Methods and evaluation of a health coach training practicum experience for healthy lifestyle behavior change

Kathryn Kathryn DeShaw

Iowa State University

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Methods and evaluation of a health coach training practicum experience for healthy lifestyle behavior change

by

Kathryn Joann DeShaw

A dissertation proposal submitted to the graduate faculty

In partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

Major: Kinesiology

Program of Study Committee:
Gregory J. Welk, Major Professor
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The student author, whose presentation of the scholarship herein was approved by the program of study committee, is solely responsible for the content of this dissertation. The Graduate College will ensure this dissertation is globally accessible and will not permit alterations after a degree is conferred.

Iowa State University

Ames, Iowa

2019

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NOMENCLATURE

BMI: Body Mass Index
BPI: Brief Pain Inventory
IPAQ-SF: International Physical Activity Questionnaire - Short Form
IRB: Institutional Review Board
KIN: Kinesiology
METs: Metabolic Equivalent Tasks
MI: Motivational Interviewing
MISC: Motivational Interviewing Skills Code
MITI: Motivational Interviewing Treatment Integrity
MVPA: Moderate to Vigorous Physical Activity
NHIS: National Health Interview Survey
OARS: Open Questions, Affirmations, Reflections, Summaries
PA: Physical Activity
SMART: Specific Measurable Attainable Realistic Time-oriented
SWITCH: School Wellness Integration Targeting Child Health
VASE-R: Video Assessment of Simulated Encounters-Revised
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ABSTRACT

The promotion of healthy lifestyle behaviors is a high public health priority due to the strong links to chronic disease and the associated impacts on health and quality of life. Motivational interviewing-based health coaching is a popular behavior change strategy to work toward encouraging healthy-decision making and provide accountability in making progress toward health goals and outcomes. A key priority in the field of health coaching is proper training to ensure proficient health coaches to engage with clients, participants, or patients for healthy lifestyle change. The purposes of this dissertation were to: 1) develop and implement an effective semester-based course to train upper level college students in the skills of motivational interviewing-based health coaching, 2) examine the effects of health coaching as a behavior change strategy among incoming college students, and 3) disseminate and evaluate a brief version of the motivational interviewing training for widespread skill obtainment.

The first study provided insight into the proficiency levels achieved by upper level undergraduate students that completed a semester long training in motivational interviewing-based health coaching. All students were able to obtain proficiency levels for technical and relational Global scores following the 16 week-period of training and practice. However, it was more difficult to obtain proficiency in the use of reflections with 13% meeting proficiency in the percent of complex reflections used, and 0% meeting proficiency for the reflection-to-question ratio. The second study evaluated the effectiveness of these previously trained peer health coaches in their ability to communicate with incoming undergraduate students regarding healthy lifestyle behavior changes. Incoming Freshman and Sophomore students were offered the opportunity to meet one-on-one with a trained peer health coach for
8 weeks during a semester to work toward health goals of their choice (physical activity, dietary habits, stress management, etc.). Following four health coaching sessions in an 8-week period, results show that incoming college students appreciated the accountability that a peer health coach provided and the sessions elicited positive changes in all domains observed. Participants reported an average gain of 39.6% in physical activity levels, 9.9% increase in sticking to healthy dietary habits, and a 16.3% decline in stress levels. The third study demonstrates the ability to train county extension workers to effectively learn the spirit and relational components of motivational interviewing through an online version of the training model that was adapted from the 16-week training protocol tested in study one. This study answered a novel question since it demonstrated that individuals completing training were able to communicate more effectively than those that did not complete the brief training.

This dissertation adds to the existing literature on methods for health coach training but also provides an example of a novel synergy between research, teaching and practice. The training methods were developed to provide a quality training experience for undergraduates to learn the skill of health coaching; however, the practicum component also provided a direct service to Iowa State University students that received the health coaching. The systematic evaluation of the programming advances the research and provides a strong foundation to ensure a sustainable future for the CydeKicks program. This dissertation also shows merit in the broad dissemination of brief motivational interviewing training for widespread health promotion efforts. Future research is needed to further evaluation the online platform and the impacts from health coaching.
CHAPTER 1. INTRODUCTION

Promoting healthy lifestyles is challenging in all populations, but there are unique challenges in reaching and influencing college students. This period of time is a formative stage of development since students are living independently and establishing lifestyle patterns that may follow them into adulthood. Research has supported the importance of understanding and influencing behaviors in this phase of life (Dinger, Brittain, & Hutchinson, 2014; Racette, Deusinger, Strube, Highstein, & Deusinger, 2008), but creative solutions are needed to impact campus environments.

Student wellness programs have increasingly relied on student ambassadors and peer educators to promote healthy lifestyles in college students. The use of formalized health coaching is also increasingly common, but a challenge is in developing strategies that can provide guidance and support to large numbers of college students on campuses. Although the underlying mechanisms through which health coaching promotes behavior change are not yet fully understood, it is considered a viable method in working towards healthy behavior changes such as physical activity, healthy eating, and medication adherence (Copeland, McNamara, Kelson, & Simpson, 2015).

The studies presented in this dissertation will help to address these gaps by studying the process and outcomes associated with a peer health coaching model to train individuals in motivational interviewing-based health coaching to promoting healthy lifestyles in college students. The training model was then disseminated to county extension and outreach individuals to be trained in a brief format to enhance their engagement with school wellness programming efforts.

The first study evaluated a semester-long curriculum designed to train upper level
undergraduate students in motivational interviewing, a formative skill for health coaching. A variety of different training protocols are currently being utilized for motivational interviewing training, (Bunyan et al., 2017; Hohman, Pierce, & Barnett, 2015; Madson, Schumacher, Noble, & Bonnell, 2013; White, Gazewood, & Mounsey, 2007) and this study provides insights into strategies that can feasibly be implemented in college programs. Specifically, the study evaluated a 16-week course designed to train Junior and Senior status college students to effectively utilize motivational interviewing in a supervised health coaching initiative.

The second study explored the outcomes associated with receiving formalized motivational interviewing-based health coaching from a trained peer coach in Freshman and Sophomore students. This study was connected to the first study as it also provides the real-life practicum experience for the coaches being trained from the first study to practice the skill of motivational interviewing.

The third study included a novel evaluation that tested the potential of more broadly disseminating the motivational interviewing training model developed in the first study. The training content was reduced into a brief, hybrid training protocol consisting of 6 online video lessons with applicable practice activities and knowledge tests for extension workers to complete at their own pace. This study evaluated the utility of the brief style training on motivational interviewing fidelity levels between a group of trained individuals compared to individuals that did not complete the training.

This dissertation summarizes the instructional methods and outcomes with training college students and outreach workers the skill of motivational interviewing, as well as the impact of health coaching on lifestyle behavior change in undergraduate students. Perhaps
more importantly, the study builds a foundation for ongoing evidence-based programming impacting Iowa State University college students and health promotion efforts state-wide.

1.1 References


CHAPTER 2. REVIEW OF THE LITERATURE

Health coaching has become an emerging trend in the field of health promotion as this one-on-one tailored experience encompassed within health coaching is often absent in healthcare systems. Health coaching encourages individuals to take part in all aspects of personal health decision-making. For instance, individuals should understand and play a role in the self-monitoring of their health status, and partake in choices being made regarding their health. For example, an individual has the choice to eat healthier foods or engage in regular physical activity in order to reduce pre-hypertension instead of going on medication as a first solution. Motivational interviewing-based health coaching offers a means of motivation, accountability, and sense of empowerment that is critical for the adoption and potential adherence to a variety of lifestyle behavior changes. Motivational interviewing is the conversational behavior change strategy incorporated within health coaching that is used to draw out motivation for change, and promote autonomy for making decisions based on health status and lifestyle behaviors.

This literature review will provide background on the needs for healthy lifestyle behavior changes, specifically in college students, as well as providing justification for targeting these needs through personalized health coaching methods. The first section will summarize what is currently known about health behaviors in college students, and how their current behaviors may affect their future health. The second section will outline common theories used in the behavior change realm, as well as outline the key theory (Self-Determination Theory) from which motivational interviewing stems from. This section will then outline the foundations of motivational interviewing, diverse training protocols, and how the strategy may be used to elicit specific behavior changes in college students.
The studies proposed within this dissertation will build upon the ongoing health coach work that has been conducted within the Physical Activity and Health Promotion Lab at Iowa State University over the last several years. Previous work from our group investigated the effects of a guided health coaching intervention for weight loss in obese adults, (Peyer, Ellingson, Bus, Walsh, Frank, & Welk, 2017) as well as the differences in the delivery method of health coaching (in-person vs online) for healthy eating, physical activity, and weight management (Bus, Peyer, Bai, Ellingson, & Welk, 2018). The current studies will move the health coaching field forward by providing a better understanding of a flipped classroom 16-week training method for fidelity of health coaches. Proper training and skill acquisition is needed in our field to be effective in promoting adoption and adherence to healthy lifestyle behavior changes in college students.

2.1 Healthy Lifestyle Behaviors and Chronic Disease Risk

This section provides an overview of the risks associated with chronic diseases and how lifestyle behavior changes can reduce these risks, as well as specific lifestyle behaviors that are important for health promotion and disease prevention. Research on lifestyle behaviors will be summarized to portray the importance of changing unhealthy habits into new positive habits to improve the health statuses and wellbeing of young adults, with a primary focus on college-aged students. This age range has been labelled and at-risk population, and promoting healthy lifestyles in young adulthood is important to aid in reductions of disease prevalence and risks in late adulthood.

