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An Exploration of Health Coaching Models and their Efficacy in Chronic Disease Management: A Literature Review

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Table of Contents

Abstract

Amidst the rise of chronic condition prevalence in recent decades, the field of health coaching has presented itself as a feasible complementary treatment method in chronic condition prevention and management. This literature review analyzes various clinical health coaching practices and their effectiveness in improving health behaviors and clinical outcomes in patients with chronic conditions. Eight studies were compared, with particular attention directed towards the evaluation of coaching techniques and modes of delivery. It was discovered that successful health coaching practices use a combination of Motivational Interviewing (MI), self-efficacy, and goal setting. Furthermore, programs that incorporated in-person intake sessions, followed by brief, biweekly telephone sessions for the duration of 3-6 months appeared to correlate most with program efficacy. Despite these findings, increased consistency amongst coaching licensure and testing outcomes are needed to strengthen current research examining the efficacy of health coaching in chronic disease management.

Key Words: motivational interviewing, self-efficacy, obesity, diabetes, cardiovascular disease, health behaviors

Introduction

Health coaching is a relatively new field of holistic wellness, characterized by a cost-effective, patient-centered relationship that primarily aims to promote healthy behavior change. Health coaching services are practiced in a variety of treatment settings, including private and clinical environments. Due to the novelty and recent developments of health coaching, there are currently no legal credentials required for health coaches to practice in the United States. In this sense, the field of health coaching is unique with a specific scope of practice that must be adhered to. Because there are no state or federally recognized certifications for health coaches, they are not considered state-authorized health care providers and must ensure that their practice abides by legal parameters (Definition of health care provider, 1993). Therefore, health coaches are not allowed to diagnose, treat, prescribe, interpret medical results, or prescribe food plans, medications, or supplements. Furthermore, health coaches must ensure they do not present their services with terms such as “nutritionist” or “dietician”, as these terms depict that certain state-required credentials have been acquired. Despite this, many health coaches have decided to pursue training and certifications through private educational institutions, to provide proper knowledge and training in effort to improve success for themselves and their clients. As a result, it has become somewhat of an industry standard to possess some form of education or training related to fitness, nutrition, and/or human physiology. To summarize, the budding field of health coaching works to partner with patients to influence the adoption of healthy behavior changes and is quickly growing in popularity, despite not being anaccredited health profession.

According to the Centers for Disease Control and Prevention (CDC), 60% of adults in the United States are living with a chronic condition, such as heart disease or diabetes (Centers for Disease Control and Prevention, 2022). Chronic conditions are commonly characterized by a

long period of development caused by numerous factors that lead to a prolonged duration of illness which is extremely difficult, if not impossible, to fully cure and generally results in impaired function (Australian Institute of Health and Welfare, 2020). It is understood that behavior changes are an effective management and treatment option for lifestyle-related chronic conditions, such as obesity, chronic obstructive pulmonary disease (COPD), or cardiovascular disease (Astrup et al., 2008; Berrington de Gonzalez, 2010; Warburton et al., 2006). In essence, most chronic conditions can be managed with appropriate health behavior implementation such as effective weight management, nutrition, and physical activity. The utilization of chronic disease self-management practices, primarily behavior change, is known to improve clinical outcomes for patients with chronic conditions (Allegrante et al., 2019). Therefore, the use of health coaching, which mainly focuses on supporting healthy behavior change, is an effective supplemental treatment option in widespread chronic disease management (Kivela et al., 2014).

Although the term "chronic conditions" includes many different conditions, ranging from depression to arthritis, they all share several underlying mechanisms affected by lifestyle. These mechanisms primarily include inflammation and oxidative stress, therefore they can be viewed synchronously. Extensive research reveals the roles of chronic inflammation and oxidative stress in the onset and progression of chronic disease (Pahwa et al., 2021). In short, most chronic condition progression is related to unhealthy behaviors such as inactivity, poor diet, and tobacco or alcohol use; these behaviors are what lead to inflammation and/or oxidative stress in the body which then manifests in a variety of chronic conditions. For these reasons, this review and much of the included literature refer to chronic conditions as a blanket term to include a variety of lifestyle-related diseases, which share common underlying mechanisms of disease and can oftentimes be managed through healthy behavior changes.

