
Insurance Status	4.577	3.545	.139	1.291	.199	.012
Q 3. My NP conveys confidence in my ability to make changes.	2.833	1.371	.179	2.067	.041*	.032

Note: DV: Activation, $R^2 = .089$, Adj $R^2 = .067$, * $p \leq .05$, two-tailed, n=126

The overall model for Item 5, "My NP listens to how want to do things,"

explained a significant amount of the variation in the outcome $F(3,121) = 3.175, p <= .05$,

$B=2.166$, SE$(B) = 1.370$, ß $=0.140, p =.116$. While the overall model was significant,

however, as shown in Table 25, none of the predictor coefficients was statistically

significant, indicating that unlike results for the previous five items with statistically

significant item coefficients which were the only significant predictors of activation,

neither Question 5 nor the covariates contributed significantly to predicting activation.

This was anticipated based on the non-significant item bivariate correlation coefficient

for this item with activation.

Table 25

Multiple Linear Regression: Location, Insurance Status, and Autonomy Support Item 5

on Activation

Variable	B	*SE B*	ß	t	Sig.	R^2 Change
Location	3.531	3.275	.117	1.078	.283	.042
Insurance Status	5.262	3.606	.160	1.459	.147	.012
Q 5. My NP Listens to how I want to do things.	2.166	1.370	.140	1.582	.116	.019

Note: DV: Activation, R^2 = 0.073, Adj R^2 = .050, two-tailed, n=125

Post hoc power analysis was conducted in G-Power based on hierarchical

multiple linear regression (Fixed Model; R^2 increase; F-Test) with four predictors. Based

on the sample size of 120 in regression two, with .05 alpha significance level, and a

medium effect size of .15, the power was .9331242.

The mediation hypothesis could not be tested. Consequently, six exploratory

hierarchical multiple regression analyses of the individual items on the autonomy support

scale were conducted. Results were that five of the six items on the autonomy support

scale significantly predicted Patient Activation.

CHAPTER 5:

SUMMARY, KEY FINDINGS, LIMITATIONS, AND IMPLICATIONS

Predictors of Patient Activation

The aim of this pilot study was to examine the utility of two Self-determination Theory constructs— Autonomy Support and Autonomous Motivation— as predictors of Patient Activation in an underserved nurse-managed primary care clinic population. This study was grounded in the Triple Aim (Berwick, et al., 2008) and nested in Chronic Care Model (Wagner et al., 2001) concept of self-management support. Hypothesis One was: Controlling for demographic and clinic use variables, Self-determination Theory Constructs Autonomy Support and Autonomous Motivation independently predict Patient Activation in a nurse managed health center population. Hypothesis Two was: Autonomous Motivation mediates the relationship between Autonomy Support and Patient Activation.

Key Findings

The key findings of this study can be summarized as follows. It was hypothesized a priori that Autonomous Motivation and Autonomy Support would independently explain variation in Patient Activation in this nurse-managed clinic. However, the findings do not support this prediction, since only Autonomy Support was statistically significant and explained a relatively small amount (19.1%) of the variation of Patient Activation. The second construct, Autonomous Motivation, did not significantly contribute to the model's prediction of Patient Activation in this investigation. This was not consistent with the study's theoretical framework, which considered both Autonomy Support and Autonomous Motivation to act jointly to develop Patient Activation. Neither

of the significantly correlated demographic variables, location and insurance status included as covariates, contributed to the model. The second hypothesis that would have tested Autonomous Motivation as a mediator between Autonomy Support and Patient Activation was not tested. Regressions of individual autonomy support items on activation indicated some significant relationships.

Patient Activation

The PAM-13 measure demonstrated high internal consistency in this nurse-managed health center sample. The Cronbach's alpha of 0.89 for the PAM-13 was higher than reliabilities of 0.83 reported by Alegriá et al. (2009) and Skolasky et al. (2011), although it was lower than that of 0.95 reported by Becker and Roblin (2008). Responses to the PAM-13 measure for Patient Activation reflect sufficient patient understanding of the questions to elicit responses that could be scored by the Rasch Scoring Excel file. The mean activation score (66.24) for these study participants placed them within the second highest activation stage, "Taking Action" (Hibbard & Mahoney, 2010). Patients at this stage are beginning to take action as self-managers. Self-management skills characteristic of this degree of activation reflect the confidence and knowledge necessary to take action for health and health care self-management activities, such as knowing different medical treatment options, available health care options, and having the ability to maintain lifestyle changes. However, individuals may still lack the skills and confidence to support new behaviors, handle symptoms on one's own, know how to prevent future problems, or maintain lifestyle changes (Hibbard et al., 2009).

This study mean was within the range of means (63.7 - 66.9) reported by Hibbard and Cunningham (2008) in the 2007 Health Tracking Survey, in which less than half of

all adults had activation scores equal to or greater than 67.1 (the highest stage of

activation). Those with chronic conditions had higher activation scores, which was

interpreted to indicate mastery of self-management skills over time, and possibly

attributable to more proactive providers' teaching and self-management support skills.

Means reported in other studies ranged between 54.8 (Ryvicker et al., 2013) among home

care patients and 69.3 (Rask et al., 2009) among urban diabetic clinic patients. Activation

scores in the third activation level range between 55.2 and 67 (Hibbard et al., 2005),

which placed the mean for this study (66.24) almost at the top of this level. Consistent

with results of previous studies using the PAM-13 (Deen et al., 2011; Lubetkin et al.,

2010, 2014; Rask et al., 2009; Skolasky et al., 2011), actual scores fell within all four

activation levels. The standard deviation of 15.11 in this study was slightly larger than

those reported in similar studies, which ranged from 12.9 among multi-morbid adults

(Skolasky et al., 2011) to 15.0 in a home care population (Ryvicker et al., 2013).

Autonomy Support Predicts Patient Activation

While Autonomy Support explained only a relatively small amount of variance in

Patient Activation in this study, this construct contributed significantly to the

hypothesized theoretical model predicting Activation. This finding is consistent with

those of other studies of predictors of activation that examined patients' relationships and

primary care experiences with their primary care provider and found them to be

important correlates of activation. Becker and Roblin (2008) reported "trust in the

physician" as one of several significant predictors of activation. In an examination of

patient-physician role relationships, Alexander et al. (2012) found that exchange,

fairness, and out of office contact were associated with a higher activation level, although

goal-setting was not. Wong et al. (2011) found significant associations between activation scores for the chronically ill and enough time with the doctor, eliciting concerns, patient-centered decision making, whole person care, and satisfaction with a usual source of care and with a family doctor.

This study used the mHCCQ, a widely used instrument in SDT research that measures health care climate by eliciting patient responses to items that reflect autonomy supportive communication styles of their care provider, as the autonomy support measure. The Cronbach's alpha of 0.89 was consistent with reliabilities ranging from 0.86 to 0.89 across three measurements reported by Fortier et al. (2007). Although it was lower than reliabilities of .0.92 and .0.93 reported by Williams et al. (2007). Even though internal consistency was high, there were some inconsistences in individual item responses. For example, while five of the six individual items on the mHCCQ significantly predicted Patient Activation, only responses to Item 5 (listening to patients) were not significantly correlated. The mean (39.72) was higher than that reported by Williams and Patrick et al. (2009). Because the autonomy support variable was negatively skewed, with 57% of self-report scores at the top of the scale range, it was dichotomized prior to conducting further analyses. The clustering of responses at the top of the scale may indicate that patients based their responses on what they thought would please the nurse practitioner. Hence social desirability may partially explain this response pattern. Furthermore, recruitment prior to the visit may have sensitized patients to the nurse practitioner encounter.

Practical Significance of Autonomy Support

The relationships of the six individual autonomy support items with the dependent variable patient activation were assessed to identify communication methods with the most impact from the patients' perspective. These items outline specific communication skills such as active listening to patients, validating their perspectives, and providing meaningful feedback. The sequence of survey items is hierarchical, with attributes culminating in the complexity of Item 6.

Item 6. "My nurse practitioner tries to understand how I see things before suggesting a new way of doing things" had the highest statistical significance of all the autonomy support items. The context of this question implies that the nurse practitioner attempts to elicit the patient's broader perspective on how they prefer to carry out a health requirement. Understanding the patient's perspective is an active process that involves trust between patient and provider. It requires the nurse practitioner to actively elicit the patient's view about the issue under discussion, then to both listen and reflect back one's interpretation of the patient's responses and preferences and, lastly, to obtain validation. A corresponding implication for primary care practice management is that sufficient engagement with the nurse practitioner may be required to facilitate this relationship, which is likely to require longer and or more frequent visits with a consistent provider to cultivate the relationship and to negotiate mutually acceptable patient-centered approaches. Assuming activation is proxy for self-management, one could infer the practical significance of the nurse practitioner's use of this communication style. Providers that exhibit such communication behaviors can facilitate patients' highest level

of activation, characterized by patients who have the highest knowledge, skills, and confidence to participate in their care (Hibbard et al., 2009).

Item 4. "My nurse practitioner encourages me to ask questions" had the second highest statistical significance of the six individual regression models. Encouraging questions from patients can provide the nurse practitioner with valuable information about how they view their current situation and the challenges and choices they face in managing their self-care. Questions from patients can also open the discussion about alternate ways of doing things. Behavior change interventions for skill acquisition suggested by Hibbard (2009) for respondents at the third and most frequent stage of activation for this study's participants involve negotiating an action plan that supports the initiation of new behaviors and continuing those they have adopted. Thus, encouraging questions may cultivate patients' negotiation skills which can facilitate developing action plans for self-managing ongoing management of exacerbations associated with chronic disease management.

Item 2. "I feel understood by my nurse practitioner" was the third highest statistically significant relationship with Patient Activation. Respondents to this question may refer to verbal and nonverbal responses their nurse practitioners convey to them during the course of exchanges in which they have expressed themselves. Affirmative responses to this the question appear to be related to Item 6, in that the patient indicates that the nurse practitioner most likely is sufficiently engaged with the patient to both appreciate and acknowledge their feelings and ideas. Additionally, understanding patient preferences is an important patient centered approach before suggesting alternative methods.

Item 1. "I feel that my nurse practitioner has provided me with choices and options" represented the next highest statistically significant relationship with activation. During the process of providing choices and options the nurse practitioner may be indicating to the patient that she is opening up the conversation in order elicit their preferences. This question seems to reflect the nurse practitioner taking the initiative to engage the patient to commit to some type of action, regardless of whether self-initiated or proposed by the nurse practitioner. By illustrating several possible courses of action, the nurse practitioner conveys interest in the patient's appraisals of the options presented. In order to provide choices and options, the nurse practitioner also reflects an understanding of the patient (Item 2). This item is also related to the key phrase in Item 6 that indicates patients value providers understanding their preferences before making suggestions. Using this approach allows the nurse practitioners to generate pertinent information about patient that can be used to frame suggestions based on patient preferences.

Item 3. "My NP conveys confidence in my ability to make changes" is the final statistically significant item in the autonomy support measure. In the patient activation context, conveying confidence indicates a type of provider feedback that would express the nurse practitioner's belief in the patient's capacity to perform a specific behavior. Such expressions of autonomy support assure the patient that their nurse practitioner believes they have the necessary will and skills to follow-through with recommendations. Assuring one's confidence in another's abilities could also increase their motivation to perform the activity. The mean activation score range of the study patients fell within the "taking action" category characterized by lack of skills and confidence, while the most

optimally activated patients express self-confidence in their ability to participate in their

care (Hibbard et al., 2009). This finding suggests that nurse practitioners who express

confidence in the patient's ability to make changes may help them acquire the necessary

knowledge, skill, and confidence to significantly participate in their care, consistent with

the highest activation stage "Staying the Course". This may require an ongoing

relationship with the nurse practitioner, who coaches patients in a manner that facilitates

their capacity to carry out the behavior. Furthermore, this finding identifies an

opportunity to increase health care provider's competence in autonomy supportive styles

that could bolster patient self-confidence.