For decades non-communicable diseases such as cardiovascular disease, cancer, and type 2 diabetes have become a major contributor to mortality rates and declining health statuses among much of the population (Ali, Jaacks, Kowalski, Siegel, & Ezzati, 2015;
Bollyky, Templin, Andridge, & Dieleman, 2015; Brugnara et al., 2016). Major contributors to these diseases may be linked to modifiable lifestyle behavior risk factors such as physical inactivity, accumulations of prolonged sedentary time, tobacco use, poor diet, and uncontrolled high blood pressure (Bauer, Briss, Goodman, & Bowman, 2014; Biddle et al., 2016; Dunstan, Howard, Healy, & Owen, 2012; Owen, Healy, Matthews, & Dunstan, 2010). Ford and colleagues suggest that sufficient physical activity, eating a healthy diet, and not smoking are the most important habits for reducing risk of mortality since each directly impacts risk for chronic disease (Ford, Bergmann, Boeing, Li, & Capewell, 2012). Brawner and colleagues discovered that individuals with chronic diseases typically report lower physical activity levels than those without chronic disease (Brawner, Churilla, & Keteyian, 2016). On average, 50.1 ± 0.5% of adults from the 2014 National Health Interview Survey (NHIS) data cohort reported meeting the recommended 150 minutes of moderate leisure-time physical activity per week, with men being more prominent in meeting these guidelines. This prevalence was 26.1 - 48.6% lower for individuals with chronic diseases. Only 38.5 ± 2.4% of diabetic men and 33.5 ± 2.3% of diabetic women reported meeting leisure time physical activity guidelines, along with 46.6 ± 1.6% of hypertensive men and 38.6 ± 1.5% of hypertensive women (Brawner et al., 2016). Similar findings were reported in children and adolescents, with sedentary time being much higher in patients with a chronic disease compared to healthy individuals and physical activity levels being below guidelines (Elmesmari, Reilly, Martin, & Paton, 2017). Promoting physical activity and reduced sedentary time is of great importance to those already having one or more chronic disease prevalent, but much of these risks could potentially be reduced if lifestyles were to change.
Poor lifestyle behaviors in adulthood are likely carried over from similar poor habits in childhood, adolescence, or early adulthood. Only half of young adults, specifically college students, regularly accumulate the recommended amount of physical activity according to the American College of Sports Medicine guidelines (Papalia, Wilson, Bopp, & Duffey, 2018; Pauline, 2011). Desai and colleagues report that regular physical activity routines in childhood are associated with greater likelihood of maintaining physical activity throughout the lifespan. This highlights the importance of transition periods since maintaining activity levels in college will also likely transition into adulthood (Desai, Miller, Staples, & Bravender, 2008).

Regular engagement of physical activity is essential for all age ranges to prevent and manage chronic disease risk factors, however starting at an earlier stage in life and adhering is key to reaping the greatest benefits throughout the entire lifespan. The field of health promotion strives to prevent risks of chronic conditions and diseases before they occur. Therefore, it is necessary to better understand how to prevent young adult health problems by targeting college students to engage in healthy lifestyle behaviors to produce better health outcomes and decreased risk in mid to late adulthood.

According to the Bureau of Labor Statistics, an overwhelming majority of young adults graduating from high school attend college in the U.S. (~70%) (Bureau of Labor Statistics, 2016). Therefore, these studies will aim to target a large majority of young adults that are enrolled in college at a Midwestern university. College student health and wellbeing warrants further attention as unhealthy behavior changes and habits often occur during this time of newly gained independence (Deforche, Van Dyck, Deliens, & De Bourdeaudhuij, 2015; Deliens, Deforche, De Bourdeaudhuij, & Clarys, 2015; Dinger, Brittain, &
Starting college is a major transition period from high school that is a crucial time where students start to develop habits and behaviors that potentially follow them into adulthood. A major concern for college student wellbeing is the accumulation of sedentary time and the decrease of physical activity that has been routinely observed (Keating, Guan, Pinero, & Bridges, 2005; Shangguan, Keating, Liu, Zhou, Clark, & Leitner, 2017). These lifestyle changes may also be accompanied by weight gain (Deforche et al., 2015) and other health issues such as increased stress and mental health factors (de Vos et al., 2015; Dinger et al., 2014).

A study conducted by Dinger and colleagues utilized a national sample of 67,861 college students that completed the National College Health Assessment. Findings reported that only half of the college students (49%, n=33,865) were meeting current moderate and vigorous physical activity guidelines via self-report (Dinger et al., 2014). This same study also revealed specific health factors that were shown to be positively associated with those students meeting recommended moderate to vigorous physical activity guidelines such as eating a proper diet (p<.001), having a healthy body mass index (BMI) (p< .001), not smoking (p< .001), accumulating an adequate amount of sleep (p< .001), as well as reporting less perceived depressive symptoms (p=.001) (Dinger et al., 2014). Therefore, students that are meeting recommended aerobic physical activity guidelines of 150 minutes of moderate physical activity, 75 minutes of vigorous physical activity, or a combination of the two accumulated in bouts of 10 minutes or more, are likely more aware of healthy habits associated with higher levels of overall wellbeing (Dinger et al., 2014). Students could potentially benefit in all aspects of wellbeing by increasing physical activity and reducing sedentary time as they transition into college.
Evaluation and evidence of health-related risks from prolonged periods of sedentary time is gaining popularity among health promotion professionals. This encompasses activities such as watching television or sitting that expend 1.0 to 1.5 metabolic equivalent tasks (METs) (Chomistek, Manson, Stefanick, Lu, Sands-Lincoln, Going, Garcia, Allison, Sims, LaMonte, Johnson, & Eating, 2013). These sedentary behaviors are related to the prevalence of coronary heart disease, metabolic syndrome, and stroke.

A study investigating the effects of prolonged sedentary behavior reported that every 60 minute increase in sedentary time, an individual increases their chance of having greater than two morbidities (arthritis, heart failure, diabetes, stroke, obesity) by 11%, therefore leading to a higher risk of mortality (Loprinzi, 2015). This study was also important in that it helped determine that the effects of health risks due to sedentary time are independent from time spent in light and moderate physical activity ($\beta$ adjusted = 0.23; 95% CI: 0.02–0.45; $P = .03$) as also seen in similar research studies (Ekblom, Ekblom-Bak, Rosengren, Hallsten, Bergstrom, & Borjesson, 2015; Loprinzi, 2015; Thorp, Owen, Neuhaus, & Dunstan, 2011). Therefore, the evidence linking physical activity and prolonged sedentary behaviors to chronic health risks is abundant and becomes of particular importance to university students.

High amounts of sedentary time have been identified in college students, likely due to the structure and nature of advanced education such as sitting in courses, completing homework, studying, and inactive leisure activities. Peterson and colleagues objectively assessed a sample of college students (n=94), reporting 10 hours per day of sedentary time on average (Peterson, Sirard, Kulbok, DeBoer, & Erickson, 2018). The most common behaviors noted in accumulations of sedentary time include video gaming, television, computer time, movies, reading and writing.
Although there are no formulated guidelines for daily sitting time, it is recommended to break up periods of sitting as much as possible to reduce associated risks. Butler and colleagues investigated the effects of reduced sedentary time in a university setting by having an experimental group stand during courses (minimum of 5 hours per week), while a matched control group continued to sit during course time (Butler, Ramos, Buchanan, & Dalleck, 2018). Results show that those standing during university course time for a 3-week period significantly reduced their metabolic syndrome score as well as significantly increasing their energy expenditure (METs) from baseline.

In addition to physical activity and sedentary time, research has also shown that college students not meeting recommended physical activity guidelines are directly related to other unhealthy characteristics such as being overweight or obese with a higher BMI, not consuming enough fruits and vegetables, poor academic performance, and having lower levels of life-satisfaction (Colby et al., 2017; Felez-Nobrega, Hillman, Dowd, Cirera, & Puig-Ribera, 2018). A study utilizing data from the National College Health Assessment II also investigated the relationship between physical activity and health-related factors in college students. This sample consisted of 67,861 participants and showed approximately half of the students (49.9%, n = 33,865) meeting current moderate to vigorous physical activity recommendations (Dinger et al., 2014; U.S. Department of Health and Human Services, 2008). This study also provided evidence that students meeting the physical activity guidelines had more positive health-related factors such as consuming a healthy diet, maintaining a healthy BMI, not smoking, adequate amount of sleep and less perceived depression (Dinger et al., 2014). Felez-Nobrega and colleagues reported breaks in bouts of
sedentary time (10-20 minutes) during weekdays is related to enhanced cognitive operations in relation to academic performance (Felez-Nobrega et al., 2018).

Lifestyle behaviors been shown to be largely influenced by parents, peers and individual factors such as perceived enjoyment, time, and convenience. (Deliens et al., 2015; Draper, Grobler, Micklesfield, & Norris, 2015). Therefore, interventions to produce lifestyle behavior changes may need to provide multilevel programming and diverse options to fit every individual’s needs (Deliens et al., 2015). The literature provides compelling evidence that healthy lifestyle behaviors are beneficial to reduce health risks, however engaging in a behavior change is very difficult and individuals often need assistance to do so.

Interventions incorporating motivational interviewing as a strategy to elicit intrinsic motivation for behavior change from individuals have shown to be successful in all age ranges including children, adolescents, and adults (Aadahl, Linneberg, Moller, Rosenorn, Dunstan, Witte, & Jorgensen, 2014; Friederichs, Oenema, Bolman, & Lechner, 2016; Gourlan, Sarrazin, & Trouilloud, 2013). Most importantly, motivational interviewing-based health coaching has been shown to promote positive behavior changes, such as increasing physical activity to reduce future risk of chronic diseases (Kivelä, Elo, Kyngäs, & Kääriäinen, 2014).