This literature review aims to assess current health coaching practices in chronic disease management and evaluate their effectiveness. Among existing health coaching models, there are a few common characteristics including being patient-focused, holistic in nature, and intent to generate healthy behavior change. Despite these commonalities, there are some differences in psychological theories and coaching modalities that drive various programs. By evaluating existing programs, future health coaching models can be developed to best serve patients and ultimately improve their clinical status.

Methods

Utilizing the academic search engine Google Scholar™, peer-reviewed research studies were accessed through several databases which included PubMed, Wiley Public Library, Springer Link, and ScienceDirect. The search terms used to identify relevant research articles were combinations of keywords which included health coaching (health coach OR health coaching) and chronic conditions (chronic conditions OR chronic illness OR obesity OR cardiovascular disease OR diabetes OR COPD OR chronic obstructive pulmonary disease) and interventions (interventions OR treatment OR outcomes OR results). Studies published since 2005 were included and limited to only those including adult participants. Furthermore, studies were only included if their central focus was on (1) health behaviors and/or clinical outcomes and/or psychological changes, in (2) a patient demographic that was diagnosed with one or more chronic conditions. Once articles were collected, a table was developed comparing the qualities of each study. Eight studies in total were included and compared sample size, population type, aims of the study, theoretical underpinnings, coaching technique(s), program delivery, and primary study findings. By comparing the methodologies of various coaching programs, general

observations were made about what current health coaching interventions consist of. Furthermore, the comparison of coaching strategies with study outcomes allowed for predictions of which program strategies were most effective.

Components of Health Coaching

Theoretical Underpinnings

The field of health coaching is built upon psychological theories that primarily concentrate on altering the behavior of individuals to improve their health and wellbeing. The fundamental theoretical underpinnings that drive health coaching methodologies include Cognitive Behavioral Theory (CBT) and the Transtheoretical Model of Behavior Change (TTM). Early discussion of CBT began decades ago. Aaron Beck, an American psychiatrist who is now regarded as the 'father of cognitive therapy' explains, "The basic cognitive technique consists of delineating the individual's specific misconceptions, distortions, and maladaptive assumptions, and of testing their validity and reasonableness," (Beck, 1970, p.184). In other words, CBT utilizes the premise that our current beliefs directly impact our behavior, and consequently our wellbeing. In addition to this, CBT also establishes the theory that cognitive thinking is a driver behind psychological stress and behavioral patterns. Because of this, when one's existing beliefs are explored under a controlled environment, such as with coaching, the individual increases their awareness of misconstrued beliefs that are limiting them from pursuing healthier behaviors. The goal of this process is to facilitate the client's ability to deconstruct harmful beliefs and generate beneficial beliefs in their place. By doing so, these individuals then develop patterns of thought that support more desirable beliefs and increase the likelihood of engaging in healthful behaviors. Over the years, CBT has been applied in a variety of behavioral therapies as one of

the most widespread theoretical underpinnings in psychological interventions and has proven to be effective (Hofmann et al., 2012).

In addition to CBT, TTM also has its influence on some health coaching practices. This model is characterized by a relatively linear process containing six primary steps of behavior change including *pre-contemplation, contemplation, preparation, action, maintenance, and termination* (Prochaska & Velicer, 1997). First developed in 1983 by James O. Prochaska, the model works to identify and deconstruct behavior change into steps that more accurately describe the entire behavior change process. Furthermore, TTM illustrates the driver of successful behavior change is not a result of coincidence or luck, but rather the successful completion of steps that result in changed behavior. The model includes a set of specific processes of change that are pathways for progression from one stage to the next. For instance, suppose an individual is exploring the idea of signing up for a gym membership and starting a workout program. The pre-contemplation phase would begin months before obtaining the membership, when the individual is still justifying their lack of action by highlighting the drawbacks or barriers facing them. The pre-contemplation phase transitions into the contemplation phase when the individual begins to shift their perspective to better understand the consequences of not taking action. In this example, the individual now understands that their lack of physical activity is unhealthy, and they can now envision themselves taking action in the near future. However, there are still beliefs and obstacles holding them back from moving forward. Once these are conquered, the action phase takes place. By now, the individual has obtained their gym membership and has started going to the gym. After consistent workouts for a few months and creating a habit, the individual has transitioned into the maintenance phase. At this point it is less likely for them to discontinue this behavior than it was in the action phase. For many, the