Item 5. This final question, "My nurse practitioner listens how I want to do

things," was not significantly correlated with activation in the bivariate analysis.

Listening to patients and eliciting their ideas about how they want to manage is a

fundamental communication skill that is related to the other scale items. The trend of the

responses to this item does not align with those of Item 6, the most significant predictor

of activation, in which patients reported their nurse practitioner tries to understand how

they see things before suggesting a new way of doing things. The response to this item

suggests that the patients may have perceived they were not given the subsequent

opportunity to express how they want to do things or that their preferences were not

heard. This is an important concern for efforts aimed at engaging the patient through

autonomy support and fostering self-management. Even if the patient's approach may

not be the preferred course of action, acknowledging their initiative validates their

engagement in the process while also presenting the opportunity to redirect the approach.

It is important to note some provider communication techniques reflected in these items are similar to those of motivational interviewing (Miller & Rollnick, 2002), which is often cited as an effective provider communication method for engaging patients to perform a specific health behavior. However, Patrick and Williams (2012) consider motivational interviewing techniques as most often associated with fostering internalization of extrinsic motivations, which may ultimately lead to intrinsic motivation if the behavior is sufficiently self-rewarding to result in its internalization over time.

More importantly for this study, the significant exploratory results of five of the six individual autonomy support items have generated new knowledge regarding a set of potentially modifiable primary care nurse practitioner behaviors. These findings contribute to the understanding of the construct of Autonomy Support as a theoretical underpinning of determinants of Patient Activation. Significant results of five of the six autonomy support questions from testing their relationship with activation have practical significance for developing autonomy supportive interventions that can be implemented in the clinic setting. Based on evidence, their routine use in the clinic and in other personal communications with patients would convey support for patient autonomy.

Nurse practitioners who provide acute episodic, preventive, and chronic care in nurse-managed health centers have the opportunity to modify their autonomy support efforts based on the level of patient's activation and in the context of their wellness and disease states. For example, the nurse practitioners can support autonomy for wellness management in patients receiving preventive care by conveying confidence in their ability to make lifestyle changes. These patients may subsequently develop acute or chronic illnesses that require additional actions and skills. Nurse practitioners can use

their prior understanding of patient preferences and abilities along with encouraging questions and listening to support autonomy for self-managing new challenges. Nurse practitioners who express confidence in the patient's ability to make changes can facilitate patients to acquire the necessary knowledge, skills, and confidence to significantly participate in their care, consistent with optimal levels of activation.

This analysis provided preliminary evidence that autonomy supportive communication styles may be one of the potential mechanisms through which the construct of autonomy support can enact activation. To the extent that nurse practitioners and other members of the health team use autonomy supportive communication styles to guide self-management behaviors, they provide self-management support.

Autonomy Support in the Context of the Chronic Care Model

This study based the investigation of activation on the concept's roots in the Chronic Care Model (CCM) concept of self-management. This model views self-management as an important primary care clinical practice transformation goal and recommends the integration of self-management support into clinical care. Based on the Triple Aim goal of better health, better health care, and lower cost, these practice transformation efforts are guiding both the reconfiguration of the primary care environment and the advancement of approaches to accomplish this patient self-management goal. Consistent with the CCM model, nurse practitioners and other clinicians rely on an array of resources to provide self-management interventions.

Significant findings of relationship between Autonomy Support and the concept of Patient Activation suggest that provider autonomy support may represent one aspect of the overall CCM domain of self-management support. Hence, the CCM concept of self-

management support is similar to the autonomy support construct in the Self-determination Theory based theoretical model in this study.

Moreover, since Autonomy Support alone explained only a small proportion of activation, other source of autonomy support should be included in the theoretical model predicting activation. Important others in the patients' social networks may constitute other sources of autonomy support. Clinicians could expand self-management support interventions by encouraging patients to enlist the support of family and supportive others to assist them with meeting self-management goals. In addition, activation, as Donald et al. (2011) suggest, may represent only one aspect of self-management, with self-monitoring, healthy lifestyle modifications, medication adherence, and expectations regarding health comprising other aspects of a more extensive self-management concept.

Care Context and Autonomy Support Opportunities

Findings of Alexander et al. (2012), Becker and Roblin (2008), and Wong et al. (2011) verified the importance of the primary care experience for activating patients for self-management. Clinic use factors reflect the duration of patients' experience with their nurse practitioner and presumed intensity based on preventive versus chronic care visit reasons, and thus reflect the context of care. More than half (58.5%) of the patients sought care for preventive and acute care reasons, which may explain the predominantly shorter duration (48.5%) of nurse practitioner experience in this sample and the most prevalent clinic duration (34.6%) of less than three months. Well and acute and preventive care patients may subsequently return for annual visits, while those with persistent conditions frequent the clinic on a regular basis. Thus, these findings could be due to shorter-term clinic and nurse practitioner duration for these patients, compared

with a relatively longer term of clinic and NP duration for the chronically ill. Since none of the clinic use reasons were significantly correlated with activation, these were not included as covariates in the regression model. The lack of association between clinic duration, length of time with the nurse practitioner, and clinic use reason and autonomy support was unexpected. Both consistency and length of engagement with the nurse practitioner would seem to provide more opportunities for autonomy support during the patient-provider interaction in primary care.

These findings also have implications for the construct of autonomous motivation since, like activation, it is a developmental concept (Patrick & Williams, 2012). Therefore, sufficient engagement with a consistent provider who uses autonomy supportive communication styles that foster and validate patient autonomy may be required for optimal autonomous motivation development.

Although the results of this study identified a relationship between Autonomy Support and Patient Activation, Autonomous Motivation was not associated with either of these two variables. Therefore, additional self-management experiences and associated skill development may be needed to foster the autonomous motivation tendencies. Nevertheless, information obtained from examining these clinic use factors could be used to segment the patient panel and for planning and delivering interventions to improve self-management based on appointment frequency and care-seeking reason.

Autonomous Motivation Findings

As the sole continuous predictor, Autonomous Motivation was not significantly correlated with Patient Activation in the bivariate analysis and was not a significant predictor of Activation in the hierarchical multiple linear regression analyses.

Furthermore, since Autonomous Motivation was not relevant to the model, the mediation hypothesis could not be tested. These findings were not consistent with those from previous studies in the health care field that supported the contribution of autonomous motivation to the Self-determination Theory mechanism of change. In this theoretical model, the social context facilitates autonomous motivation (i.e., internalization and self-regulation) through the mechanism of autonomy support, increasing the likelihood for self-regulation of behavior and more enduring behavior change (Williams, McGregor, & Sharp et al., 2006). Based on the results of this study in which the Autonomy Support and Autonomous Motivation constructs did not operate in unison, the scoring and performance of the 8-item TSRQ require further analysis.

TSRQ results. The version of this scale used in this study was comprised of an autonomous subscale and a controlled subscale, consisting of four items each, which assessed autonomous and controlled reasons respectively for managing one's health and health care. The autonomous and controlled motivation subscale items differentiate between these two motivational tendencies. Williams, Ryan, and Deci (2014) indicate that the composite subscale scores, ranging from 4 to 28, can be used separately. However, since SDT maintains that only autonomously motivated behavior leads to sustained behavior change, which is the focus of self-management, autonomous motivation was considered a balance variable; therefore both subscales were included in the composite score in the current study.

Williams et al. (2014) suggest a scoring approach that incorporated both subscales into one autonomous motivation variable by subtracting the controlled item (1, 3, 5, 8) means from the autonomous item (2, 4, 6, 7) means to create the relative autonomous

index. The objective was to measure the relative degree to which responses indicated autonomous versus controlled reasons as motivational tendencies. Using a composite variable in lieu of separate autonomous and controlled subscales was consistent with the view that while autonomous motivation is a developmental concept that is changeable, controlled motivation can contribute to overall motivation.

The scoring approach used in this study reverse-coded the controlled subscale items then summed them with the autonomous subscale items to create a composite autonomous motivation score. This method assigned lower values to responses at the top of the controlled reasons subscale, while retaining the higher values for responses at the top of the autonomous reasons subscale. Consistent with the SDT premise that only autonomously motivated behavior leads to sustained behavior change, which is the focus of self-management, the objective was to identify the relative influence of these two types of motivations on activation in this nurse-managed health center sample. Using this approach, in this study the mean composite autonomous motivation score was 38.13, with a standard deviation of 5.66. Levesque and colleagues (2007) reported a mean score of 38.18 with a standard deviation of 6.36 and second mean score of 32.53 with a standard deviation of 1.00 for two sites in an exercise study, using a 15-item version of the TSRQ comprised of six items measuring autonomous tendencies, two of introjected regulation, four of external regulation, and three amotivation items.

Since the studies referenced analyzed the 8-item TSRQ autonomous and controlled subscales separately, in order to compare this study's results with those of previous investigations, the means and standard deviations were examined for each subscale. The mean autonomous reasons subscale score was 25.93 with a standard

deviation of 3.65 in this study. Williams et al. (1998) reported similar results, a mean autonomous subscale score of 26.0 and a standard deviation of 3.2, in a diabetes study. The mean for the controlled reasons subscale in the current study prior to reverse scoring the items was 19.8, with a standard deviation 6.46, compared with findings of a mean score of 18.9 and a standard deviation of 6.8 by Williams et al. (1998). The mean for the reverse-scored controlled reason subscale in the current study was 12.19, with a standard deviation of 6.49. There was no indication that the researchers reverse scored the controlled items in the aforementioned study, which may explain both the lower controlled motivation subscale scores and overall autonomous motivation composite scores in the present study.

None of the studies reviewed that used the 8-item TSRQ computed composite subscale scores and instead tested only the autonomous subscale or both subscales individually in predictive analyses or in structural equation models of theory testing. Williams et al. (1998) used the TSRQ autonomous and controlled subscales separately in statistical analyses and reported significant positive correlations between autonomous, but not controlled, motivation with health outcomes. Similarly, studies (Williams & Gagné, et al., 2002; Williams et al., 1996; Williams & Niemiec, et al., 2009) that measured and/ or tested only autonomous motivation subscales found significant correlations with perceived competence and health outcomes. While another approach would have been to regress the two subscales separately on activation to determine their relative influence in the model, examining autonomous reasons separately from controlled reasons would not account for the relative role of both autonomous and controlled tendencies in behavior change, which would not have been consistent with the

full model. This was not elected in this investigation, which may account for the lack of significance of Autonomous Motivation in the regression model.

None of the previously referenced studies reported an overall Cronbach's alpha for the eight item TSRQ. However, since they reported autonomous and controlled items subscale reliabilities, reliabilities for the two subscales used in this study were conducted. The Cronbach's alpha for the 4-item autonomous reasons subscale in this study was 0.82, consistent with those of 0.81, 0.83, and 0.85 reported by Williams et al. (1998). However while Williams et al. (1998) reported Cronbach's alphas of 0.80, 0.85, and 0.86 for the 4-item controlled reasons subscale, the reliability of this scale was only 0.75 in this study, which is reflected in the overall relatively lower TSRQ composite scale reliability of 0.80.

The TSRQ may not have been a valid measure of this construct in this population, based on the pattern of responses particularly to the controlled motivation subscale. The performance of the TSRQ may be due to the instrument's item structure, which uses a stem followed by a health behavior (manage my health and health care) and four questions each that vary in the degree to which they reflected autonomous and controlled motivation. The stem was modified with the broad term "health and health care," replacing a more specific health behavior term "exercise regularly" used in previous SDT studies. The subscales were measured on a 7-point likert scale (*not at all true*) to (*very true*). The modal response pattern was "7" for each individual item on the scale item prior to recoding, based on individual item analysis. This could possibly indicate a respondent tendency to select the "very true " item responses. Additionally, 13 percent of the sample's 126 cases with complete scores selected "7" for all eight of the items on the

scale. Prior to recoding, items coded "7" on the controlled motivation subscale indicated higher controlled motivation. Similarly, items coded "7" on the autonomous motivation subscale indicated higher autonomous motivation. Reverse-coding the controlled motivation subscale items assigned "1" to the responses at the highest end and "7" to the items at the lowest end of the controlled motivation subscale, decreasing their value relative to that of the autonomous subscale. This resulted in modal scores of 32 (out of 56) for the composite instrument. The composite score methodology that used the reverse-scored controlled subscale may have resulted in the two motivations cancelling each other out, which limited variability of this variable. Consequently, the pattern of responses may have contributed to the lack of significant findings, including the non-significant and negative relationships with autonomy support and activation.