To help students cope with the difficult transition from high school to college, there is a need for motivational interviewing to be implemented into higher education to provide students with this resource as a guide to better health decision-making.

2.2 Theories of Behavior Change

This section summarizes well known health promotion theories and describes the effectiveness of interventions designed to understand, predict, and impact healthy behavior
adoption and adherence. The primary focus is on the Self-Determination Theory which is the underlying theoretical framework that serves as a basis for motivational interviewing-based health coaching. Research includes behavior change applications in different populations, but emphasis is placed on studies that have been done with college students since that is the target population in this project.

2.2.1 Overview of Theories

Interventions within the health promotion field are often grounded in theory to better predict, influence, and understand the related constructs in which a behavior is being changed in a given setting. This section will introduce popular theories that have been used to implement behavior change interventions for physical activity and other aspects of health promotion.

*Health Belief Model*

The most popular and commonly used theory in health promotion is the Health Belief Model. This model is based on the idea that individuals will only change their behaviors based on their personal beliefs or perceptions about their susceptibility or severity of contracting a specific disease or illness (Hochbaum, 1958). McArthur and colleagues implemented a Health Belief Model based intervention to better understand weight management in college students (McArthur, Riggs, Uribe, & Spaulding, 2017). College student participants filled out an online survey and a regression model was run to predict constructs of the Health Belief Model for body mass index (BMI). Findings showed significant relationships between perceived severity, susceptibility, external cues to action, barriers and benefits, and BMI (McArthur et al., 2017).
Another example of beliefs and norms in relation to a health behavior was portrayed in a study investigating determinants associated with the use of e-cigarettes. This study found that college males believed that e-cigarettes were less harmful, less addictive, and more socially acceptable to use than regular cigarettes, and therefore were more likely to be influenced by friends to try smoking an e-cigarette than a regular tobacco cigarette (Dunn, 2015).

Lastly, physical activity levels among college students have shown to be dependent upon perceived benefits and barriers associated within the Health Belief Model (King, Vidourek, English, & Merianos, 2014). Results show that college students at a Midwestern university were more likely to engage in vigorous physical activity if there were perceptions of benefit and cues to action. Participants that perceived greater barriers to engaging in vigorous intensity physical activity were associated with actual lower activity levels at this intensity (King et al., 2014).

Therefore, constructs of the Health Belief Model seem to influence college students within these studies for their decision to engage in a variety of lifestyle behaviors such as maintaining a healthy weight, engaging in physical activity, and smoking.

*The Theory of Reasoned Action & Planned Behavior*

The Theory of Reasoned Action has a long history in the health promotion field as emphasizing the construct of intention to perform a behavior (Fishbein, 1967). The Theory of Reasoned Action identifies attitude toward the behavior and subjective norm as major factors comprising behavioral intention, which in turn is the determinant for actually engaging in a specific behavior. This theory has since been modified to become the Theory of Planned
Behavior with the additional component of perceived behavioral control as a construct to also determine behavioral intention (Ajzen, 1991).

Linder and colleagues recently conducted an intervention grounded in the Theory of Planned Behavior to investigate whether the constructs of this theory could explain the physical activity patterns of college student populations in North Carolina (Linder, Harper, Jung, & Woodson-Smith, 2017). Students enrolled in lifetime fitness classes were asked to complete questionnaires for two weeks to determine the relationships among constructs of the Theory of Planned Behavior and their physical activity patterns. In this case, the constructs of intention and attitude seemed to define whether the college student participants engaged in regular exercise (Linder et al., 2017).

Another study investigated the Theory of Planned Behavior constructs to better understand college student perceptions related to energy drink consumption (Treloar, Tidwell, Williams, Buys, Oliver, & Yates, 2017). Results show that college students perceived the consumption of energy drinks negatively for health, but perceived consumption as positive in relation to consuming for alertness. Therefore, the construct of intention was an important predictor of consumers vs non-consumers of energy drinks. For example, those believing energy drinks are bad for their health would not consume them, and the others feel it helps them stay alert and therefore would consume them. Similar results were also found in a study among college students attempting to understand factors related to smokers by applying the Theory of Planned Behavior. Findings reported significant differences in model constructs of attitude, beliefs, subjective norms, perceived behavioral control, and intention not to smoke between a group of smokers and non-smokers (Hilley, Lindstrom Johnson, Royce, & M’Cormack McGough, 2018).
Collectively, these studies show value in helping understand the intention whether to partake in several health-related behavior patterns through the constructs of the Theory of Planned Behavior.

*Transtheoretical Model*

The Transtheoretical Model was originally developed to understand how people change as they change their behaviors, and eventually was adopted into the realm of physical activity and health promotion (Prochaska, Diclemente, & Norcross, 1993; Prochaska & Velicer, 1997). This model puts the processes of change into stages to explain how a desired behavior is attained, and includes the construct of self-efficacy. The five stages are pre-contemplation, contemplation, preparation, action, and maintenance. Each stage of an individual’s change toward a behavior can typically be categorized into one of the five categories, however in this model an individual does not need to start at the beginning and progress through as well as the idea that individuals can relapse and go backward through the stage as well. Through movement between the five stages, this model includes 10 behavior change constructs that can be implemented to promote the process of moving forward at specific stages within the model. For example, if an individual were to be in the precontemplation stage for a behavior, a likely effective strategy would be consciousness raising. Attempting to educate the individual on the negative health consequences of not making a behavior change, or the benefits if they do. Other constructs include dramatic relief, environmental reevaluation, self-reevaluation, self-liberation, contingency management, helping relationships, counterconditioning, and stimulus control.

There is an abundance of literature investigating the stage of change model within the health promotion field, specifically for physical activity. This first study examined
differences in behavior change constructs and processes of the Transtheoretical Model for two large pooled datasets of maintainers, relapsers, and nonchangers (Lipschitz, Yusufov, Paiva, Redding, Rossi, Johnson, Blissmer, Gokbayrak, Velicer, & Prochaska, 2015). Data was collected among a theory-based intervention to encourage exercise behavior, and differences among groups were compared at baseline, 12 months, and 24 months. Findings were consistent with the model constructs. In general, maintainers had higher scores for the related model constructs (self-efficacy, consciousness raising, dramatic relief, self-reevaluation, etc), relapsers started with higher scores until 12 months and then declined, and stable non-changers had steadily declining construct values from baseline to 24 months (Lipschitz et al., 2015). Han and colleagues recently investigated determinants for sedentary behavior and physical activity regarding the Transtheoretical Model (Han, Gabriel, & Kohl, 2017). This study consisted of college students in health education courses, and included a battery of surveys as well as wearing an accelerometer for 7 consecutive days. Students accrued numerous amounts of sedentary time regardless of physical activity levels and current stage of change. Overall, there were no differences identified in the model constructs for sedentary behavior and physical activity levels among this group of participants (p > 0.05) (Han et al., 2017). A systematic review of the effectiveness of the Transtheoretical Model for multi component behavior interventions reports progress through the stages of change with increases in physical activity and health eating habits overall (Carvalho de Menezes, Bragunci Bedeschi, Caroline dos Santos, & Cristine Souza Lopes, 2016). Kang and colleagues also identified different decisional balance scores and cognitive processes of change among stable active participants compared to activity adopters and perpetual preparers in a college setting (Kang et al., 2017). Therefore, those with stability in engaging
in healthy behaviors have better long-term adherence than those planning to adopt the behavior since there is a much lower probability of needing to shift within a stage of change in the model. The Transtheoretical Model is unique in that it recognizes the often non-linear fashion of a behavior change. It highlights the fact that all individuals’ paths or progress toward a lifestyle behavior change may be different, including the processes needed to get there.

These theories are identified within this literature review as they may be incorporated into a behavior change intervention along with the strategy of motivational interviewing. However, as previously mentioned, motivational interviewing stems from the Self-Determination model and will be highlighted in the next section.

2.2.2 Self-Determination Theory

Self-Determination is a widely used theory that is the foundation for most health coaching applications, and will be of great relevance in introducing motivational interviewing in the following section. Ryan and Deci initially developed the Self-Determination Theory to better understand behavior self-regulation encompassing human motivation and personality (Ryan & Deci, 2000). This theory encompasses three main determinants or basic needs: autonomy, competence, and relatedness. Ryan and Deci proposed that an individual needs to meet the three basic constructs, or needs, to create the conditions necessary to foster a behavior change (Deci & Ryan, 1985). Intrinsic motivation is thought to be vital for behavior changes such as physical activity in order to maintain long term adherence (Ryan & Deci, 2000).

The Self-Determination Theory has played a large role in helping understand the reasons why individuals behave the way they do, and how we can work toward
understanding these determinants to promote healthy lifestyle behaviors. Ginis and Bray conducted a study with university students to try to understand self-regulatory behaviors to explain lapses in exercise planning, effort, and adherence (Ginis & Bray, 2010). This study investigated a self-regulatory depletion manipulation to see how it affected exercise effort during a 10-minute bicycling task, and then predict exercise adherence for 8 weeks following the initial task. This depletion task was administered by having participants report what intensity they would rate as “heavy” exercise, and this determined the difficulty of the biking task for each participant in the experimental group. The bike task was completed twice, and results show that those in the experimental condition decreased their exercise work output during the second ride when compared to the control condition (mean change in kJ output = -5.23 ± 7.48 vs -2.80 ± 7.49, respectively; p = 0.21; d = 0.32) (Ginis & Bray, 2010). Therefore, this study portrayed less effort put into exercise when an individual’s self-regulatory resources are depleted. This in turn may hinder decision-making and explain periods of exercise non-adherence, although further investigation of this finding is needed to portray real life settings.