maintenance phase continues indefinitely. While for some, the maintenance stage may transition into the transition phase. In this case, the individual now has zero temptation to quit going to the gym and has a complete sense of self-motivation and efficacy. Going to the gym consistently will not change, despite any challenges or enticements they may encounter. It is important to note that the TTM posits that individuals can transition back to a previous step or move between steps in a non-linear pattern. For instance, in this example the individual may stop going to the gym, contemplate going back, and then take action again. Overall, nearly all behavior change processes follow the TTM, whether we are conscious of our progression through the phases or not. Since its conception, TTM has become an effective model for improving health behaviors for those managing chronic conditions (Hashemzadeh et al., 2019).

Approaches in Health Coaching

Motivational Interviewing

While the theoretical foundations of health coaching are CBT and TTM, these overarching concepts are put into practice through three primary counseling techniques: motivational interviewing (MI), building self-efficacy, and goal setting. While all three modalities are patient-centered and oriented to promote desirable behavior change, they are distinguishable. MI expands upon the assumption that simply being educated about the risks or negative impacts of certain behaviors is not enough to facilitate healthy behavior change. This talk-therapy style intervention method works to promote an environment where the patient uncovers their current behaviors, beliefs, and limitations that are inhibiting their adoption of healthy behavior change. MI was first developed in 1983 by psychologist William Miller, as part of his work with “problem drinkers” (Miller et al., 1983). Miller asserts that motivation, or lack

thereof, is not an inherent character trait. Instead, motivation is a state of willingness and readiness for change, which will fluctuate over time. In other words, one's lack of motivation is not a reflection of an undesirable personality and Miller shares that this is an opportunity to utilize MI to address root concerns that bring about the hesitancy of change. Since many chronic condition management interventions are grounded in behavior change, MI has shown promising results as a complementary intervention method with lasting results (Chen et al., 2011; Hardcastle et al., 2013).

Self-Efficacy

In addition to MI, the development of self-efficacy also plays a key role in health coaching mediation. The theory of self-efficacy was first identified by psychologist Albert Bandura and is defined as "an individual's belief in his or her capacity to execute behaviors necessary to produce specific performance attainments" (Carey & Forsyth, 2009, para. 1). Particularly, self-efficacy is an indication of one's assurance in their own ability to achieve their desired goals in the face of barriers to success. Bandura asserted that self-efficacy is brought about by four key sources: mastery experiences, vicarious experiences, verbal persuasion, and psychological arousal (Celestine, 2022). Briefly speaking, mastery experiences are those we undergo when we attempt and succeed at a new challenge, while vicarious experiences occur through observation of others, which results in our own predicted outcome of our experience with the same challenge. Verbal persuasion is the receipt of positive encouragement. Lastly, psychological arousal highlights the relationship between emotions and self-efficacy, revealing the detrimental impacts of fatigue and other negative psychological states on one's belief in their abilities.

In the context of health coaching for patients with chronic conditions, the presence of self-efficacy is crucial. It is important to note that health coaching is especially promising for improving self-efficacy in patients when compared to traditional primary care, where patient self-efficacy is often lacking due to the passive delivery of complex information during clinical visits (Devan et al., 2018). This is of course not to say that traditional primary care interventions should be mitigated, but rather should be combined with health coaching programs to increase patient adherence to prescribed behavior changes. Self-efficacy works to bridge the gap between coaching intervention and results. In short, the presence of proper health coaching practices has been shown to increase self-efficacy in patients with chronic conditions (Tülüce & Kutlutürkan, 2018). From there, the presence of self-efficacy brings about increased adherence to healthy behavior change because patients possess the belief that they can achieve healthier lifestyles and improve their conditions through proper chronic disease self-management (Farrell et al., 2004). For these reasons, self-efficacy is unique in comparison to other psychological mechanisms of health coaching because it is both a result and driver of healthy behavior change in patients, creating a perpetual cycle of continuous motivation to adherence to a healthy lifestyle.