Demographic Variables

Insurance status and clinic location were the only two demographic variables associated with patient activation. Categorical-level data for age and income may have compressed differences that could have become evident if continuous measures were collected on these variables. For these variables as well as gender, self-identified race, and education, it may be that the nurse practitioners in this nurse-managed health center not only have expertise in providing autonomy support for self-management but do so in a culturally competent manner as such that these socio-economic factors do not impact patient activation.

Data Quality

The a-priori power analysis predicted that a minimum sample size of 127 would sufficiently power a multiple linear regression model including 12 potential predictors to

detect significance of the theoretical model at the .05 level. With only four predictors

entered into the second regression (N = 120), Autonomy Support remained the sole

significant predictor. Thus, the statistical analysis of the theoretical model in this study

was sufficiently powered to detect statistically significant predictors, as verified by the

post hoc power analysis, if such relationships were present and thus supports the

conclusion that Autonomy Support was the only significant predictor of Patient

Activation.

However, several additional issues related to data quality may account for these

results. First, there were violations of multiple linear regression assumptions. Neither

the theoretical constructs nor the dependent variable (continuous measures) were

normally distributed. There was heteroscedasticity between both autonomous motivation

and autonomy support and the dependent variable, activation. There was not a strong

linear relationship between the remaining continuous independent predictor, Autonomous

Motivation and the dependent variable Patient Activation.

There was no significant collinearity between the Autonomous Motivation and

Autonomy Support constructs, although the linear regression correlation coefficient

(Pearson r) was in the negative direction. This meaning cannot be assessed, since the

autonomy support score was dichotomized. Therefore the linear relationship between

these variables could not be examined. Significant collinearity was detected between the

two demographic covariate variables (location and insurance status) when the linear

regression assumptions were tested. The Variance Inflation Factor (VIF) and tolerance

statistics were within the acceptable ranges. Since these tests were conducted based on

the regression model that included all likely covariates and both constructs, the

magnitude of their potential influence may have been reduced in the overall model. However, the hierarchical multiple linear regression model correlation matrix (for each of the three regressions) demonstrated sufficient multicollinearity between location and insurance status to make neither variable independently significant in the regression models. Thus, the impact of multicollinearity most likely increased when the number predictors was reduced to four in the regression two, the final analysis.

Clinic location was also significantly correlated with autonomy support, and clinic duration, although clinic duration was not correlated with autonomy support. Differences in the insurance case-mix of the rural clinic, which served both the insured and the uninsured, and the urban clinic, whose patients were predominantly uninsured Latinos, may account for these interrelationships. The smaller sampling frame of English-speaking patients in the urban clinic, compared with the rural clinic may have confounded this effect. These data quality issues may contribute to bias and questionable results.

Scope, Delimitations, and Limitations

Scope and Delimitations of the Study

The scope of this study included the effects of autonomy support of the nurse practitioner and the patient's autonomous motivation on patient activation in English-speaking patients at urban and rural clinic sites of a nurse-managed health center. Thus, delimitation of the scope means that further research would need to validate the findings for the non-English speaking population in this nurse-managed health center and for other nurse managed clinics and medical primary care practices. This study was also delimited by the provider specific autonomy support it examined from the patients' perspective.

Future studies should elicit the nurse practitioner's appraisal of specific encounters and overall autonomy supportiveness as well as patients' responses. Future theoretical models should also investigate other sources of autonomy support available to patients seeking primary care for preventive or chronic health concerns. Furthermore, future theoretical models should also include the effects of the patient's experience with other health care team members in the clinic and the broader health care system, the availability of community resources, and the impact of health policies and financing on patients' access to resources that could foster activation. The later could include disease-specific management classes and consultation by other experts in the care of the chronically ill.

This study contributed to the body of knowledge regarding the self-management capacity of both well and chronically ill English-speaking patients in a nurse-managed health center. Generating primary data from patients receiving care in a nurse-managed health center and analyzing activation in the context of patients' perceptions of their providers' supportive behaviors were two study strengths. This pilot study of determinants of activation provided previously unavailable information about the self-management capacity of English-speaking vulnerable populations who received primary care from nurse practitioners in this safety-net nurse-managed health center.

Limitations

This investigation examined autonomy support solely on the patient's perspective, without corresponding assessment of the nurse practitioner's assessment of the interaction. Thus, whether the nurse practitioners were actually communicating in the ways reflected by the patients' responses is unknown. The available data does not

provide the necessary information to determine if the nurse practitioners were actually

acting in autonomy supportive ways that the patients did not perceive or recognize. The

unavailability of parallel nurse practitioner validation of encounters was a study

limitation. Similarly, this cross-sectional study was not able to determine how the

autonomy supportive behaviors resulted in activation.

Other limitations for this study include issues related to measures, research

design, and representativeness of the sample. Limitations of the autonomous motivation

measure, including item construction, item interpretation, and scoring were previously

discussed. These may have interacted so as not to sufficiently capture an accurate

autonomous motivation participant profile.

In addition, the instruments shared several common, more general instrumentation

issues related to clarity of items and instructions. The complexity of the stem and

responses in the TSRQ may have interfered with the participants' ability to sufficiently

understand the questions to generate a response. The terms associated with the 7-point

likert scales were different in the mHCCQ and the TSRQ. In addition, the PAM-13 used

a scale of 1 to 4 and a different format. Respondents may not have understood the

questions or experienced difficulty interpreting them. Overall literacy may also have

limited both reading ability and question comprehension. Respondents may not have

been able to critically appraise the individual questions or to discern the nuances of the

TSRQ measure's subscales prior to selecting responses. Patients may have been

embarrassed to ask for assistance. Patients in a safety net clinic, compared to the overall

population, may find surveys difficult to complete. This may be particularly true in an

on-line environment, even though patients completed responses onsite and assistance was

available to read the questions to them. The on-line self-administration method may have further discouraged respondents from seeking assistance.

The study methods did not involve cross-referencing patient health records, therefore, recall about their duration as a clinic patient, length of exposure to their nurse practitioner, and primary clinic visit reason may not have been accurate. Although patients were instructed to base survey responses on their most recent nurse practitioner visit, they may have responded from a longitudinal perspective. To the extent that these factors may have affected the quality of their recall, history may be a threat to internal validity. Because other studies included additional covariates and predictors than those investigated in this study, such as primary language, years of acculturation, and specific disease states, this study did not measure all the factors that may predict activation in a nurse-managed clinic population.

This study's cross-sectional design and the lack of random sampling methodology preclude making causal inferences about the relationship between the predictor variable Autonomy Support and Patient Activation. Confidence in the prediction would be stronger if longitudinal data about the overall patient experience with autonomy support and sequential development of activation and motivation could be assessed using repeated measures over time. This particularly important, given that both patient activation and autonomous motivation are developmental concepts.

The limited sampling frame from which participants could be recruited based on eligibility requirements resulted in a small sample size relative to overall clinic enrollment. Because this was a convenience sample of only English-speaking patients, those who elected to participate in the survey may have differed from other English-

speakers who did not participate or who were not recruited because they did not have an appointment or seek care during the study timeframe. Differences detected were restricted to the limited comparative analysis between the sample and the small number of English-speaking eligible patients who declined participation, and therefore do not reflect the overall Wellmobile clinic population.

Recruitment was limited to English-speaking recipients of care from a rural and an urban Maryland nurse-managed health center who were able to respond to the questionnaire in English, even with assisted administration. This is a major study limitation, since both the rural and the urban clinics served a significant Latino population, approximately 95% of whom were Spanish-speaking. Thus, the sample was not reflective of the overall nurse-managed health center patient census. Excluding non-English proficient Spanish-speakers decreased the sampling frame and reduced variability. Therefore, these study findings do not reflect the overall cultural, ethnic, and linguistic diversity of this clinic population and are not generalizable to the entire practice. Since most participants were young and middle-aged adults, this study did not capture the perspectives of children and the elderly. Results cannot be generalized to other nurse-managed health centers, populations primarily insured by health plans, those participating in integrated health systems, and those receiving primary care from physician practices. Since both clinics served non-English speaking patients who required interpreters, this study was unable to detect an association between the theoretical constructs and activation in non-English proficient enrollees.

Implications for Clinical Practice

These study findings have several practical implications. The relationship between the Self-determination Theory construct of Autonomy Support and Patient Activation points to specific provider-level competencies that could be enhanced by including autonomy supportive communication techniques and subsequent opportunities for their practice in both health professions pre-licensure education programs and ongoing health professional staff development activities. Emphasis on these concepts and practice opportunities would establish proficiency in their use during the patient encounter.

The extended primary care visit, based on the Chronic Care Model, is being advanced through demonstration sites funded by the Centers for Medicare and Medicaid Services (CMS, 2016) Transforming Clinical Practice Initiatives (TCPI). Primary care use factors, although not significantly correlated with patient activation, are relevant in the context of planning patient, nurse practitioner, care manager, and primary care clinic-level interventions to foster autonomy support. Patterns of patient clinic use and the types of care they seek provide useful information for primary care practice redesign efforts that facilitate providing clinic-wide autonomy support. Recent applications of the Chronic Care Model in nationally funded primary care demonstration projects are focusing on the interactions of all team members with patients (Weitzman Institute, 2016). Hence, two practical actions from these findings are related to the social ecological model. The first is for nurse-managed health centers to expand their practice model to an interprofessional model that incorporates autonomy support from an

interprofessional team. The second is to engage and collaborate with community resources to better address social determinants of health for the underserved population.

Primary care clinics employ unlicensed assistive personnel, such as community health workers, outreach workers, and patient navigators, who can provide additional sources of autonomy support. Since these individuals often share common geographic, culture and language as the patients, they may assert more influence on behavior change than the nurse practitioner. Such an approach would use observational learning interventions consistent with Social Cognitive Theory (Bandura, 1997). Hibbard et al. (2007) suggest administering the activation assessment on intake and then assigning patients to dedicated staff who could deliver interventions appropriate to their activation level, providing multiple team members an opportunity to promote self-management. Interventions that promote autonomy supportive styles, such as enhancing listening skills and providing meaningful feedback to primary care patients, could foster increased autonomy supportive provider behavior, promote autonomy support, and subsequently improve patient outcomes in this vulnerable clinic population. Hence, clinics should provide ongoing staff development programming on autonomy supportive communication methods and other autonomy supportive interventions to all clinic staff. These could include simulation and role play with standardized patients.

Implications for Future Study

Validation of Patients Perceptions of Autonomy Support

Although these research findings confirmed the relationship between Autonomy Support and Patient Activation, how the nurse practitioner's actual behavior activates patients for self-management is unknown. This is an area for future investigation. The

appraisal of the nurse practitioners' autonomy supportiveness was based on the patient's perspective. Future research is needed to understand autonomy supportive communication from the nurse practitioners perspective and to triangulate their views of the encounters with those of the patients using mixed methods approaches and nested research design methods. In order to change the patient's perception of autonomy support, there needs to be a change in the nurse practitioner's behavior. Based on the significance of the individual autonomy support items, additional investigation is warranted to understand which aspects of autonomy support should be focused on with nurse practitioners and how to change those that are most significant. To do so, we need to know more about what specific types of provider behaviors affect autonomy support. The possibilities include listening, empathy, reflecting understanding, encouraging questions, and providing choices and options. Observational assessment of provider autonomy supportive communication techniques and their frequencies and provider understanding of patient activation also are worthy of future study. These new lines of research would validate and complement the patient's perspective of perceived autonomy support.