Another recent study looked into the specific motivators for physical activity within college students (Fletcher, 2016). Through qualitative analysis, Fletcher reported that many students remain inactive and lack the motivation to become active. Contributors to this lack of motivation in college students were time, social life, stress, mood, and lack of sleep (Fletcher, 2016). Active students reported that extrinsic motivation played a role in their activity levels since they like to look good physically, or comply with social norms. Overall, this study shows the main determinant of inactivity as amotivation for college students.
Friederichs and colleagues also determined autonomous motivation as one of the most significant predictors of physical activity patterns, as well as motivational regulation and low motivation playing a role in regulating physical activity patterns (Friederichs, Bolman, Oenema, & Lechner, 2015). Interventions investigating the Self-Determination Theory framework show a general consensus of needing to focus on improving the autonomous motivation and self-regulation of motivation to adopt and adhere to healthy behaviors such as physical activity (Fletcher, 2016; Friederichs et al., 2015; Ginis & Bray, 2010). These findings have been used to initiate the development and foundation of motivational interviewing which will be introduced in the following section.

2.2.3 Foundations of Motivational Interviewing

Motivational interviewing was developed as an application from the framework of the Self-Determination Theory, therefore utilizing the same key constructs of autonomy, competence, and relatedness to promote conditions to foster behavior change (W. R. Miller & Rollnick, 2009; Vansteenkiste & Sheldon, 2006). The Self-Determination Theory and motivational interviewing both work around the idea that individuals have a basic need-satisfaction, and therefore behavior change strategies utilizing these theories seem to be producing positive effects (Vansteenkiste & Sheldon, 2006).

Motivational interviewing is heavily based on building autonomy. Autonomy refers to the concept of self-regulation, where the individual feels a sense of volition and willingness (Ryan & Deci, 2000). This is perhaps one of the most important constructs within motivational interviewing since patients and participants are often told what to do, and are not often given a choice. In 1957 Carl Rogers stated, “when a person’s views of himself change, his behavior changes accordingly” (Rogers, 1957). This quote still holds merit today
with the understanding that an individual is more likely to try to change if they perceive the need to change, and come up with their own plans on how to do so with a tolerable amount of guidance.

Motivational interviewing is comprised of a set of skills used in a conversational setting to elicit and evoke motivation from an individual to engage in a healthy lifestyle behavior change, such as quitting smoking, increasing physical activity, or eating healthier (Schumacher, Madson, & Nilsen, 2014). This is often incorporated into a health coaching session or within healthcare settings, as a way to initiate self-monitoring of an individual’s health status. This skill tasks the individual with their own autonomy to decide whether they can outweigh the cons with the pros of making change, and empowers them with the responsibility to do so.

Research supports the use of Self-Determination Theory and motivational interviewing strategies for promoting behavior change. A recent study was conducted to examine the effectiveness of increasing physical activity levels by implementing motivational interviewing from the Self-Determination Theory (Mahmoodabad, Tonekaboni, Farmanbar, Fallahzadeh, & Kamalikhah, 2017). Women were recruited into the study, and randomized into either the intervention group that received four motivational interviewing sessions as a means to educate the participants and evoke motivation for change, or the control group that only received content based general education. Assessments included theory-based surveys, and physical fitness assessments such as flexibility, muscular endurance, agility, and cardiorespiratory fitness. Results of the study after a four month follow up show that the experimental group has much higher levels of autonomy ($p < 0.001$ vs. $> 0.05$), competence ($p < 0.01$ vs. $> 0.05$), and identified regulation ($p < 0.001$ vs. $p > 0.0$).
5) when compared to the control group. Experimental group participants also had higher physical activity levels (p < 0.001 vs. > 0.05), less sedentary time (p < 0.001 vs. > 0.05), and a decrease in BMI (p < 0.001 vs. > 0.05) in comparison to the control group (Mahmoodabad et al., 2017). The changes suggest the effectiveness of motivational interviewing is linked to the quantifiable change in Self-Determination Theoretical constructs. Miller and colleagues have also investigated whether the Self-Determination Theory and motivational interviewing techniques are beneficial in promoting physical activity within minority groups that typically have less motivation for behavior change (Miller & Gramzow, 2016). Similarly, the present study is designed to examine the generalizability and effectiveness of the Self-Determination Theory determinants and motivational interviewing technique for behavior change in a different sample of the population (i.e. college students). While the foundation of motivational interviewing is well established in the literature, further research is needed to understand just how effective this strategy is as well as the amount of training needed to be able to provide individuals with motivational interviewing. These topics will be addressed in future sections of this literature review.

2.3 Motivational Interviewing and Health Coaching

Health coaching is a growing field of study that provides personalized training on lifestyle behaviors. While a health coach can employ a variety of behavior change strategies, the use of motivational interviewing is the predominant approach due to the emphasis on communication and motivation. Evidence supports the use of motivational interviewing as a viable method for behavior change within health coaching applications (Martins & McNeil, 2009).
Health coaching encompasses a holistic approach to engage a client, patient, or participant in a healthy behavior change, whether that is providing education, navigating the health care system, or utilizing problem solving techniques such as motivational interviewing (Hill, Richardson, & Skouteris, 2015; Rollnick & Miller, 1995). The holistic approach encompasses education as well as the involvement of cognitive factors to increase confidence and motivation to change unhealthy behaviors (Hill et al., 2015). Health coaching incorporates the initiative to reduce disease risk and promote overall wellbeing through self-management, rather than simply disease management (Cramm & Nieboer, 2016). Promoting lifestyle behavior changes is a difficult task, as most individuals need support to adopt and adhere to these habits (Olsen & Nesbitt, 2010). Motivational interviewing has been adopted by the health promotion realm as a means for support to promote uptake and adherence to healthy behaviors.

Motivational interviewing is defined by its spirit and facilitative style for eliciting behavior change in ambivalent individuals (Rollnick & Miller, 1995). The spirit of motivational interviewing has been shown to be a promising aspect for promoting readiness to change in exercise patterns \( p = 0.04 \) and weight loss \( p = 0.005 \) (Copeland, McNamara, Kelson, & Simpson, 2015). This technique was originally established in 1983 when Miller was trying to help problem drinkers (W. R. Miller, 1983). Miller began to understand that clients were better able to strategize goals for behavior change when they came up with the ideas for change on their own, rather than being told what to do from an expert (Rollnick & Miller, 1995).

The conversations encompass goal-setting and patient-centered approaches to collaboratively work with the client, patient, or participant to elicit motivation for change
The conversation progresses through focusing on a target behavior change followed by a health coach working to evoke the motivation for change from the individual using reflections and open-ended questions. Readiness for change is also a major factor in moving toward planning and implementing a behavior change strategy; clients must be ready to work toward a goal (Rollnick & Miller, 1995). This type of conversation often helps increase the client’s self-efficacy or confidence in making a change, which in turn helps with the decision balance to overcome barriers and take action (Walpole, Dettmer, Morrongiello, McCrindle, & Hamilton, 2013).

The methods of administering health coaching are also versatile, such as in-person meetings, over the telephone, or via mobile health applications, have all been shown to be effective in promoting positive behavior change within chronic disease and mental health management to reduce hospital readmissions (Harter, Dirmaier, Dwinger, Kriston, Herbarth, Siegmund-Schultze, Bermejo, Matschinger, Heider, & Konig, 2016).

Health coaching can also be applied in a variety of settings such as within workplaces, health care facilities, fitness centers, universities, and research studies (Hill et al., 2015). Often times health coaching is incorporated within a behavior change intervention that lasts anywhere from 2 to 22 months to target change from unhealthy behaviors. Hill and colleagues conducted a systematic review of health coaching interventions (n = 16), and reported 94% of the reviewed studies to have elicited at least one positive outcome variable such as diet, health status, or BMI (Hill et al., 2015). Health coaching has been shown to increase health-related self-efficacy and client activation, as well as a moderate effect on increasing physical activity and dietary behaviors (Hill et al., 2015; Wolever, Jordan, Lawson, & Moore, 2016).
Health coaching is becoming more popular within health care settings as our health care system moves toward a more preventative care oriented model (Wroth, 2015). Physical therapists and physicians can aid in behavior change strategies by utilizing health coaching techniques to encompass more client-centered caring relationships (Wroth, 2015). To reduce the time burden on physicians, health coaches are being added to health care teams to provide more effective methods in a timely manner for everyone (Wolever, Moore, & Jordan, 2016).