Goal Setting

Lastly, no health coaching intervention would be sufficient without some employment of goal setting. Serving as a roadmap for chronic condition management, setting goals of healthy behavior change is an integral part of health coaching (Pearson, 2012). Ideally, patients develop goals together with a health coach who offers support, feedback, and assistance when necessary. Goal setting helps keep patients on track while also serving as a benchmark to celebrate the adoption of desirable health behaviors. When setting goals, some goal characteristics have shown

to be more effective than others. Foremost, it has been shown that setting approach-oriented goals yield better results than avoidance-oriented goals (Oscarsson et al., 2020). Approach-oriented goals strive toward a desired behavior change, while avoidance-goals are structured to evade undesirable ones. For example, an approach-oriented goal might be "I will go for a 20-minute walk every day," while an avoidant-goal would be "I will not sit on the couch and watch T.V. after work,". Furthermore, successful behavior change is often more than simply setting a goal. To improve patient outcomes, it has also been shown that developing action plans alongside goals is effective (Lorig et al., 2014). By developing an action plan, patients create their own pathways containing steps that aid in the achievement of their desired goals. Although existing literature on goal setting as a sole coaching intervention method is limited, it has been revealed to be an effective contributor to health behavior change when paired with other techniques in chronic disease management.

Despite the differences between the three mechanisms, nearly all health coaching interventions possess qualities of MI, goal setting, and self-efficacy. In other words, an effective health coaching model contains the incorporation of all three psychological methodologies. Furthermore, from a practical standpoint, it is nearly impossible to rely solely on one technique without incorporating the others to some degree. For instance, MI relies on the patient's sense of s*elf-efficacy* to set personal *goals* that aid in achieving their desired outcomes. The foundation of health coaching is built upon a synergistic relationship between MI, self-efficacy, and goal setting. In a coaching setting, these strategies come together as an effective approach for behavior change. Based on our current understanding of health coaching, it would be an appropriate claim to assume that practically all effective health coaching models embody a blend of MI, self-efficacy, and goal setting.

Modes of Delivery

The ways in which health coaching programs engage with patients differs greatly. Various program attributes may impact program effectiveness, so it is vital to identify the ways in which coaching designs differ to understand what modes of delivery correlate most with successful outcomes. The length of the coaching program is one of these key attributes. From a coaching perspective, there needs to be an ideal timespan where enough time can pass to effectively instill healthy behavior habits, while still being short enough that the patient feels that their goals are achievable. Furthermore, the duration of meetings is another essential coaching program characteristic. Similarly to program length, coaches should strive for a sessions that are long enough to discuss all necessary topics, while not being so long that patients are unwilling to meet. Regarding the setting of coaching sessions, coaches may find themselves engaging in sessions over the phone or online via videocalls, for convenience of both themselves and the patient. This is especially true in response to the COVID-19 pandemic, where in-person interactions have been limited and there is an increased dependency on virtual communication for health-related communication (Monaghesh & Hajizadeh, 2020). In summary, health coaching programs share many underlying mechanisms but have the opportunities for personalization of delivery methods in response to patient needs, program aims, and availability of resources.

Comparison of Studies

Table 1

Study, (Year)	Sample size & Population	Study Aims	Therapeutic Approaches	Program Length, Frequency, and Mode of Delivery	Primary Findings
Benzo et al., (2016)	n=108, patients with COPD after hospitalization for a COPD exacerbation	Test the effect of health coaching on COPD rehospitalizations following hospital discharge	MI, goal setting	8-week program, 1 x 2 hour in-person intake session, followed by 7 sessions via telephone	Decreased rates of rehospitalization 1-, 3-, and 6-months post-discharge between intervention and control groups (1.9%, 9.4%, and 15.4%; 9.4%, 20.7%, and 27.7%, respectively) (p=0.0174, 0.0280, and 0.0315, respectively)
Chen et al., (2019)	n=59, patients with type 2 diabetes for >1 year and a baseline HbA1c of 7% or greater for the past 6 mo	Examine the impacts of health coaching on self-efficacy and lowering HbA1c	MI, goal setting	6-month program, 1 in-person intake session, followed by 6 x 10-20 minute telephone sessions bi-weekly during first 3 mo, followed by 3 x 10–20-minute telephone sessions during the last 3 mo	Decrease of HbA1c levels from 0.64% (CI = 0.45 to 0.83) within 3 months ($p < 0.01$) and a decrease of 0.68% (CI = 0.40 to 0.96) within 6 months($p < 0.01$) Increase of 3.04 points (CI = −4.46 to −1.60) in self-efficacy of diabetes self-management was observed within 3 months ($p < 0.01$) and an increase of 3.89 points (CI = −5.60 to −2.17) within 6 months ($p < 0.01$) Increase in physical activity within both 3 ($p < 0.01$) and 6 months ($p = 0.02$)
Efraimsson et al., (2008)	n=26, patients with COPD	Examine the effects of nurse-led educational intervention on Quality of Life (QoL), smoking cessation, and COPD knowledge	MI	2 x 1 hour in person sessions, 3-5 months apart	Reduction of mild COPD symptoms from 53.4 units to 25.2 ($p = 0.00035$)