For further validation, the Clinician Support for Activation Measure (CS PAM; Hibbard, Collins, Mahoney, & Baker, 2010) can be administered to nurse practitioners as a self-assessment of beliefs about the patient's role in their own care, their understanding of the importance of autonomy support for self-management, and their attitudes and behaviors toward autonomy support. Future studies may consider using medical record data to capture both the time spent with patients during the patient encounter and documentation of patient-provider communication as other measures of engagement.

Other Sources of Autonomy Support

Based on the significance of provider autonomy support as predictor of patient activation in this nurse-managed health center, future studies should include additional variables in the theoretical model to measure other sources of autonomy support both within the clinic and in the patients' social network. This could increase the amount of variance explained by the model. Rouse et al. (2011) suggests that autonomy support is a framework for understanding how significant others can support behavioral change. The roles of "supportive others," such as family, patient navigators, community health workers, outreach staff, and other important people in the patients sphere of influence could expand the understanding of other significant sources of autonomy support. Other scales adapted from the mHCCQ measure the autonomy supportiveness of significant others in the patient's family and social network. The patient (FCCQ-P) and family version (FCCQ-F) of the Family Care Climate Questionnaire (FCCQ; Clark & Dunbar, 2003) capture both perspectives. The Important Other Climate Questionnaire (IOCQ; Williams, Lynch et al., 2006), adapted from the FCCQ, measures support drawn from one's broader social network. Natural helper and social influence theories can also guide further investigations of the roles of significant others who may provide other sources of autonomy support. Collectively, this array of additional autonomy support constructs can be incorporated into a more robust patient activation model to guide further investigations, as part of an overall social ecological approach.

Furthermore, theories specific to each level of the social ecological model may provide additional constructs for consideration in the theoretical model. Such exploratory studies could investigate associations between other health behavior theory constructs

and those of SDT and patient activation to enhance understanding of antecedents of autonomy and self-management. Identifying the relationship between these constructs and other possible significant variables and activation could provide key information about other potentially modifiable determinants of activation amenable to innovative primary care practice transformation approaches. These could include the patient, health care providers, the clinic, the health care system, and public policy. Efforts such as these that translate theory into practice may promote the development of evidence-based patient, provider, and clinic level interventions that can be tailored to activation levels.

Autonomous Motivation

Understanding the construct of autonomous motivation warrants further study exclusive of other variables before including it in future predictive models with autonomy support and activation. To fully understand the relationships between autonomy support, autonomous motivation, and activation, the construct of autonomous motivation and its measurement require further refinement.

TSRQ measure. The current version of the 8-item TSRQ should be usability tested across a broader patient sample than the vulnerable populations served by a nurse-managed health center, to assess its utility in eliciting subscale responses. In addition, the 15-item TSRQ should be examined for other potentially more suitable items that could be included in each of the autonomous and controlled subscales. These items could either replace or be added to the existing four item subscales of the eight item scale used in this study. Following selection of subscale items, the instrument should undergo confirmatory factor analysis to create a reliable scale with the least amount of items. In creating a composite score, other options for scoring the items should be considered in

order to elicit the balance between autonomous and controlled motivation. Alternately, the subscales could be analyzed separately in statistical analyses, based on the hypothesis undergoing testing. Survey administration should be supplemented with patient interviews that identify strategies used in responding to the questions and the users' ability to discriminate between the subscale items. Once retesting has been completed and reliability and validity has been confirmed, additional longitudinal studies using repeated measures should be conducted to assess its ability to measure change over time and the construct's relationships with autonomy support and activation. Possible levers of change could include all potential sources of autonomy support and activation in the primary care domain.

The validated autonomous motivation measure should be included in a subsequent study to retest both study hypotheses in the English speaking population. Next, the survey items would be vetted for cultural and linguistic appropriateness with Spanish-speaking patients prior to translating them into versions suitable for Spanish-speakers. Replicating this study in this nurse-managed clinic would then more accurately elicit the perspectives of the non-English-speaking Latino population.

The SDT model of change. A major premise of SDT is that autonomy supportive contexts foster satisfaction of the three basic human needs of autonomy, relatedness and competence (Rouse et al., 2011), which cause the reasons for engaging in a behavior to become more self-determined or autonomous over time. The results of this investigation suggest the performance of the TSRQ measure and the scoring method most likely accounted for the lack of significant relationships with both autonomy support and patient activation. However, since motivation is a developmental concept, the

relationships between autonomy support and autonomous motivation and between autonomous motivation and patient activation may be longitudinal in nature. Thus, sufficient time may not have elapsed to allow these relationships to develop in this study sample.

Furthermore, consistent with findings of Fortier et al. (2007) that autonomous motivation is a result of being competent, autonomous motivation may occur as result of being an activated patient, rather than causing activation either directly or as a mediator of autonomy support. While patient activation was the outcome variable in this investigation, the assumption behind this proposed model of change that could be tested is that patient activation (as competence for self-management) may result in increased autonomous motivation. Hence, the theoretical model used for future studies should be revised to reflect activation as a measure of self-management competence and consider autonomous motivation as a more distal dependent variable. In this alternate conceptual model, patient activation may mediate the relationship between autonomy support and autonomous motivation, generating an additional research question. This approach is consistent with Social Cognitive Theory (Bandura, 1986) which suggests competence, through the construct of self-efficacy, increases motivation to repeatedly demonstrate a behavior.

Based on both the SDT model of change, which could not be tested in this study, and the work of Fortier et al. (2007), autonomous motivation may then have a bidirectional relationship back to patient activation, since motivation may further increase activation for self-management. Further model testing of these research questions, with longitudinal studies using repeated measures and structural equation modeling, should

therefore be the subject of further study. Based on the SDT premise that behavior change will occur and persist if it is autonomously motivated (Williams et al., 1998), investigations of this nature are important, since only autonomously motivated behavior is expected to result in long-term persistence and adherence required for patients to maintain a behavior sufficiently to control a disease or health outcome (Rouse et al., 2011). Additionally, developing patient self-management capacity, which involves activating patients, will increase the likelihood that patients will effectively self-manage across multiple health domains, including developing new health behaviors and associated behavior change.

Concluding Thought

This study sought to examine the relationship between the Self-determination Theory constructs of Autonomy Support, Autonomous Motivation, and Patient Activation in English-speaking patients at urban and rural clinic sites of a nurse-managed health center. This relationship was examined entirely from the patient perspective. The study found a significant relationship between Autonomy Support and the concept of Patient Activation, while Autonomous Motivation, as operationally defined and measured in this investigation, was not a factor. This study based the investigation of activation on its roots in the Chronic Care Model (CCM) concept of self-management. Patient Activation, defined as patients' knowledge, skills, confidence, and willingness to manage their own health care, was precisely measured using a valid and reliable instrument that is currently used in other primary care settings.

In this investigation, this Self-determination Theory construct autonomy support reflects the practice climate created by the nurse practitioner in the course of delivering

primary care. Thus, the chief contribution of the study may be the relationships between the individual autonomy support survey items and activation. These items reflect the patients' perceptions of their experience with their nurse practitioners' communication approaches and resultant feedback that affected their engagement in their health. This suggests the importance for nurse practitioners to be proficient in actively supporting patient autonomy for self-management aside from offering specific health and disease management guidance.

Autonomy Support alone explained only a small proportion of self-management, which prompts the search for other sources of autonomy support that might benefit patient self-management, such as family and extended social networks. Meanwhile, clinicians could expand self-management support interventions by encouraging patients to elicit the support of family and supportive others.

This is the first known study of patient activation in a nurse managed health center, establishing usability of the activation measure in this setting. This is also the first known study to investigate the relationship between health behavior theory constructs focusing on the practice environment and activation. This study contributes to the nursing literature by demonstrating how selected health behavior theory concepts and measures can be used to assess clinical practice self-management efforts as intermediate patient outcomes. Likewise, findings of an association between the nurse practitioners' autonomously supportive communication styles impact self-management demonstrate progress in developing the Chronic Care Model concept of self-management support. As nurse-managed health centers join other primary care practices in efforts to improve patient outcomes and reduce the burden of chronic disease, the ability to effectively

support patient self-management will increase the prospect that patients will engage as

partners in improving their health. Such efforts will advance the accomplishment of the

Triple Aim goals of better health, better health care, and lower cost.

APPENDIX

Appendix A IRB Approvals

UNIVERSITY OF MARYLAND

INSTITUTIONAL REVIEW BOARD

DATE: March 9, 2015

TO: Bradley Boekeloo, PhD, ScM
FROM: University of Maryland College Park (UMCP) IRB

PROJECT TITLE: [697078-1] Predictors of Patient Activation Among Underserved
                             Patients in a Nurse-managed Health Center: A Pilot Study
REFERENCE #:
SUBMISSION TYPE: New Project

ACTION: APPROVED
APPROVAL DATE: March 9, 2015
EXPIRATION DATE: March 8, 2016
REVIEW TYPE: Expedited Review

REVIEW CATEGORY: Expedited review category # *7*

Thank you for your submission of New Project materials for this project. The University
of Maryland College Park (UMCP) IRB has APPROVED your submission. This approval
is based on an appropriate risk/benefit ratio and a project design wherein the risks have
been minimized. All research must be conducted in accordance with this approved
submission.

Prior to submission to the IRB Office, this project received scientific review from the
departmental IRB Liaison.

This submission has received Expedited Review based on the applicable federal
regulations.

Please remember that informed consent is a process beginning with a description of the
project and insurance of participant understanding followed by a signed consent form.
Informed consent must continue throughout the project via a dialogue between the
researcher and research participant. Unless a consent waiver or alteration has been
approved, Federal regulations require that each participant receives a copy of the consent
document.

Please note that any revision to previously approved materials must be approved by this committee prior to initiation. Please use the appropriate revision forms for this procedure.

All UNANTICIPATED PROBLEMS involving risks to subjects or others (UPIRSOs) and SERIOUS and UNEXPECTED adverse events must be reported promptly to this office. Please use the appropriate reporting forms for this procedure. All FDA and sponsor reporting requirements should also be followed.

All NON-COMPLIANCE issues or COMPLAINTS regarding this project must be reported promptly to this office.

This project has been determined to be a Minimal Risk project. Based on the risks, this project requires continuing review by this committee on an annual basis. Please use the appropriate forms for this procedure. Your documentation for continuing review must be received with sufficient time for review and continued approval before the expiration date of March 8, 2016.

Please note that all research records must be retained for a minimum of seven years after the completion of the project.

If you have any questions, please contact the IRB Office at 301-405-4212 or irb@umd.edu. Please include your project title and reference number in all correspondence with this committee.

This letter has been electronically signed in accordance with all applicable regulations, and a copy is retained within University of

Maryland College Park (UMCP) IRB's records.

Sample text for an Institution with a Federalwide Assurance (FWA) to rely on the IRB/IEC of another institution (institutions may use this sample as a guide to develop their own agreement).

Institutional Review Board (IRB) Authorization Agreement

Name of Institution or Organization Providing IRB Review (Institution/Organization A):
University of Maryland College Park

IRB Registration #: IRB00000474   Federalwide Assurance (FWA) #, if any: FWA00005856

Name of Institution Relying on the Designated IRB (Institution B):
University of Maryland Baltimore

FWA #: FWA00007145

The Officials signing below agree that University of Maryland Baltimore may rely on the designated IRB for review and continuing oversight of its human subjects research described below: (*check one*)

(___) This agreement applies to all human subjects research covered by Institution B's FWA.