Although health coaching has proven benefits, the scope of practice is still not completely defined. It is important to note the current debate within the literature of whether the terms “health coaching” and “wellness coaching” may be used interchangeably (Huffman, 2016). In the past, individuals within the health coaching realm did not have an agreement on the specific definition or scope of practice rather than just requiring licensure and proper training to ensure competency for providing health coaching (Wolever & Eisenberg, 2011). This caused a slight dilemma as the body of literature surrounding health coaching began to grow, needing clarification for training protocols and scope of practice. Huffman currently debates the idea that health coaching and wellness coaching are separate entities, where health coaching is within the scope of nurses dealing with chronic issues, and wellness coaching is oriented toward prevention and promotion of overall wellness (Huffman, 2016). Table 2.1 portrays the qualifications needed for both health and wellness coaches to remain within their scope of practice as discussed by Huffman. More evidence is needed to differentiate the coaching and come to an agreement upon the correct terminology, which will in turn standardize training, scope of practice, and certification procedures and protocols. For purposes of this dissertation, the term health coaching will be used.
Following years of discrepancy of what exactly motivational interviewing is and consists of, Miller and Rollnick published a paper regarding things that motivational interviewing is not. This article countered the claims that motivational interviewing is therapy, easy to use, or getting people to do what you want them to do (W. R. Miller & Rollnick, 2009). Miller and Rollnick stress the importance of individuals needing to be sufficiently trained in the skill of motivational interviewing as well as understanding the scope of practice to effectively elicit motivation for behavior change (W. R. Miller & Rollnick, 2009). Therefore, rigorous curriculums to train health coaches in motivational interviewing are necessary.

2.4 Training Programs for Motivational Interviewing

Motivational interviewing training typically involves a structured curriculum with opportunities for applied training, practice, and feedback to improve skills. The term fidelity is often used in motivational interviewing training studies to reflect the degree to which coaches adhere to the established motivational interviewing principles in practice. Assessing fidelity of coaches is a critical component of training programs, but is often not reported. Documenting fidelity is important both in efforts to understand how to best train individuals to use motivational interviewing, but also in documenting skills of coaches that may be using these skills in behavioral interventions.

2.4.1 Methods for Evaluating Motivational Interviewing Fidelity

Multiple methods exist to assess motivational interviewing fidelity, including the Motivational Interviewing Treatment Integrity Code 4.2.1 Manual (MITI), Video Assessment of Simulated Encounters-Revised (VASE-R), Motivational Interviewing Skills Code (MISC), and the OnePass coding system (Hohman, Pierce, & Barnett, 2015; Lord, Can, Yi, Marin,
Dunn, Imel, Georgiou, Narayanan, Steyvers, & Atkins, 2015; McMaster & Resnicow, 2015; Moyers, Manuel, & Ernst, 2015; Moyers, Rowell, Manuel, Ernst, & Houck, 2016). Fidelity evaluation typically consists of trained coders listening to recorded motivational interviewing sessions and tallying specific components of the conversation such as simple reflections, complex reflections, open ended questions, affirmations, spirit, empathy, and partnership to assess total motivational interviewing adherence levels (see Appendix B for example coding document) (Moyers et al., 2015). Evaluating whether or not coaches incorporate these components into a conversation can allow coders to understand if they are meeting proficiency levels that motivation interviewing requires to be most beneficial as a behavior change strategy.

Several challenges of assessing the fidelity of motivational interviewing should be noted. First, there are a variety of different methods and the recommendations also continue to be refined over time. This makes it difficult to compare outcomes across studies or over time. There is also no consensus regarding criteria to designate ‘proficiency’ levels. Standards are typically based on expert opinion, but empirical evidence is needed to establish more objective standards and benchmarks for levels of proficiency (Jelsma, Mertens, Forsberg, & Forsberg, 2015). Jelsma and colleagues (2015) have also pushed for a standardized reporting of inter-rater reliability to ensure proper coding of fidelity by the expert coder. Lastly, there are no official recommendations for the number of sessions to be recorded or the number of coders needed to properly ensure fidelity. Past studies assess somewhere between 4 to 32% of conversation sessions held, and double code them (1 trained researcher, 1 trained coder) to assess inter-rater reliability between them, while other studies assess all sessions completed. The number of sessions recorded and coded is typically
determined by how many conversations are carried out within a specific size study for this to be feasible among researchers and personnel involved.

Treatment fidelity of a nurse delivered motivational interviewing program among adolescent girls was assessed using the Motivational Interviewing Treatment Integrity Coding Manual version 3.0 (Robbins, Pfeiffer, Maier, LaDrig, & Berg-Smith, 2012). This version of the manual is similar to the most current version, with slight changes in the global scores and behavior counts. The nurse submitted three recorded motivational interviewing sessions per participant (n=32) over the course of 3 months, and raters coded the recorded conversations to assess changes in skill level over time. Results show that fidelity scores increased following the first session, and the nurse demonstrated proficiency by the third conversation. Achieving the beginning proficiency level for the ratio of complex to simple reflections is difficult, as well as the ratio of reflections to questions, with this coach meeting the proficiency levels at only the first two of the three total sessions. It is unknown why the coach’s proficiency levels for utilizing reflections would decrease over time, contrary to the hypothesis that skill level would increase with continued use. However, extended periods without practice or feedback regarding skill level and principles of motivational interviewing may be a cause for skill deterioration.

Few studies have utilized the most recent version of the Motivational Interviewing Treatment Integrity Coding Manual version 4.2.1 (Moyers et al., 2015) to assess fidelity within an intervention since its latest modification. One study to note is a randomized trial to reduce unhealthy alcohol use among a minority group (Serrano, Serafini, Eller, Torres, Donovan, & Ornelas, 2017). This study utilized a one visit, 30-minute brief action planning session intervention protocol. Individuals providing motivational interviewing were health
care or health education professionals that underwent a 2-day instruction period to learn the skill and components involved, and then practiced the skill in mock sessions based on previous case scenarios. A selected 50% of the recorded audio sessions were double-coded by two trained coders. Inter-rater reliability was assessed between the coders utilizing percent agreement, however this method is no longer suggested for this specific use. The current reporting of inter-rater reliability should be by intra-class correlation coefficients using a two-way mixed model with absolute agreement (Jelsma et al., 2015). This is a more conservative approach for continuous variable data. Benchmark values for scores of intra-class correlations were based on established values (Jelsma et al., 2015): <0.40 = poor; 0.40-0.59 = fair, 0.60-0.74 = good, and 0.75-1.00 = excellent. The fidelity assessment resulted in coaches meeting basic motivational interviewing competence in 50% of measures. Based on these results, authors deemed these health promoters as able to deliver this intervention in community settings with sufficient fidelity (Serrano et al., 2017).

The specific results of the fidelity ratings in this study provide a good benchmark for comparison and an example for how these data are reported. Global scores ranged from 3.8 to 4.3 on a 5-point scale, and an average of 0.4 to 2.6 for motivational interviewing-adherent behavior counts. Overall, 94% met basic competence criteria, while approximately 72% met proficiency criteria of a higher threshold for global ratings (study mean = 4.1; basic competency = 3; proficiency threshold = 4). For behavior counts, coaches struggled to utilize complex reflections over simple reflections, and used more questions than reflections. Proficiency ratings for behavior counts for percent complex reflections to simple were 66% meeting basic competence, and 44% meeting proficiency (study mean = 48%; basic competency = 40%; proficiency threshold = 50%). For reflection-to-question ratios, 75% met
basic competency while 25% met proficiency (study mean = 1.7; basic competency = 1; proficiency threshold = 2). Tables 2.2 and 2.3 show reporting of the MITI 4.2.1 results from Serrano and colleagues (2017), and will serve as a reference for standard reporting of fidelity results for the purposes of this dissertation.

Assessing fidelity of coaches is key to determining the success of a health coaching intervention, in addition to evaluating various protocols available for training coaches in a variety of settings. However, the most effective training methods remain unknown.

**2.4.2 Comparisons of Motivational Interviewing Training Methods**

Current health coach training models teach similar content and require similar background knowledge from the health field, however the most variable aspects include the setting, length of training, skill practice time involved, and skill evaluation methods. The next few paragraphs will outline several different methods to train health coaches in a variety of settings.

Hohman and colleagues implemented a semester long course to train undergraduate students in motivational interviewing (Hohman et al., 2015). The course met twice per week for 1 hour and 15 minutes, and included demonstrations of motivational interviewing conversations, role-play, lectures, videos, and in-class exercises. Topics covered included the spirit of motivational interviewing, conversational components such as reflections, open-ended questions, affirmations and summaries, coding systems to track learning and skills, understanding change talk, and planning procedures. This study recorded practice conversations during the course to assess fidelity by coding the conversations utilizing a Video Assessment of Simulated Encounters-Revised (VASE-R) measure. This measure assesses key components that should be covered including reflections, responding to
resistance, summarizing, eliciting change talk, and developing discrepancy. With a sample of 141 students being trained over four course offerings, results show that students significantly increased their motivational interviewing skills compared to baseline from the VASE-R scale score, \( t = -34.46, df = 137, p < .001 \) and 86% of students were at or above proficiency level following completion of the course (Hohman et al., 2015).

Another recent study explored the feasibility for nurses to learn and use motivational interviewing within the health rehabilitation field as well as assess the differences in patient care with the use of motivational interviewing techniques (Bunyan et al., 2017). The training protocol included a 2-day live intensive training where nurses were able to work in groups to practice motivational interviewing skills. Nurse’s skills were evaluated before and after training, as well as a supervision period, followed by a 6-month follow up. Training the nurses was found to be feasible, with the majority of the nurses (89%) rating the training and utilization of motivational interviewing as extremely relevant to their work. Patient satisfaction slightly increased with nurses using motivational interviewing, however results remain insignificant with a small sample size (Bunyan et al., 2017).

Madson and colleagues evaluated three different approaches to teaching undergraduate students motivational interviewing to investigate which protocol elicited the best coach fidelity ratings (Madson, Schumacher, Noble, & Bonnell, 2013). The training protocols included a 1-week intensive course, a 16-week extended course, or a 1-hour counseling theories lecture course. Results show that both the 1-week intensive and 16-week courses were better than the brief lecture for building motivational interviewing knowledge and skills \( p < .002 \), suggesting that extended and intensive practice is necessary. Results of
proficiency levels in specific motivational interviewing components within each training protocol are shown in Figure 2.1.