					37.5% of participant who were smokers stopped smoking (p = 0.0185)
Linden et al., (2010)	n=106, healthcare employees with one or more chronic conditions	Evaluate the impacts of health coaching on chronically ill employees	MI	Undefined program length, 1 x 30-40 minute intake session, avg 3 x 10-20 minute follow up sessions, primarily via telephone (in-person upon request)	Improved patient activation measure score of 4.57 (p=0.02) Increased self-efficacy by 0.65 points (p=0.01) Improved self-reported health status of 3.6 points (p=0.03)
Sacco et al., (2009)	n=31, patients with type 2 diabetes with at least 1 cardiovascular risk factor	Examine the impacts of coaching on behavior adherence and clinical outcomes in diabetic patients	Self-efficacy, goal setting	6 mo program, 1 intake session (average 53 minutes), 1 x 15-20 min/ week session for 3 mo followed by 1 x 15-20 min/bi-weekly session for 3 mo, all sessions via telephone	Improved adherence of health behaviors (5, 51) = 17.07, (p<0.001)
Sherman et al., (2017)	n=98 (1-year f/u) n=70 (2-year f/u), overweight and obese adult patients	Evaluate the impacts of health coaching on weight loss	MI, goal setting	3 mo program, 1 x 60 minute in person intake session, followed by 4 x 15-30 minute telephone sessions	Average weight loss of 7.2% after 12 months (SD=0.6, P<0.001) Average weight loss of 6.8% after 24 months (SD=1.0, P<0.001)
Wolever et al., (2010)	n=30, patients with type-2 diabetes for >1 year	Assess the impacts of health coaching on lifestyle behaviors, psychosocial functioning, and A1C levels	MI, goal setting, self-efficacy	6 mo program, 1 intake session followed by 8 x 30-minute weekly sessions, 4 x 30 minute bi-weekly sessions, and 1 x 30-minute call 1 mo later, all sessions via telephone	Significant increase in self-reported exercise (Z = –2.230; P = .026) Participants with elevated baseline A1C (≥7%, n = 16), significantly reduced their A1C by 0.64% over 6 months
Young et al., (2014)	n=51, patients with type 1 or type 2 diabetes	Evaluate the benefits of telehealth coaching in rural communities	MI, goal setting, self-efficacy	1 x 2-hour in-person intake session, 5 x 30-minute sessions biweekly via telephone (3 participants opted for videoconference calls)	Increased self-efficacy scores in the intervention group compared with the control group at 9 months (4.03 versus 3.64, respectively; p < 0.05)

The comparison of studies in a tabular form allows for the investigation of potential correlations in program design and success. Foremost, nearly all investigated coaching programs incorporated MI, self-efficacy, and goal setting to some extent. However, the approach was not reflected in the table unless explicitly stated in the article, which is why some studies do not list all three. As discussed previously, the nature of health coaching relies on a blend of MI, self-efficacy, and goal setting, even if each method is not specifically addressed in the coaching procedures. When comparing the studies, all but one study discussed MI (Sacco et al., 2009). Most studies mentioned goal setting (Benzo et al., 2016; Chen et al., 2019; Sacco et al., 2009; Sherman et al., 2017; Wolever at al., 2010; Young et al., 2014), while only a few discussed self-efficacy (Sacco et al., 2009; Wolever at al., 2010; Young et al., 2014). To conluce, only two studies explicitly mentioned the presence of all three therapeutic approaches (Wolever at al., 2010; Young et al., 2014).