(X) This agreement is limited to the following specific protocol(s):

     Name of Research Project: [697078] Predictors of Patient Activation Among Underserved Patients in a I
     Name of Principal Investigator: Bradley Boekeloo, PhD, ScM; Susan M. Antol, MS, RN Co-Investigator
     Sponsor or Funding Agency: None   Award Number, if any:

(___) Other (*describe*):

The review performed by the designated IRB will meet the human subject protection requirements of Institution B's OHRP-approved FWA. The IRB at Institution/Organization A will follow written procedures for reporting its findings and actions to appropriate officials at Institution B. Relevant minutes of IRB meetings will be made available to Institution B upon request. Institution B remains responsible for ensuring compliance with the IRB's determinations and with the Terms of its OHRP-approved FWA. This document must be kept on file by both parties and provided to OHRP upon request.

Signature of Signatory Official (Institution/Organization A):
_____ Date: 3/11/15

Print Full Name: Patrick G. O'Shea   Institutional Title: Vice President & CRO

NOTE: The IRB of Institution A may need to be designated on the OHRP-approved FWA for Institution B.

Signature of Signatory Official (Institution B):
_____ Date: 4/2/15

Print Full Name: Bruce E. Jarrell   Institutional Title: SVP & Institutional Official

Appendix B Survey Instrument

Survey Instructions:

- o Please do not access the internet or open windows while completing this study.

- o Contact the care manager with questions about progressing through the survey. You may ask the care manager for help with general computer use as needed, reading survey questions and answers, and moving through the on-line survey program. The care manager cannot interpret questions or response options, or assist with selecting responses.

- o If you feel you cannot complete the survey on-line, you may ask the care manger to read the questions to you and enter the response you choose in the computer during the interview.

- o Select the best response for each question.

- o Click on **NEXT** to continue to the next question.

- o You can skip a question and go back to answer it by clicking **BACK**.

I am taking this survey

- o On the day of my appointment with my nurse practitioner.

- o I returned to the clinic to take the survey.

Demographic Questions

Please respond to the following questions about your personal information.

1. What is your age?

- o 18-20 years old
- o 21-44 years old
- o 45-64 years old
- o 65 years or older
- o Refused/don't know

2. What is your gender?

- o Male
- o Female
- o Refused/don't know

3. What Race do you most identify with?

- o White
- o Black
- o Asian/ Pacific Islander
- o Native American
- o Other
- o Refused/don't know

4. Are you Hispanic or Latino?

- o Yes
- o No
- o Refused/don't know

5. What is your annual household income?
   o Less than $31,460
   o 31,461 to 49,999
   o $50,000 or more
   o Refused/don't know
6. What is your highest educational level completed?
   o Less than eighth grade
   o Less than high school
   o Completed high school
   o Some college or more
   o Refused/don't know
7. Where is the clinic where you receive care located?
   o Central Maryland (urban)
   o Eastern Shore (rural)
   o Refused/don't know
8. What is your insurance status?
   o Insured (Medicare, Medicaid, commercial, or other insurance coverage)
   o Uninsured
   o Refused/don't know

Primary Care Use Factors
Please answer the following questions about your use of this clinic.

9. How long have you been coming to this clinic?
   o Less than 3 months
   o 3 months to less than 6 months
   o 6 months to less than 1 year
   o 1 year to less than 2 years
   o 2 years or more
   o Refused/don't know
10. How long have been seeing your current nurse practitioner?
   o Less than 3 months
   o 3 months to less than 6 months
   o 6 months to less than 1 year
   o 1 year or more
   o Refused/don't know
11. What is the main reason you come to this clinic?
   o Well care (annual physicals, pap smears) or acute care (cold, infections)
   o Chronic care (high blood sugar, high blood pressure, asthma, medication management)
   o Refused/don't know

Autonomy Support Questions
The following questions ask about your visits with your nurse practitioner.
Select the response that indicates your agreement or disagreement with each statement.
Please respond about your most recent experience with your nurse practitioner.

1. I feel that my nurse practitioner has provided me choices and options.

1	2	3	4	5	6	7	9
strongly disagree			neutral			strongly agree	refused or don't know

2. I feel understood by my nurse practitioner.

1	2	3	4	5	6	7	9
strongly disagree			neutral			strongly agree	refused or don't know

3. My nurse practitioner conveys confidence in my ability to make changes.

1	2	3	4	5	6	7	9
strongly disagree			neutral			strongly agree	refused or don't know

4. My nurse practitioner encourages me to ask questions.

1	2	3	4	5	6	7	9
strongly disagree			neutral			strongly agree	refused or don't know

5. My nurse practitioner listens to how I want to do things.

1	2	3	4	5	6	7	9
strongly disagree			neutral			strongly agree	refused or don't know

6. My nurse practitioner tries to understand how I see things before suggesting a new way to do things.

1	2	3	4	5	6	7	9
strongly disagree			neutral			strongly agree	refused or don't know

Autonomous Motivation Questions
The following question relates to the reasons why you would either start to manage your health and health care activities regularly or continue to do so. Different people have different reasons for managing their health and health care and we want to know how true each of the following reasons is for you. Read each of the statements and respond to all 8 of the reasons.

Please indicate the extent to which each reason is true for you, using the following 7-point scale:

1	2	3	4	5	6	7	9
not at all true			somewhat true			very true	refused or don't know

The reason I would manage my health and health care activities is:

1. Because I would feel guilty or ashamed of myself if I did not manage my health and health care activities.

	1	2	3	4	5	6	7	9
	not at			somewhat			very	refused or
	all true			true			true	don't know

2. Because I personally believe it is the best thing for my health.

	1	2	3	4	5	6	7	9
	not at			somewhat			very	refused or
	all true			true			true	don't know

3. Because others would be upset with me if I did not.

	1	2	3	4	5	6	7	9
	not at			somewhat			very	refused or
	all true			true			true	don't know

4. Because I have carefully thought about it and I believe it is very important for many aspects of my life.

	1	2	3	4	5	6	7	9
	not at			somewhat			very	refused or
	all true			true			true	don't know

5. Because I would feel bad about myself if I did not manage my health and health care activities.

	1	2	3	4	5	6	7	9
	not at			somewhat			very	refused or
	all true			true			true	don't know

6. Because it is an important choice I really want to make.

	1	2	3	4	5	6	7	9
	not at			somewhat			very	refused or
	all true			true			true	don't know

7. Because it is very important for being as healthy as possible.

	1	2	3	4	5	6	7	9
	not at			somewhat			very	refused or
	all true			true			true	don't know

8. Because I want others to see I can do it.

	1	2	3	4	5	6	7	9
	not at			somewhat			very	refused or
	all true			true			true	don't know

PAM-13 Questions

The following questions ask your opinion about how you manage your health and health care activities.

Read each of the statements and select the one response that best indicates how you manage your health and health care.

1. When all is said and done, I am the one who is responsible for taking care of my health.
   o Disagree Strongly [1]
   o Disagree [2]
   o Agree [3]
   o Agree Strongly [4]
   o Not applicable [5]
2. Taking an active role in my own health care is the most important factor in determining my health and ability to function.
   o Disagree Strongly [1]
   o Disagree [2]
   o Agree [3
   o Agree Strongly [4]
   o Not Applicable [5]
3. I am confident that I can take actions that will help prevent or minimize some symptoms or reduce problems associated with my health.
   o Disagree Strongly [1]
   o Disagree [2]
   o Agree [3]
   o Agree Strongly [4]
   o Not applicable [5]
4. I know what each of my prescribed medications does.
   o Disagree Strongly [1]
   o Disagree [2]
   o Agree [3]
   o Agree Strongly [4]
   o Not applicable [5]
5. I am confident that I can tell when I need to go get medical care and when I can handle a health problem myself.
   o Disagree Strongly [1]
   o Disagree [2]
   o Agree [3]
   o Agree Strongly [4]
   o Not applicable [5]
6. I am confident that I can tell a nurse practitioner the concerns I have even when he or she does not ask.
   o Disagree Strongly [1]
   o Disagree [2]
   o Agree [3]
   o Agree Strongly [4]
   o Not applicable [5]

7. I am confident I can follow through on medical treatments I may need to do at home.
   o Disagree Strongly [1]
   o Disagree [2]
   o Agree [3]
   o Agree Strongly [4]
   o Not applicable [5]
8. I understand the nature and causes of my health problems.
   o Disagree Strongly [1]
   o Disagree [2]
   o Agree [3] Agree Strongly [4]
   o Not applicable [5]
9. I know the different medical treatment options available for my health problems.
   o Disagree Strongly [1]
   o Disagree [2]
   o Agree [3]
   o Agree Strongly [4]
   o Not applicable [5]
10. I have been able to maintain the lifestyle changes for my health that I have made.
   o Disagree Strongly [1]
   o Disagree [2]
   o Agree [3]
   o Agree Strongly [4]
   o Not applicable [5]
11. I know how to prevent problems with my health.
   o Disagree Strongly [1]
   o Disagree [2]
   o Agree [3]
   o Agree Strongly [4]
   o Not applicable [5]
12. I am confident I can figure out solutions when new situations or problems arise with my health.
   o Disagree Strongly [1]
   o Disagree [2]
   o Agree [3]
   o Agree Strongly [4]
   o Not applicable [5]
13. I am confident that I can maintain lifestyle changes, like diet and exercise, even in times of stress.
   o Disagree Strongly [1]
   o Disagree [2]
   o Agree [3]
   o Agree Strongly [4]
   o Not applicable [5]

These questions are on the Nurse Care Manager Page.
Nurse care manager please respond to the following questions regarding survey administration methods.

1. The patient completed the survey in Qualtrics.
    o Yes
    o No

Question 2 only appears when the care manger answers 'Yes' to the above question.
2. The nurse care manager provided assistance with the survey questions.
    o Yes
    o No

Question 3 only appears when the care manger answers 'No' to above question 1.
3. The nurse care manager administered the survey as an interview and entered the patient's responses in Qualtrics.
    o Yes
    o No

Appendix C Pilot Study Recruitment Flyer

The University of Maryland College Park School of Public Health and the University of Maryland Baltimore School of Nursing seek current English-speaking clinic patients for a research study pilot test.

The purpose of the study is to help clinicians understand how clinic patients view managing their health and health care and their interaction with their nurse practitioner.

The study involves taking a one-time anonymous survey in English on a computer and answering questions about your experience with the survey.
You may receive assistance with computer administration.
Your participation in this research is voluntary.
Responses will be kept confidential.

Compensation for study completion is $20.

Contact Information:
For more information please contact:

Susan M. Antol, MS, RN
(410) 258-5853 or antol@son.umaryland.edu
o   IRB HSR # (insert)

Principal Investigator*:* **Dr. Bradley O. Boekeloo, PhD, ScM**
School of Public Health, Suite 2360
College Park, MD
1-301-505-8546
Boekeloo@umd.edu
Co-Investigator: Susan M. Antol, MS, RN
1-410-706-5145
antol@son.umaryland.edu

Appendix D Pilot Study Recruitment Script

The Co-investigator will follow this script to recruit community members for pilot testing of the computer survey.

"Hello, my name is Susan Antol. Dr. Bradley Boekeloo, faculty from the University of Maryland College Park School of Public Health and I are conducting a research study on how patients view their involvement in their health and health care and interaction with their nurse practitioner. The study involves completing an anonymous survey on a computer. You may receive assistance with computer administration. In preparation for the study, we are seeking people similar to the clinic population willing to take the survey and provide feedback on their survey experience. The study will take approximately 45 minutes to complete. You will not benefit directly from participation, although future participants may benefit from the information gained. You will receive $20 cash for completing the survey.

Participation is voluntary and your responses will be kept confidential.

Do you have any questions?

If you are interested in participating in this survey, please let me know.

Thank you for your help."

If not interested the Co-investigator will state: "Thank you for your time."