Not only is proper training of health coaches imperative, it is also necessary to understand how to sustain motivational interviewing skills long-term following the training period (Schwalbe, Oh, & Zweben, 2014). Schwalbe and colleagues conducted a meta-analysis to investigate what types of training lead to better sustained skills, and at what point skills decline after training. Results show that skills erode the quickest (6 months, $d = -0.30$) when training does not incorporate feedback or real-life coaching experiences, such as online methods. More effective methods for sustained skills were in-person post-training feedback and multiple live coaching experiences ($d = 0.03$). Results also show that more frequent use sustains skill level, such as three to four health coaching sessions over a span of 6 months (Schwalbe et al., 2014).

A systematic review was recently conducted to investigate motivational interviewing proficiency and sustainment of skill levels of trained clinicians over the past 30 years (Hall, Staiger, Simpson, Best, & Lubman, 2016). The review identified 20 studies within the search criteria, with 15 collecting post-training fidelity outcomes. Of the 15 studies, 8 utilized the Motivational Interviewing Treatment Integrity coding manual, 4 the Motivational Interviewing Skill Code, and 3 the Independent Tape Rater Scale to assess fidelity, with only 11 of these studies having reported sufficient data to calculate fidelity for comparisons. Results report low proficiency levels in clinicians following skills training in motivational interviewing. For example, Figure 2.2 portrays results from the studies utilizing the Motivational Interviewing Treatment Integrity coding manual to assess proficiency levels. The red dashed line represents the proficiency threshold of 75% as set by the authors, with
only one study reporting this threshold being met after 2.5 years of training and practice for clinicians. The systematic review was conducted to help understand how training of clinician’s skills in motivational interviewing has improved over the years, however findings show that improved training procedures are still needed to achieve appropriate fidelity levels in coaches. The most effective training protocol from this review seems to be a workshop to train the individuals motivational interviewing components, following by direct supervision while practicing the skill with clients, followed by feedback sessions (Hall et al., 2016). Fidelity assessments also portray the importance of extended training (i.e. weeks to months) for proper skill acquisition. The next section will summarize more robust, college-based training models.

2.4.3 Review of College Motivational Interviewing Training Programs

The growth of health coaching and the need for effective training has led to a variety of college preparatory experiences aimed at teaching skills in motivational interviewing. The programs have largely sprung up as a means to support the growth of peer health coaching programs within college student health and wellness programs. These types of peer health coaching models in which upper class college students undergo training and provide coaching to peers have shown to be beneficial for student health and wellness initiatives (Short, Kinman, & Baker, 2010). Ohio State University has a growing health coaching program where students are trained as peer health coaches by completing in-house training procedures, and are able to provide coaching to students on campus very similar to the model shown in this dissertation (Larcus, Gibbs, & Tyler, 2016). The basis of the Ohio State training model includes holistic wellness, aspects of positive psychology and communication, along with the particular emphasis on college student development that spans 12-15 hours.
typically incorporated into 2-3 live sessions with follow up practice sessions throughout the remainder of a semester (Figure 2.3).

However, many routes are available in training college students the skill of motivational interviewing-based health coaching, with the major difference ending in the obtainment of a well known accreditation or certification. Recent training methods among institutions include a full degree option or minor in health coaching. Upon completion of course work and practicum hours, students are able to sit for an exam to receive a certificate from an accredited affiliation. For example, the University of Minnesota created an accredited program in which students complete approximately 20 credits in health coaching related courses as their training, and test out through completion of the International Consortium for Health and Wellness Coaches examination process. It is not uncommon to have students obtain an external health coaching certification in addition to completing a health coach training within an institution. For example, many students sit for accreditation of the Wellcoaches certification endorsed by the American College of Sports Medicine following completion of institution training methods. Another institution, Georgetown University, offers a health coaching minor as an approved transition program for the International Consortium for Health and Wellness coaching certification. In order for students to sit for this examination following training, the health coach training program (institution) needs to enroll to be an approved training program through the accredited external affiliation. The Georgetown University program is therefore restricted to enrollment based upon instructor permission, or acceptance into the course, to ensure that students will be able to acquire this skill through training procedures and successfully test out. The Georgetown University training method encompasses 8 required courses over the duration of
6 months, and is also available as continuing education credits for non-students. Individuals must enroll in a 30-hour practicum, and pay tuition fees up to $8,500. Course curricula includes extensive knowledge of the fundamentals of coaching, foundation of behavior change science, exploration of associated behavior change theories, and practice of the evidence-based communication strategy for health behavior change (motivational interviewing).

Overall, there is not yet a systematic training protocol for training health coaches within institutions or through external accredited parties. Options typically include a higher education certificate through course completion and skill practice only, in-house institutional training accompanied by the completion of an accredited certification, or only external accreditation.

2.4.4 Development and Description of the Iowa State University Training Model

The Iowa State University health coach training course evolved through previous research efforts within the Kinesiology department aimed at studying behavior change. Health coaching was used as part of a series of research studies conducted, including the comparison of health coaching applications for guided weight loss (Peyer, Ellingson, Bus, Walsh, Franke & Welk, 2017). A group that received health coaching and a monitor had better outcomes than groups receiving health coaching alone or the monitor alone. This showed the additive benefits of health coaching for behavior change. A subsequent study found no differences between in-person and over the phone health coaching delivery (Bus, Peyer, Bai, Ellingson & Welk, 2018).

These studies built some capacity for behavior change research but the focus shifted to methods to provide standardized training in motivational interviewing to enhance the
structure of the health coaching. A team of affiliated researchers completed a Clinical Health Coach Training Certification through the Iowa Chronic Care Consortium in Des Moines, Iowa. Upon obtaining certification, the researchers began offering a physical activity-based motivational interviewing training to undergraduate students that were then able to work as research assistants to offer health coaching as a behavior change strategy to adult participants in physical activity intervention studies.

The motivational interviewing training of the undergraduate students consisted of a brief training protocol, typically consisting of 3-4, 2-hour evening sessions. Training covered motivational interviewing related content, scope of practice within physical activity and health promotion, and skill practice activities. As the research studies progressed, there became a need for reoccurring standardized training due to the level of skill needed to be effective at utilizing motivational interviewing and the growing need for health coaching in the field of Kinesiology.

The next step in creating a standardized training model was led by a Master’s student along with three other PhD students in the Kinesiology department, that all completed the certification process at the Iowa Chronic Care Consortium. It was decided that the training model should evolve into a semester-long practicum course that could provide students with a credit-earning experience. By offering our practicum training as a credit-earning course at Iowa State University, students are able to avoid additional tuition fees and be trained specific to the university and resources available. The course was approved through Iowa State University curricula procedures, and developed to meet one day per week for a scheduled 2-hour time period. Content was spread out through the first 8 weeks of the 16-week semester, with the second half of the semester being used for real health coaching
experiences with study participants. Therefore, the course served the purpose of both training undergraduate students in the skill of health coaching and providing them the opportunity to volunteer as research assistants in related ongoing studies.

Similar to other campus-based health coaching programs, the motivational interviewing practicum evolved into a campus-wide initiative through a collaboration with the Student Wellness department. The Student Wellness department is housed within the Division of Student Affairs and offers students an environment that promotes health and wellbeing on campus. Specifically, the Student Wellness mission harnesses the capability to enhance student success, higher learning, holistic development, belonging and engagement on campus through implementation of evidence-informed strategies, services, and resources. However, the unique aspect of this collaboration is that students are coached by students that are trained through an academic course. The connection with the practicum course provides accountability and helps to ensure the sustainability of the programming since new student coaches will be trained each semester to continue the programming.

The course content is formatted to introduce and slowly progress trainees through the content and skill practice activities. As shown in Figure 2.4, Week 1 introduces the trainees to health coaching as a field and the spirit of motivational interviewing; the conversational strategy typically incorporated within health coaching. Week 2 introduces the tools used within a conversation such as simple and complex reflections and open-ended questions (OARS). Practice activities include reformatting closed questions to open questions and providing several variations of reflections to enhance learning before applying these tools within a real conversation. Weeks 3 and 4 progress into more difficult areas such as working with resistant or ambivalent participants or clients. For example, a client may not be ready to
make a change, or not know where to start. The health coach needs to know how to identify this sustain talk, and utilize specific learned tactics to progress this individual forward. Week 5 ties all information together by introducing the full conversation flow model. Every conversation should start with the engaging stage, and progress through focusing, evoking, planning, and ending with the closing stage. Introducing this stage before planning in Week 6 allows students extra time to practice full conversations. Planning is also typically the easiest step for students to master since students in Kinesiology and related majors are taught early on how to form SMART goals (specific, measurable, attainable, realistic, time oriented). Also, if an individual is not ready to make a change, coaches may not be able to progress to the planning stage until the client or participant is ready to do so. After Week 6, students are fully trained in motivational interviewing content, and should be able to provide health coaching sessions for lifestyle behavior change. However, since students are paired with incoming undergraduate participants at Iowa State University the curriculum provides additional information on available resources to refer participants to such as recreation services, counseling, academic success center. This is a key program component since health coaches are unable to provide information or deal with aspects outside of their scope of practice. The subsequent weeks of the semester (8-16) consist of all trained health coaches meeting with several incoming undergraduate students that want assistance in working toward a lifestyle behavior change. This is the live practicum experience that allows students to practice their learned skills from weeks 1-7.