Regarding program delivery, an overwhelming majority of coaching of the sessions occurred over the phone (Benzo et al, 2016; Chen et al., 2019; Linden et al., 2010; Sacco et al., 2009; Sherman et al., 2017; Wolever et al, 2010; Young et al., 2014). As a result, we can assume that effective outcomes occur through verbal coaching over the phone or online via videocalls. For both coaches and patients, this highlights both the convenience and cost-effectiveness of health coaching. This is especially advantageous amidst current implications surrounding the COVID-19 pandemic. However, it is important to note that most of the programs begun with an in-person intake session (Benzo et al, 2016; Chen et al., 2019; Sherman et al., 2017; Young et al., 2014). Therefore, there may be value in establishing an initial in-person meeting between patients and coaches to build rapport, connection, and trust. The frequency of sessions differed greatly among coaching interventions and some even changed meeting frequency over the

duration of the program. Generally, follow-up sessions occurred on a biweekly basis. It is important to note there were a few studies that did not specify session frequency. Despite this, the studies that utilized a bi-weekly schedule resulted in significant positive outcomes (Chen et al., 2019; Sacco et al., 2019, Wolever et al., 2010; Young et al., 2014). This frequency provides enough time to incorporate changes and reach goals based on session discussions, while not so long that patients lose focus of the coaching program. Lastly, most programs reviewed took place over 3-6 months (Chen et al., 2019; Efraimsson et al., 2008; Sacco et al., 2009; Sherman et al., 2017; Wolever et al., 2010; Young et al., 2014). This appears to be an effective program duration as it provides substantial time for new habits to be fully adopted, while still appearing achievable to patients.

When comparing program attributes and outcomes, is it challenging to analyze effectiveness amongst studies due to the disparities in how treatment responses were measured. The three overarching types of measurements observed in this review were (1) change in clinical status, (2) change in health behavior(s), and (3) change in beliefs and thought patterns. However, most studies did not investigate all three of these assessments. For instance, two studies included in the review only measured clinical outcomes to gauge program success (Benzo et al., 2016; Sherman et al., 2017). In comparing the research, only one study considered all three categories of measurements (Chen et al., 2019). Ideally, research exploring the efficacy of health coaching should incorporate all three types of outcomes to achieve a comprehensive understanding of program efficacy. In summary, the studies included in this review yielded varying levels of statistical significance in their findings. Those with what appear to have the most statistical support for their claims had the following characteristics: program lengths ranging between 3-6 months and the utilization of in-person intake sessions followed by brief, bi-weekly phone

sessions lasting an average of 20 minutes. Overall, the comparison of studies provided distinct qualities of successful coaching programs.

Conclusion

This literature review explored and analyzed existing clinical health coaching programs for the management of various chronic conditions. The rise in chronic conditions in recent decades has revealed the increased importance of improving health behaviors for the prevention and management of these conditions. By presenting the foundational theoretical underpinnings and therapeutical approaches in health coaching, future programs can be properly developed to ensure they contain sufficient incorporations of MI, self-efficacy, and goal setting. Furthermore, the comparison of coaching delivery methods amongst studies reveals successful program attributes to incorporate in the development of future coaching programs. Despite the recommended program outlines, health coaches should acknowledge the importance of personalizing programs in response to patient needs, desires, and resources. Therefore, the findings of this literature review serve as general guidelines for future coaching program developments, with the opportunity to adapt to a variety of applications.

There are several limitations of this review and the current state of research in clinical health coaching. Firstly, drawing conclusions on coaching efficacy amongst various studies is challenging due to the various testing techniques and measures of successful patient outcomes. Future research should incorporate standardized scoring for health coaching interventions so that findings can be accurately compared among various studies. Future studies should investigate all three major categories of measurable outcomes, including clinical status, behavior change, and psychological perspectives. Furthermore, current research has revealed the lack of credential

requirements within the field of health coaching. Coaching professionals currently range greatly in experience, education, and licensure. Moving forward, the field of clinical health coaching would strongly benefit from credential requirements to provide effective standardized treatments for patients. In other words, the regulation of health coaching licensure and credentials would likely improve the credibility and applicability of health coaching in primary care. In a clinical setting, this would be especially suitable, as nearly all health care professions possess some type of regulatory guidelines. From a research perspective, this would also likely provide clarity of successful coaching methods and techniques, as there would be more commonalities amongst programs, which would mitigate study variables. Altogether, this thesis effectively examines the current literature on health coaching and identifies commonalities among successful coaching programs, which should continue to be incorporated in future program designs. However, limitations of the current research were also identified, and future studies should focus on consistency of program methodology, coaching regulations, and testing parameters.

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