Appendix E Pilot Study Consent Form

Project Title	*Predictors of Patient Activation Among Underserved Patients in a Nurse-managed Health Center*
Purpose of the Study	*This research is being conducted by **Dr. Bradley O. Boekeloo** and **Susan M. Antol** at the University of Maryland, College Park. We are inviting you to pilot test a survey and to provide feedback to us. Your feedback will help us understand the survey user experience. The purpose of this research project is to help the clinic staff understand how patients view their involvement in their health care and interaction with their nurse practitioner.*
Procedures	*The procedures involve completing an on-line survey and 6 follow-up questions on a computer and an interview about your experience with the survey. The entire study will take approximately 45 minutes to complete. You will be assisted with logging into the computer and answering questions about progressing through the survey. You may notify the researcher if you prefer to be interviewed rather than take the survey on a computer. The researcher will ask you the questions and enter your responses into the computer as you respond. You can refuse to answer any question that makes you feel uncomfortable and can stop the survey at any time.*
Potential Risks and Discomforts	*The researchers will try to minimize the risks associated with participation in this research. You may feel uncomfortable responding to questions about your health behaviors or about interactions with your nurse practitioner. You may experience fatigue while taking the survey. If the researchers do not keep your responses confidential, there could be unforeseen consequences. There is the potential for loss of anonymity if the care manager records your responses.*
Potential Benefits	*There are no direct benefits from participating in this research. This research is not designed to help you personally. Future survey users may benefit from modifications based on your feedback. We hope that, in the future, other people might benefit from this study through improved understanding of how patients view their involvement in their health care and guidance provided by their nurse practitioner. The program may use results to improve clinic processes and patient care experiences.*
Medical Treatment	*The University of Maryland does not provide any medical, hospitalization or other insurance for participants in this study. Nor will the University of Maryland provide any medical treatment or compensation for any injury sustained as a result of participation in this research study, except as required by law.*
Confidentiality	*The survey is anonymous. Your name will not be collected nor associated with your responses to the survey. The researchers will also protect the confidentiality of your survey responses by: having you complete the survey privately where others cannot see or hear your responses, storing your responses in a way that no one other than the*

	researchers can see them, and reporting your responses only after they are aggregated with others' responses. Any potential loss of confidentiality will be minimized by storing analyzed data on a password protected computer servers under at the protections of the University of Maryland Schools of Public Health and Baltimore School of Nursing.
Compensation	*You will receive a total of $20. Cash for completing this study. If you refuse compensation, you may still participate.*
Right to **Withdraw and** **Questions**	*Your participation in this research is voluntary. You may choose not to take part at all. If you decide to participate in this research, you may stop participating at any time. If you decide not to participate in this study or if you stop participating at any time, you will not be penalized or lose any benefits to which you otherwise qualify.* *If you decide to stop taking part in the study, if you have questions, concerns, or complaints, or if you need to report an injury related to the research, please contact the investigator/ co-investigator:* ***Dr. Bradley O. Boekeloo, PhD, ScM, Principal Investigator**** School of Public Health, Suite 2360, College Park, MD 1-301-505-8546, Boekeloo@umd.edu* ***Susan M. Antol, MS, RN, Co-Investigator,*** *655 West Lombard St., Suite 425B, Baltimore, MD 21201,1-410-706-5145, antol@son.umaryland.edu*
Participant **Rights**	*If you have questions about your rights as a research participant or wish to report a research-related injury, please contact:* **University of Maryland College Park** **Institutional Review Board Office** **1204 Marie Mount Hall** **College Park, Maryland, 20742** **E-mail: irb@umd.edu** **Telephone: 301-405-0678** *This research has been reviewed according to the University of Maryland, College Park IRB procedures for research involving human subjects.*
Statement of **Consent**	*Your signature indicates that you are at least 18 years of age; you have read this consent form or have had it read to you; your questions have been answered to your satisfaction and you voluntarily agree to participate in this research study. If you do not receive a copy of this consent form, please ask for one as you are entitled to a copy.*

Signature and **Date**	**NAME OF PARTICIPANT** **[Please Print]**	
	SIGNATURE OF PARTICIPANT	
	DATE	

Appendix F Pilot Study Usability Questions

Pilot study participants will complete an additional nine usability questions using the assisted-online administration. The researcher will enter the responses to the three open-ended questions.

We want your opinion about your experience with this survey and using the computer to complete it. This will help us in further survey development. Please answer the following questions.

1. I felt comfortable using the computer to complete the survey.
   - o Strongly disagree
   - o Disagree
   - o Neutral
   - o Agree
   - o Strongly Agree
2. I understood the survey instructions.
   - o Strongly disagree
   - o Disagree
   - o Neutral
   - o Agree
   - o Strongly agree
3. I understood the questions I was asked on the survey.
   - o Strongly disagree
   - o Disagree
   - o Neutral
   - o Agree
   - o Strongly agree
4. It was difficult for me to select a response.
   - o Strongly disagree
   - o Disagree
   - o Neutral
   - o Agree
   - o Strongly agree
5. I needed assistance to complete the survey.
   - o Yes
   - o No
6. I was able to print out the paperwork to show survey completion.
   - o Yes
   - o No

Please notify the researcher that you have completed the survey. The researcher will ask you a few more questions. Do not proceed or log off the computer.

7. Do you have any questions for me about the survey? _____
8. Please provide any recommendations you have for improving the survey instructions or delivery._____
9. Please provide any other comments you have about the survey or its administration. _
_____
Thank you.

Appendix G Study Recruitment Flyer

The University of Maryland College Park School of Public Health and the University of Maryland, Baltimore School of Nursing seek current English-speaking clinic patients for a research study.

The purpose of the study is to help clinicians understand how clinic patients view managing their health and health care and their interaction with their nurse practitioner.

The study involves taking a one-time anonymous survey in English on a computer in a room in the clinic.

You may receive assistance with computer administration.
Your participation in this research is voluntary.
Responses will be kept confidential.

Treatment and service will not be affected by participation.

- Compensation for study completion is $15.

Contact Information:
For more information please contact the clinic care manager:

Jeanine Brown, MS, RN
(410) 913-5678 or Jbrown@son.umaryland.edu
or
Carole Collins, PhD, MS, RN

(443) 282-5577 or collins@son.umaryland.edu

o IRB HSR # (insert)

Principal Investigator*:* Dr. Bradley O. Boekeloo, PhD, ScM
School of Public Health, Suite 2360
College Park, MD
1-301-505-8546
Boekeloo@umd.edu
Co-Investigator: Susan M. Antol, MS, RN
1-410-706-5145
antol@son.umaryland.edu

Appendix H Study Recruitment Script

The nurse care manager will follow this script to recruit patients who arrive for their clinic appointments for the study.

"Hello, my name is [Jeanine Brown/Carole Collins]. I am assisting researchers Dr. Bradley Boekeloo, faculty and Ms. Susan M. Antol at University of Maryland College Park. They are conducting a research study about how patients view their involvement in their health and health care and interaction with their nurse practitioner. You may have noticed the recruitment flier posted in the reception area. We are inviting you to participate in this research project because you receive health care from a nurse practitioner in this nurse-managed clinic. To participate in this research study, you must be a returning clinic patient, at least 18 years old, speak English, and complete an anonymous survey on a computer in one of the clinic rooms. You may receive assistance with computer administration. It should take about 30 minutes to complete the survey. You will receive $15 cash for completing the survey.

Participation is voluntary and refusal to participate will not affect care you receive in the clinic. Responses will be kept confidential.

If you are interested in participating in this survey, you may complete it today after your appointment or return on a clinic day to complete it. I am asking if you would be willing to complete the survey. Do you have any questions?

If you are able to take the survey today's appointment please let me know and I will take you to the room. If you prefer to return to take the survey within the next two weeks, please let me know when you plan to return.

Thank you for your help."

If not interested, nurse care manager will ask if they are willing to answer the demographic questions. Participation is voluntary.

Then the case manager will state: "Thank you for your time."

Appendix I Voluntary Refusal Survey

Patients declining study participation will be asked to voluntarily complete an anonymous survey to gather the following demographic information- age, gender, race/ethnicity, and highest level of educational attainment, using the same categorical ranges as those in the study survey. Responses will be used to compare study participants with non-participants.

1. What is your age?
   o 18-20 years old
   o 21-44 years old
   o 45-64 years old
   o 65 years or older
   o Refused/ don't know
2. What is your gender?
   o Male
   o Female
   o Refused/don't know
3. What Race do you most identify with?
   o White
   o Black
   o Asian/ Pacific Islander
   o Native American
   o Other
   o Refused/don't know
4. Are you Hispanic or Latino?
   o Yes
   o No
   o Refused/don't know
5. What is your highest educational level completed?
   o Less than eighth grade
   o Less than high school
   o Completed high school
   o Some college or more
   o Refused/don't know

Appendix J Study Consent Form

Project Title	*Predictors of Patient Activation Among Underserved Patients in a Nurse-managed Health Center*
Purpose of the **Study**	*This research is being conducted by **Dr. Bradley O. Boekeloo** and **Susan M. Antol** at the University of Maryland, College Park. We are inviting you to participate in this research project because you receive health care from a nurse practitioner in this nurse-managed clinic. The purpose of this research project is to help the clinic staff understand how patients view their involvement in their health care and interaction with their nurse practitioner.*
Procedures	*The procedures involve completing an on-line survey on a computer in the clinic. The survey will take approximately 30 minutes to complete. The care manager will assist you with logging into the computer and answer questions about progressing through the survey. You may notify the care manager if you prefer to be interviewed rather than take the survey on a computer. The care manager will ask you the questions and enter your responses into the computer as you respond. You can refuse to answer any question that makes you feel uncomfortable and can stop the survey at any time.*
Potential Risks and Discomforts	*The researchers will try to minimize the risks associated with participation in this research. You may feel uncomfortable responding to questions about your health behaviors or about interactions with your nurse practitioner. You may experience fatigue while taking the survey. If the researchers do not keep your responses confidential, there could be unforeseen consequences.*
Potential Benefits	*There are no direct benefits from participating in this research. This research is not designed to help you personally; however, possible benefits include improved quality of care. We hope that, in the future, other people might benefit from this study through improved understanding of how patients view their involvement in their health care and guidance provided by their nurse practitioner. The results may be used to improve clinic processes and patient care experiences.*
Confidentiality	*The survey is anonymous. Your name will not be collected nor associated with your responses to the survey. The researchers will also protect the confidentiality of your survey responses by: having you complete the survey privately where others cannot see or hear your responses, storing your responses in a way that no one*

	other than the researchers can see them, and reporting your responses only after they are aggregated with others' responses. Data are stored on password protected computer servers under the protections of the University of Maryland Schools of Public Health and Nursing.
Medical Treatment	*The University of Maryland does not provide any medical, hospitalization or other insurance for participants in this study. Nor will the University of Maryland provide any medical treatment or compensation for any injury sustained as a result of participation in this research study, except as required by law.*
Compensation	*You will receive a total of $15 cash for completing the survey. If you refuse compensation, you may still participate.*
Right to Withdraw and Questions	*Your participation in this research is voluntary. You may choose not to take part at all. If you decide to participate in this research, you may stop participating at any time. If you decide not to participate in this study or if you stop participating at any time, you will not be penalized or lose any benefits to which you otherwise qualify. Treatment and service will not be affected by participation.* *If you decide to stop taking part in the study, if you have questions, concerns, or complaints, or if you need to report an injury related to the research, please contact the investigator/ co-investigator:* **Dr. Bradley O. Boekeloo, PhD, ScM, Principal Investigator** *School of Public Health, Suite 2360,College Park, MD 1-301-505-8546,* *Boekeloo@umd.edu* **Susan M. Antol, MS, RN, Co-Investigator,** *655 West Lombard St., Suite 425B, Baltimore, MD 21201, 1-410-706-5145,* *antol@son.umaryland.edu*
Participant Rights	*If you have questions about your rights as a research participant or wish to report a research-related injury, please contact:* **University of Maryland College Park** **Institutional Review Board Office** **1204 Marie Mount Hall** **College Park, Maryland, 20742** **E-mail: irb@umd.edu** **Telephone: 301-405-0678** *This research has been reviewed according to the University of Maryland, College Park IRB procedures for research involving*

	human subjects.
Statement of Consent	*Your signature indicates that you are at least 18 years of age; you have read this consent form or have had it read to you; your questions have been answered to your satisfaction and you voluntarily agree to participate in this research study. If you do not receive a copy of this consent form, please ask for one as you are entitled to a copy.*

Signature and Date	**NAME OF PARTICIPANT [Please Print]**	
	SIGNATURE	
	DATE	

Appendix K Incentive Receipt

Cash Receipt

Thank you for the completion of the "Predictors of Patient Activation among Underserved Patients in a Nurse-managed Health Center: A Pilot Study", University of Maryland Study No.:6977078-1.