Although this is a refined practicum experience, a current limitation is that students do not acquire an accreditation or certification from an external entity due to the program not being approved for these examinations. However, Iowa State University has developed a
similar Health Coaching Certificate as the previously mentioned training programs (Section 2.4.3) in which students have the opportunity to complete 23 credits of required coursework in areas of Food Science and Human Nutrition, Kinesiology, and Psychology. This coursework includes the Practicum in Motivational Interviewing course to learn and practice the skill, but is not yet accredited for a board examination such as Wellcoaches or the International Consortium for Health and Wellness Coaching.

2.4.5 Description of the Brief Motivational Interviewing Training Model

Following development and implementation of the Iowa State University Health Coaching Training Model, the content was then condensed to be more broadly disseminated as a brief training protocol. Becoming an expert in motivational interviewing is time intensive and requires extended practice. Therefore, having the ability to incorporate basic motivational interviewing skills (i.e. listening and reflecting) into daily communication with less resources expended may be of interest to individuals in the workforce that are not specifically working as health coaches. This brief training was created to provide that basic introduction to the spirit and skill of motivational interviewing to enhance daily communication while also reducing the burden of time and resources on individuals enrolled in the training.

The content was reduced into 6 lessons, each taking approximately 1-2 hours to complete. Trainees could progress through lessons at their own pace, however completing one lesson per week was encouraged. The content layout is shown in Figure 2.5, and includes a mid-point check in through a webinar at the end of Week 3 followed by live practice sessions after Week 6. The primary instructor provided feedback as needed for the online content, and carried out the mid-point webinar and live practice sessions. Practice activities
were specifically revised for this brief training to incorporate real-world examples that extension workers may encounter to help aid them in identifying ways to incorporate motivational interviewing adherent tactics into their daily work conversations.

2.5 Motivational Interviewing for Lifestyle Behavior Change

Motivational interviewing-based health coaching has been applied to several behaviors such as alcohol and substance abuse, medication adherence, and lifestyle behaviors. The following sections will outline research studies utilizing motivational interviewing as a strategy for adoption and adherence to specific lifestyle behaviors.

Physical Activity

Motivational interviewing conversations often consist of coming up with goals to work toward increasing physical activity levels since it is of importance as a direct link to reducing cardiovascular disease risk factors (Baillot et al., 2015; Brugnara et al., 2016; Ekblom et al., 2015). As previously discussed, Mahmoodabad and colleagues conducted a study to investigate the effects of a motivational interviewing based intervention to increase physical activity levels among women while also incorporating components of the Self-Determination Theory (Mahmoodabad et al., 2017). To look specifically at the physical activity promotion portion of the study, results indicated significant increases in self-reported physical activity (854 ± 271.60 vs 470 ± 80.46 Total Met-min/Week; p < 0.001) and decreases in sedentary time (4.26 ± 1.76 vs 5.91 ± 2.21 Total Hours/Day; p 0.002) within the experimental group receiving motivational interviewing sessions when compared to the control group (Mahmoodabad et al., 2017).

Another study focused on the effectiveness of consumer based monitors alone or in addition to a tailored health coach intervention on weight loss in obese adults (Peyer et al.,
This study consisted of two groups in which one group received a physical activity monitor, while the second group received this monitor in addition to a health coaching-based guided weight loss program. Both groups significantly reduced their weight following the intervention, although there were no significant differences between treatment groups for physical activity. However, the treatment group consisting of the guided weight loss program had significantly greater changes in metabolic syndrome scores than the group with the activity monitor alone.

Friederichs and colleagues (2016) incorporated motivational interviewing into an online intervention to compare the effectiveness to in-person protocols (Friederichs et al., 2016). The study consisted of three conditions: (1) a web-based intervention incorporating motivational interviewing and self-determination theory components, (2) a web-based theory driven group utilizing transtheoretical model and theory of planned behavior components, and (3) a control condition which consisted of a waiting list. Physical activity behaviors were assessed via self-report at baseline, 3 months, and 6 months. Results show that condition 1 did create a small, but significant increase in total weekly minutes of MVPA compared to the other groups at 6 months (Group 1 = 640 ± 650, Group 2 = 636 ± 661, Group 3= 562 ± 583; p = .027). Similarly, Bus and colleagues investigated differences in the delivery of health coaching, utilizing both online and in-person methods (Bus et al., 2018). This study indicated that in-person health coaching was more effective than online health coaching for healthy eating, however there were no significant differences between delivery methods for physical activity or weight change. Therefore, both methods of health coaching delivery may be effective in promoting behavior change.
Hardcastle and colleagues conducted a randomized controlled trial to promote weight loss and reduce cardiovascular disease risks by increasing physical activity through the use of motivational interviewing (Hardcastle, Taylor, Bailey, Harley, & Hagger, 2013). The experimental group was given motivational interviewing counselling, while the second group was a minimal intervention group that received educational materials. The intervention group significantly increased their walking at 6 months (p = .006) and at 18 months (p = .032) compared to the control group. Therefore, findings from this study show that motivational interviewing is beneficial, and may also elicit long-term effects to increase physical activity. Overall, physical activity is one of the most targeted behaviors to change through motivational interviewing as it has been shown to be a viable strategy.

Sedentary Behavior

There is abundant literature on reducing or breaking up sedentary behavior in general. However, the use of motivational interviewing to aid in this behavior change has not been adequately investigated. A recent study shows that motivational interviewing may be effective in reducing sedentary time (Aadahl et al., 2014). Participants sedentary time was objectively assessed using the activPAL 3TM research grade monitor for a 7-day period at both baseline and 6 months. Participants were then randomized into either the experimental group that provided four one-on-one health coaching sessions spread out over 6 months, or a control group that was instructed to continue their typical lifestyle habits for the duration of the study. Although not statistically significant, at 6 months following the intervention participants in the experimental group receiving coaching reduced their sedentary time, while the control group participants increased their sedentary time (-0.32 hours/day, 95% CI= -0.087, 0.24, p = 0.26). Within the intervention group, standing time increased by .44 hours/day
(95% CI = 0.08, 0.80, p = 0.02) (Aadahl et al., 2014). This study provides preliminary evidence that motivational interviewing may be effective at breaking up sedentary bouts as well as increasing standing time, however more research joining motivational interviewing and sedentary time is needed.

**Diet**

Strategies to improve dietary habits may also implement motivational interviewing components. A recent study incorporated registered dieticians and motivational interviewing to improve pediatric dietary habits to reduce BMI (Resnicow, McMaster, Bocian, Harris, Zhou, Snetselaar, & Wasserman, 2015). The control group consisted of usual care, the second group was experimental with a primary care provider only, and the third experimental group consisted of a provider as well as the registered dietician that offered health coaching. On average, 3 sessions of motivational interviewing were completed per participant with a parent either in-person or over the phone. At the two year follow up evaluation, the intervention group with motivational interviewing from the dietician BMI percentile difference was 4.9, as compared to the second intervention group at 3.8, and the usual care control group at 1.8. This study shows that incorporating motivational interviewing into primary health care may be more effective at changing pediatric dietary behaviors than usual care alone.

A similar study utilized a brief motivational interviewing protocol within a obesity intervention to reduce weight and improve healthy eating behaviors among adolescents (Bean, Powell, Quinoy, Ingersoll, Wickham, & Mazzeo, 2015). Participants within this study were already participating in a multidisciplinary behavior support intervention, however a portion of the participants were then randomized into another experimental group to receive
two, 30-minute motivational interviewing sessions at week 1 and 10 of this intervention. The experimental group receiving coaching had greater adherence to the program at both 3 months (89.2% vs 81.0%, p = 0.041) and 6 months (84.4% vs 76.2%, p = 0.026) (Bean et al., 2015). Therefore, this literature helps define the usefulness of motivational interviewing in dietary interventions.

**Stress Management**

Motivational interviewing is applicable to many domains of wellbeing including stress management techniques. A recent study recruited type 2 diabetic participants to engage in motivational interviewing sessions to help them improve their psychological wellbeing (Chen, Creedy, Lin, & Wollin, 2012). Participants within the randomized controlled trial were randomly allocated to a control group to receive usual care, and the experimental group that consisted of motivational interviewing sessions. Participants in the experimental group did increase their self-efficacy (t = -6.40, p < 0.01) and quality of life (t = -4.49, p < 0.01), however the intervention did not reduce their stress levels associated with anxiety and depression (F = 0.13, p = 0.719) (Chen et al., 2012).

Lovejoy conducted a study to investigate the effects of telephone based motivational interviewing on stress levels in an HIV positive sample (Lovejoy, 2012). Participants were randomly assigned to the control group, or one of two treatment groups that consisted of either one or four motivational interviewing sessions. Individuals in the treatment groups reported statistically significant lower stress levels at the 6-month follow up when compared to the control group (1 session p < 0.04, 4 sessions p < 0.01). However there were no significant differences within the treatment groups receiving one or four motivational interviewing sessions (p = 0.12) (Lovejoy, 2012).
Another recent study utilizing telephone based health coaching looked at the effects of psychological and emotional health in an at-risk population (Lawson, Jonk, O'Connor, Riise, Eisenberg, & Kreitzer, 2013). The study consisted of coaching sessions to promote behavior change through self-management skills such as self-awareness, stress management, and emotional intelligence. Following the study, there was a nearly 12% decrease in stress levels as assessed by a quality of life survey. Spencer and colleagues also reported reductions in fatigue-related stress toward cancer (d = 0.620) while reviewing interventions utilizing motivational interviewing with cancer patients (Spencer & Wheeler, 2016). The literature provides evidence that motivational interviewing may be an effective method within interventions to reduce stress and work toward improved quality of life in various population samples.