Receipt of Cash Payment

I received $15 cash for completion of the online study Predictors of Patient Activation Study.

This cash was received from the Research Team for completion of the online study Predictors of Patient Activation among Underserved Patients in a Nurse-managed Health Center: A Pilot Study, University of Maryland Study No.: XXXX.

Survey User ID #:_____

Research Team Member Signature: _____

Date_____

Appendix L Insignia Health Non-exclusive Copyright License Agreement

Insignia Health®

NON-EXCLUSIVE COPYRIGHT LICENSE

License Fee. As good and valuable consideration for the license granted herein, you shall pay to Insignia Health, LLC ("Insignia") the payment as shown in your shopping cart above (the "License Fee").

License Terms. Subject to the terms of this Agreement, you have the right to administer the PAM Materials (as defined herein) to up to the number of survey participants selected in your shopping cart and as defined below ("Participants"), beginning on the date of your online license purchase ("Effective Date") and ending twelve (12) months thereafter ("End Date").

DEFINITIONS

"PAM Materials" means the Patient Activation Measure (PAM) survey tool, the PAM survey scoring table; four different levels in which to classify people participating in a PAM survey, guidelines for responding to people in each level, benchmark score and level data and if selected, the Coaching for Activation online nurse/coach guidance, PAM online survey administration tools, and/or online e-learning tools.

A "Participant" is defined as any individual consumer or potential consumer of health care services who is provided access to the PAM Materials, up to the maximum number of participants you selected in your shopping cart.

TERMS AND CONDITIONS

This Agreement is a grant of a non-exclusive, non-transferrable copyright license to use the PAM Materials for the purpose of assessing and modifying the level of health engagement of Participants, subject to the terms and restrictions set forth herein (the "Agreement"). Use of the PAM Materials for any purpose other than those described herein is expressly prohibited without the written consent of Insignia. For clarity, the rights granted herein DO NOT include the right to:

- Copy, reproduce, publish, disseminate, or otherwise publicly display the PAM Materials or any part thereof outside of the scope of this Agreement;
- create derivative works or make alterations to the PAM Materials or any part thereof;
- use the PAM Materials or any part thereof, including but not limited to the PAM survey, to develop, validate or optimize a new or existing assessment of consumer health engagement, motivation, activation or similar assessment tool;
- sublicense the PAM Materials; or
- reverse engineer, reverse translate, decompile, disassemble or in any manner decode the PAM Materials or any part thereof, or any of the algorithms contained therein.

1. Rights Granted. Insignia hereby grants to you a non-exclusive, personal and non-transferable right to reproduce, distribute, and display the PAM Materials for the purpose of administering the PAM survey and collecting information related thereto to no more than the number of Participants defined by your on-line Participant range selection. Using PAM with Participants beyond that Participant range is a violation of this Agreement.

2. Your Obligations.

2.1. You agree not to alter, add, change, or remove any identification marks, including copyright or trademark notices, from the PAM Materials. You further agree that if you reference the PAM Materials to Participants in written materials, publish any studies or findings relating to your use of the PAM Materials, or in any other way publicize your use of the PAM Materials, you shall refer to the PAM survey as the "Patient Activation Measure®" or "PAM®." You further agree to obtain any consents from Participants that are necessary to allow the PAM Materials to be provided to them.

2.2. Reporting; Upon End Date.

(i) You shall provide to Insignia a written report in an electronic format approved by Insignia identifying the number of Participants who were given the PAM survey during the term of this Agreement. You further agree to maintain records supporting such report(s) for at least one (1) year following submission; and

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(ii) Subject to the confidentiality requirements of Section 3, you agree to share with Insignia non-personally identifiable, individual data ("Data") generated from your use of the PAM Materials. The Data shared shall include individual level data records containing answers to each of the PAM questions, and, if captured, (i) demographic variables, health status and condition variables, (ii) specific outcome variables including health behaviors, self-management behaviors and whether patients using PAM improved the self-management aspects of their health care, and (iii) the PAM Materials' effect on or relationship to patient health care utilization and costs. Such Data shall be reported to Insignia at least annually in the electronic format agreed upon by the parties to this Agreement. You hereby grant Insignia a royalty free, perpetual license to use such Data for its product improvement efforts.

3. Confidentiality. Both you and Insignia each acknowledge that either party may receive confidential and proprietary information of the other party including, without limitation, (i) technical information, including functional and technical specifications, analysis, research, processes, computer programs, job control language, communications scripts, methods, ideas, "know how" and the like; (ii) business information, including sales and marketing research, materials, plans, provider and beneficiary demographics, provider-specific information and the like; (iii) electronic media claims data in accordance with the Federal Privacy Act of 1974, as amended; (vi) the PAM Materials and all algorithms utilized by Insignia in the provision of the services set forth in this Agreement; (v) Data; and (vi) other information designated in writing by the owner as confidential at the time of delivery of such information to the recipient (collectively "Confidential Information").

Except for Protected Health Information (as defined by the Health Insurance Portability and Accountability Act of 1996, Public Law 104-191 (HIPAA)), Confidential Information of a party hereto shall not include information that: (a) becomes generally available to the public other than as the result of unauthorized disclosure by the recipient; (b) is independently derived by the recipient without the aid, application or use of the disclosing party's Confidential Information; or (c) was received by the recipient on a non-confidential basis prior to receipt from the disclosing party from a third-party lawfully possessing and lawfully entitled to disclose such information.

4. Covenant Not to Disclose. Except as provided in Section 2.2, each party receiving Confidential Information from the other party hereby agrees that it shall not use, commercialize or disclose such Confidential Information to any person or entity, without prior written permission of the non-disclosing party. Each party shall use at least the same degree of care in safeguarding the other party's Confidential Information as it uses in safeguarding its own Confidential Information.

5. Ownership of the PAM Materials. The State of Oregon, acting by and through the State Board of Higher Education on behalf of the University of Oregon, owns the copyright, title, and other related rights in and to the Patient Activation Measure ("PAM") and related guidance (collectively referred to as the "PAM Guidance") developed by Dr. Judith Hibbard and others. Insignia is the exclusive licensee of certain rights related to the PAM Guidance and is the owner of all trademark rights associated with this technology. All rights not otherwise granted to you in this agreement are reserved by Insignia and/or the University of Oregon.

6. Indemnification and Limitation of Liability.

6.1. You agree to indemnify and hold harmless both Insignia and the University of Oregon and their respective members, directors, officers, governing board members, agents, employees, students, volunteers, and assigns against any and all claims, demands, damages, liability, losses, causes of action, costs and expenses arising out of or in any way related to the use, reproduction, distribution or public display of the PAM Materials by you or any of your Participants, or your failure to comply with applicable privacy laws.

6.2. INSIGNIA AND THE UNIVERSITY OF OREGON PROVIDE ACCESS TO THE PAM MATERIALS ON AN "AS IS, WITH ALL DEFECTS" BASIS. NEITHER INSIGNIA NOR THE UNIVERSITY OF OREGON MAKE ANY REPRESENTATIONS OR WARRANTIES, EXPRESS OR IMPLIED. BY WAY OF EXAMPLE, BUT NOT LIMITATION, INSIGNIA AND THE UNIVERSITY OF OREGON MAKE NO REPRESENTATIONS OR WARRANTIES OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE (EVEN IF INSIGNIA OR THE UNIVERSITY OF OREGON KNOW OF SUCH PURPOSE), OR THAT THE USE OF THE PAM MATERIALS WILL NOT INFRINGE ANY PATENTS, COPYRIGHTS, TRADEMARKS OR OTHER RIGHTS OF THIRD PARTIES. YOU HEREBY AGREE TO SAVE, HOLD HARMLESS, DISCHARGE AND RELEASE INSIGNIA AND THE UNIVERSITY OF OREGON AND ALL OF THEIR RESPECTIVE AGENTS, SERVANTS, EMPLOYEES AND VOLUNTEERS, FROM ANY AND ALL LIABILITY, CLAIMS, CAUSES OF ACTIONS, DAMAGES OR DEMANDS OF ANY KIND AND NATURE WHATSOEVER WHICH MAY ARISE FROM OR IN CONNECTION WITH YOUR USE OF THE PAM MATERIALS.

7. Term and Termination.

7.1. The term of this Agreement shall commence on the Effective Date and shall continue until the End Date or until terminated in accordance with this Section 7, whichever is earlier ("Term").

7.2. Insignia may terminate this Agreement and the license granted herein for Insignia's convenience, by providing not less than ten (10) days advance written notice to you by electronic communication or otherwise.

7.3. Upon termination or expiration of this Agreement you shall cease using, reproducing, distributing, or publicly displaying any portion of the PAM Materials.

7.4. You acknowledge and agree that termination of Insignia's agreement with the State of Oregon for the right to use and sublicense the PAM survey and PAM Guidance shall terminate this Agreement; provided however that you may request continuation of this Agreement by making written request to the State of Oregon within sixty (60) days of your receipt of written notice of such termination. Such written request for license continuation shall include your agreement to assume with respect to the State of Oregon all obligations (including obligations for payment) contained in this Agreement with Insignia. In such case, the State of Oregon may in its sole discretion agree to accept or decline such request for assignment of this Agreement. Such written request shall be made to Director, Office of Technology Transfer, 1238 University of Oregon, Eugene, Oregon, 97403-1238.

8. Return or Destruction of Information. Except for the Data provided by you pursuant to Section 2.2, upon the expiration or termination of this Agreement, you and Insignia shall, within twenty (20) days, each return or destroy all Confidential Information of the other party; provided, however, that the receiving party may keep one copy of the Confidential Information for archival purposes so long as such archived Confidential Information is safeguarded against disclosure and use prohibited hereunder. In either case, upon request, the recipient shall provide the disclosing party with written certification that all Confidential Information has been returned or destroyed, as the case may be. Despite such a return or destruction, the parties' obligations under this Section shall survive indefinitely.

9. Remedies for Breach of Confidentiality. Each party hereby acknowledges that the violation by it of the restrictions imposed hereunder would cause irreparable harm to the owner of such Confidential Information and that remedies at law would be inadequate to redress any actual or threatened violation of this agreement. Each party agrees that, in addition to other relief that may be available, the foregoing restrictions may be enforced by temporary and permanent injunctive relief. Any award of relief to the owner of such Confidential Information in an action in which the owner substantially prevails shall include recovery of such owner's costs and expenses of enforcement (including attorneys' fees, including attorneys' fees and any costs associated with appeal).

10. General Provisions.

10.1. Assignment. The rights granted hereunder and this Agreement may not be assigned, transferred, or sublicensed directly or indirectly, by operation of law, contract or otherwise, by you except with the express written consent of Insignia, which consent may be withheld at Insignia's sole discretion.

10.2. Entire Agreement, Modification, and Waiver. This Agreement replaces and supersedes any prior agreements between the parties and sets forth the entire agreement between the parties with respect to the subject matter hereof, and may not be modified or amended except by written agreement executed by the parties hereto. No waiver, consent, modification, or change of any terms of this Agreement shall be binding unless the same is in writing and signed by both parties and all necessary approvals have been obtained. Such express waiver, consent modification, or change, if made, shall be effective only in the specific instance and for the specific purpose set forth in such signed writing.

10.3. Governing Law. This Agreement shall be construed and enforced in accordance with the laws of the State of Oregon, without giving effect to the conflict of law principles thereof, and applicable federal law. Any action or suit brought by the parties relating to this Agreement shall be brought and conducted solely and exclusively in the state and federal courts in Multnomah County in the State of Oregon in Portland, Oregon. You hereby waive any objection to venue in such courts, and waive any claim that such forum is an inconvenient forum. BY EXECUTION OF THIS AGREEMENT, YOU HEREBY CONSENT TO THE PERSONAL JURISDICTION OF SUCH COURT.

10.4. Notice. Any notice under this Agreement shall be in writing and be delivered in person or by public or private courier service (including U.S. Postal Service Express Mail) or by certified mail with return receipt

requested or by electronic mail. Notice to you shall be addressed to the contact information you provided above, notice to Insignia shall be addressed to the following address or at such other address as Insignia may from time to time direct in writing:

For Insignia:

Insignia Health, LLC
Attn: License Department
Street: 10900 Wayzata Blvd., Suite 810
City, State Zip: Minnetonka, MN 55305
Email: info@insigniahealth.com

Any notice shall be deemed to have been given on the earlier of: (i) actual delivery or refusal to accept delivery, (ii) the date of mailing by certified mail, (iii) the day facsimile delivery is verified or (iv) if by email the date sent unless an out of office-type reply is received in which case the notice shall be deemed given when the notice indicates the recipient will return to the office. Actual notice, however and from whoever received, shall always be effective.

10.5. Severability. If any one or more provisions of this Agreement shall be adjudicated to be illegal, invalid, or unenforceable in any respect, the validity, legality and enforceability of the remaining provisions shall not in any way be affected or impaired thereby. The parties hereby agree to attempt to substitute for any illegal, invalid, or unenforceable provision a valid or enforceable one, which achieves the economic, legal and commercial objectives of the invalid or unenforceable provision to the greatest extent possible.

10.6. No Third Party Beneficiaries. Nothing in this Agreement gives, is intended to give, or shall be construed to give or provide any benefit or right, whether directly, indirectly, or otherwise, to any other third persons.

10.7. Headings, Drafting, and Counterparts. This Agreement may be executed electronically and in counterparts, each of which may be an original but all of which, when taken together, shall constitute one and the same instrument. Headings included herein are for convenience only and shall not be used to construe this Agreement. The parties agree that they have participated equally in the formation of this Agreement and that the language herein should not be presumptively construed against either of them.

10.8. Audits. You shall create and maintain records as required by this Agreement and you shall grant Insignia reasonable access during normal business hours to examine and take copies of, on no less than ten (10) business days' advance written notice and at Insignia's cost, the records relating to this Agreement, to verify your compliance with the terms and conditions of this Agreement.

10.9. Survival. All terms of this Agreement with the exception of Section 1 shall survive the expiration or termination of this Agreement.

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Appendix M Rasch Scoring Excel Spreadsheet

FOR USE WITH A VALID, ACTIVE COPYRIGHT LICENSE ONLY

1) Enter data in white cells only

2) Hover your mouse over the red triangles in row 10 for each of the PAM statements

3) Answer options and scoring:

Disagree Strongly	1
Disagree	2
Agree	3
Agree Strongly	4
N/A	5

Need to answer 10 of 13 question for a valid score.

PAM 13 Score Level		PAM1	PAM2	PAM3	PAM4	PAM5	PAM6	PAM7	PAM8	PAM9	PAM10	PAM11	PAM12	PAM13
3		4	4	4	4	5	3	3	3	3	2	2	2	5
55.6	1													
0.0	1													
0.0	1													
0.0	1													
0.0	1													
0.0	1													
0.0	1													

Appendix N Survey Codebook

Demographic Questions

1. What is your age? [AGE]
   o 18-20 years old [1]
   o 21-44 years old [2]
   o 45-64 years old [3]
   o 65 years or older [4]
   o Refused/don't know [99]
2. What is your gender? [GENDER]
   o Male   [1]
   o Female [2]
   o Refused/don't know [99]
3 & 4. What Race/ethnicity do you most identify with? [RACE Self-identified]
   o White [1]
   o Black [2]
   o Hispanic [3]
   o Other (Asian Pacific Islander, Indian, Mixed, Other) [4]
5. What is your annual household income? [INCOME]
   o Less than $31,460 [1]
   o 31,461 to 49,999 [2]
   o $50,000 or more [3]
   o Refused/don't know [99]
6. What is your highest educational level completed? [EDUC]
   o Less than eighth grade [1]
   o Less than high school [2]
   o Completed high school [3]
   o Some college or more [4]
   o Refused/don't know [99]
7. In what part of Maryland do you live? [URBRUR]
   o Central MD (urban) [1]
   o Eastern Shore (rural) [2]
   o Refused/don't know [99]
8. What is your insurance status? [INSSTAT]
   o Insured (Medicare, Medicaid, commercial, or other insurance coverage) [1]
     Uninsured [2] = [0] Reverse coded 2 = 0
   o Refused/don't know [99]

Clinic Use Factors

9. How long have you been coming to this clinic? [CLINDUR]
   o Less than 3 months [1]
   o 3 months to less than 6 months [2]
   o 6 months to less than a year [3]
   o 1 year to less than 2 years [4]
   o 2 years or more [5]
   o Refused/don't know [99]

10. How long have been seeing your current nurse practitioner? [NPDUR]
    o Less than 3 months [1]
    o 3 months to less than 6 months [2]
    o 6 months to less than a year [3]
    o 1 year or more [4]
    o Refused/don't know [99]
11. What is the main reason you come to this clinic? [CLINREAS]
    o Well care (annual physicals, pap smears) or acute care (cold, infections) [1]
    o Chronic care (high blood sugar, high blood pressure, asthma, medication management) [2]
    o Refused/don't know [99]

Autonomy Support Questions [AS]

1. I feel that my nurse practitioner has provided me choices and options. [CHOICE]

1	2	3	4	5	6	7		99
strongly disagree			neutral			strongly agree		refused or don't know

2. I feel understood by my nurse practitioner. [UNDERST]

1	2	3	4	5	6	7		99
strongly disagree			neutral			strongly agree		refused or don't know

3. My nurse practitioner conveys confidence in my ability to make changes. [CONFID]

1	2	3	4	5	6	7	99
strongly disagree			neutral			strongly agree	refused or don't know

4. My nurse practitioner encourages me to ask questions. [ASKQUEST]

1	2	3	4	5	6	7	99
strongly disagree			neutral			strongly agree	refused or don't know

5. My nurse practitioner listens to how I want to do things. [LISTENS]

1	2	3	4	5	6	7	99
strongly disagree			neutral			strongly agree	refused or don't know

6. My nurse practitioner tries to understand how I see things before suggesting a new way to do things. [UNDERST]

1	2	3	4	5	6	7	99
strongly disagree			neutral			strongly agree	refused or don't know

Cumulative Autonomy Support Score add items 1 through 6 [Autonomy Support Score]
Recoded (Dichotomized) Autonomy Support Variable ["Does the study participant perceive NP autonomy support?" (scores 9-41= No [0], 42=Yes [1]

Autonomous Motivation Questions [AM]

The reason I would manage my health and health care activities is:

1. Because I would feel guilty or ashamed of myself if I did not manage my health and health care activities. [GUILT] (controlled subscale, reverse coded)

1	2	3	4	5	6	7	99
very			somewhat			not at all	refused or
true			true			true	don't know

2. Because I personally believe it is the best thing for my health. [BEST] (autonomous subscale)

1	2	3	4	5	6	7	99
not at			somewhat			very	refused or
all true			true			true	don't know

3. Because others would be upset with me if I did not. [UPSET] (controlled subscale, reverse coded)

1	2	3	4	5	6	7	99
very			somewhat			not at all	refused or
true			true			true	don't know

4. Because I have carefully thought about it and I believe it is very important for many aspects of my life. [IMPORT] (autonomous subscale)

1	2	3	4	5	6	7	99
not at			somewhat			very	refused or don't know
all true			true			true	

5. Because I would feel bad about myself if I did not manage my health and health care activities. [FEELBAD] (controlled subscale, reverse coded)

1	2	3	4	5	6	7	99
very			somewhat			not at all	refused or don't know
all true			true			true	

6. Because it is an important choice I really want to make. [IMPTCH] (autonomous subscale)

1	2	3	4	5	6	7	99
not at			somewhat			very	refused or don't know
all true			true			true	

7. Because it is very important for being as healthy as possible. [IMPHEAL] (autonomous subscale)

1	2	3	4	5	6	7	99
not at			somewhat			very	refused or don't know
all true			true			true	

8. Because I want others to see I can do it. [OTHERS] (controlled subscale, reverse coded)

1	2	3	4	5	6	7	99
very			somewhat			not at all	refused or don't know
true			true			true	

PAM-13 Questions [ACTSCORE] from Appendix M Rasch Scoring Excel Spreadsheet

1. When all is said and done, I am the one who is responsible for taking care of my health.
    - o Disagree Strongly [1]
    - o Disagree [2]
    - o Agree [3]
    - o Agree Strongly [4]
    - o N/A [5]

2. Taking an active role in my own health care is the most important factor in determining my health and ability to function.
    - o Disagree Strongly [1]
    - o Disagree [2]
    - o Agree [3]
    - o Agree Strongly [4]
    - o N/A [5]

3. I am confident that I can take actions that will help prevent or minimize some symptoms or reduce problems associated with my health.
    - o Disagree Strongly [1]
    - o Disagree [2]
    - o Agree [3]
    - o Agree Strongly [4]
    - o N/A [5]

4. I know what each of my prescribed medications does.
    - o Disagree Strongly [1]
    - o Disagree [2]
    - o Agree [3]
    - o Agree Strongly [4]
    - o N/A [5]

5. I am confident that I can tell when I need to go get medical care and when I can handle a health problem myself.
    - o Disagree Strongly [1]
    - o Disagree [2]
    - o Agree [3]
    - o Agree Strongly [4]
    - o N/A [5]

6.   I am confident that I can tell a nurse practitioner the concerns I have even when he or she does not ask.
    - o Disagree Strongly [1]
    - o Disagree [2]
    - o Agree [3]
    - o Agree Strongly [4]
    - o N/A [5]

7. I am confident I can follow through on medical treatments I may need to do at home.
   o Disagree Strongly [1]
   o Disagree [2]
   o Agree [3]
   o Agree Strongly [4]
   o N/A
8. I understand the nature and causes of my health problems.
   o Disagree Strongly [1]
   o Disagree [2]
   o Agree [3]
   o Agree Strongly [4]
   o N/A [5]
9. I know the different medical treatment options available for my health problems.
   o Disagree Strongly [1]
   o Disagree [2]
   o Agree [3]
   o Agree Strongly [4]
   o N/A [5]
10. I have been able to maintain the lifestyle changes for my health that I have made.
    o Disagree Strongly [1]
    o Disagree [2]
    o Agree [3]
    o Agree Strongly [4]
    o N/A [5]
11. I know how to prevent problems with my health.
    o Disagree Strongly [1]
    o Disagree [2]
    o Agree [3]
    o Agree Strongly [4]
    o N/A [5]
12. I am confident I can figure out solutions when new situations or problems arise with my health.
    o Disagree Strongly [1]
    o Disagree [2]
    o Agree [3]
    o Agree Strongly [4]
    o N/A [5]
13. I am confident that I can maintain lifestyle changes, like diet and exercise, even in times of stress.
    o Disagree Strongly [1]
    o Disagree [2]
    o Agree [3]
    o Agree Strongly [4]
    o N/A [5]

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