Sleep

Healthy sleep habits are another important component of leading a healthy lifestyle, and inadequate sleep may lead to other detrimental effects such as absenteeism, decreased cognitive functioning, and obesity (Willgerodt, Kieckhefer, Ward, & Lentz, 2014). A recent study incorporated theoretical components of motivational interviewing and the Transtheoretical Model into an intervention to improve sleep quality in adolescents (Willgerodt et al., 2014). Participants received motivational interviewing with their guardian to learn more about the participant’s sleep habits, and collaborate toward goals to improve these habits. Although this was a small sample size, (n = 9) participants changed their sleep habits following the intervention with a 30-minute increase in minutes of sleep per night at two months after the initial assessment.
Cain and colleagues conducted a study to understand if motivational techniques can improve knowledge and behavior of sleep habits in adolescents (Cain, Gradisar, & Mosely, 2011). Participants in the treatment group attended four, 50-minute sleep education classes that provided motivational interviewing-based strategies to promote healthy sleep behaviors, and a control group attended a usual class. Findings show that knowledge regarding sleep habits can increase, (p = 0.001) however this does not necessarily lead to prolonged increases in sleep time (p = 0.11) or improved behavior (Cain et al., 2011). Although there is limited literature regarding motivational interviewing and sleep habits, this provides preliminary evidence that should be investigated further.

*Pain Management*

Pain is a difficult problem to treat, and is often associated with high costs (Holden, Davidson, & O’Halloran, 2014). Holden and colleagues reviewed the literature to determine if health coaching is effective in helping reduce pain symptoms, specifically low back pain (Holden et al., 2014). Five studies met the inclusion criteria, and results were mixed due to the lack of literature. The randomized controlled trials show some evidence of low back pain reduction (95% CI: - 0.30 -1.09 to 0.54), however generalized results remain inconclusive (Holden et al., 2014).

Thomas and colleagues conducted a study to investigate pain management using motivational interviewing techniques in cancer patients (Thomas, Elliott, Rao, Fahey, Paul, & Miaskowski, 2012). Participants in the treatment group received four health coaching sessions to work toward pain management skills for 6 weeks. Following the intervention, no differences were identified among groups (p = 0.08), but scores for pain interference were statistically significant (p = 0.01) (Thomas et al., 2012).
Miller-Matero and colleagues examined the effects of motivational interviewing for pain management in spouses (Miller-Matero & Cano, 2015). The study design incorporated an interview to gain information on the couples, and then provide a tailored feedback session to promote capabilities of working together to manage pain. When compared to a control group, the individuals that participated in the motivational interviewing assessment group produced favorable effects such as reduced pain ratings (Baseline: 8, Post-Assessment: 2) as well as improvements in mood (Miller-Matero & Cano, 2015).

Another protocol investigated the effects of wellness coaching on pain ratings of individuals with fibromyalgia (Hackshaw, Plans-pujolras, Rodriguez-saona, Moore, Jackson, Sforzo, & Buffington, 2016). Participants received coaching via telephone individually and as a group for 12 months. Pain was assessed via the Brief Pain Inventory (BPI) resulting in statistically significant decreased pain from baseline to 6 months (56.7 ± 18.1 vs 37.0 ± 17.7) as well as 12 months from baseline (56.7 ± 18.1 vs 38.7 ± 20.9) (Hackshaw et al., 2016). Overall decreases in the BPI were 34.7% and 31.7% from baseline assessments. Further research is needed to determine the effectiveness of motivational interviewing in alleviating symptoms of pain.

Summary

The literature review provides a foundation for the use of health coaching as a strategy to promote healthy lifestyle behaviors in a variety of settings, with a focus on the health and wellbeing of young adults attending college. Motivational interviewing-based health coaching shows promise in the health promotion field as it may be the means of providing a collaborative partnership to hold an individual accountable to meeting a healthy lifestyle goal.
Although the literature is largely in favor of the effectiveness of this behavior change strategy, many study designs are weak or flawed (Copeland et al., 2015). Therefore, further investigation of the proficiency of coaches in addition to mechanisms of behavior outcomes are needed. The following studies, conducted as part of this dissertation, will work to evaluate a refined training model for peer health coaches, assess proficiency levels in coaches completing this training method, as well as the effectiveness of peer led coaching for college student health-related outcomes.

2.6 References


### 2.7 Tables and Figures

Table 2.1. Health coach qualifications and skills. Adopted from Huffman, 2016.

<table>
<thead>
<tr>
<th>Qualifications/Eligibility</th>
<th>Health Coach</th>
<th>Wellness Coach</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-requisite: A professional or clinical license or credential from either a State or National licensing/credentialing body</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Prerequisite: Licensed/credentialed to assess, plan, treat and/or evaluate treatment/care plans or provide care based on the health and/or behavioral health diagnosis or condition, and safely provide health teaching accordingly</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Provides interventions according to the clinical practice standards and ethics for one’s health care discipline</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Prerequisite: an academic degree with a major in a health and/or wellness related field</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Clinically trained to teach individuals with active disease and/or chronic conditions, acute illness or medical conditions, and/or moderate to high health risk(s)</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Clinically trained to identify behavioral health issues requiring referral to behavioral health specialist</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Provides coaching within the boundaries of one’s State or National Practice Act or National Certification</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Generally requires coach training beyond formal education</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Provides health teaching</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

**Coaching Core Competencies**

<table>
<thead>
<tr>
<th>Coaches testing to demonstrate coaching competence</th>
<th>Health Coach</th>
<th>Wellness Coach</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maintaining health and wellness: Tobacco cessation, weight management, stress management, physical activity, eating well</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Guides agenda/goal setting/coaching interventions based on health risk(s)/condition(s)/co-morbidities/safety/and/or prescribed treatment plan</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Motivational Interviewing and/or Positive Psychology</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Health outcomes measurement</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Evidence based Clinical Practice Guidelines</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Cultural competence</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>
Table 2.2. Mean MITI scores. Adopted from Serrano et al., 2017.

<table>
<thead>
<tr>
<th>Item</th>
<th>Mean Score (SD)</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Global Measures</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cultivating Change Talk</td>
<td>4.1 ± 0.91</td>
<td>2-5</td>
</tr>
<tr>
<td>Softening Sustain Talk</td>
<td>4.1 ± 0.72</td>
<td>3-5</td>
</tr>
<tr>
<td>Partnership</td>
<td>3.8 ± 0.85</td>
<td>2-5</td>
</tr>
<tr>
<td>Empathy</td>
<td>4.3 ± 0.60</td>
<td>3-5</td>
</tr>
<tr>
<td><strong>Behavior Counts</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Giving Information</td>
<td>4.4 ± 3.28</td>
<td>0-12</td>
</tr>
<tr>
<td>Persuade with Permission</td>
<td>1.5 ± 2.49</td>
<td>0-8</td>
</tr>
<tr>
<td>Questions</td>
<td>15.1 ± 6.54</td>
<td>6-29</td>
</tr>
<tr>
<td>Simple Reflections</td>
<td>11.3 ± 5.93</td>
<td>2-25</td>
</tr>
<tr>
<td>Complex Reflections</td>
<td>9.9 ± 4.23</td>
<td>4-22</td>
</tr>
<tr>
<td>Affirmations</td>
<td>2.5 ± 1.92</td>
<td>0-7</td>
</tr>
<tr>
<td>Seek Collaboration</td>
<td>2.6 ± 2.00</td>
<td>0-7</td>
</tr>
<tr>
<td>Emphasize Autonomy</td>
<td>0.4 ± 0.87</td>
<td>0-4</td>
</tr>
<tr>
<td>Persuade</td>
<td>0.4 ± 0.98</td>
<td>0-4</td>
</tr>
<tr>
<td>Confront</td>
<td>0 ± 0.00</td>
<td>0-0</td>
</tr>
</tbody>
</table>

Table 2.3. MITI summary scores and basic competence and proficiency in motivational interviewing. Adopted from Serrano et al., 2017.

<table>
<thead>
<tr>
<th>Item</th>
<th>Mean Scores (SD)</th>
<th>Basic Competence Threshold</th>
<th>Proficiency Threshold</th>
<th>% of Sessions Meeting Basic Competence Criteria</th>
<th>% of Sessions Meeting Proficiency Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Global Measures</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Technical Global</td>
<td>4.1 ± 0.76</td>
<td>3</td>
<td>4</td>
<td>93.8</td>
<td>71.9</td>
</tr>
<tr>
<td>Relational Global</td>
<td>4.1 ± 0.63</td>
<td>3.5</td>
<td>4</td>
<td>93.8</td>
<td>75.0</td>
</tr>
<tr>
<td><strong>Behavior Counts</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% Complex</td>
<td>48 ± 0.15</td>
<td>40</td>
<td>50</td>
<td>65.7</td>
<td>43.8</td>
</tr>
<tr>
<td>Reflection:Question</td>
<td>1.7 ± 0.98</td>
<td>1:1</td>
<td>2:1</td>
<td>75.1</td>
<td>25.0</td>
</tr>
</tbody>
</table>
Figure 2.1. Percentage of participants in each training protocol who met or exceeded the beginning proficiency benchmark for total score and each subscale score on the VASE-R Scale. Adopted from Madson et al., 2013.

Figure 2.2. Percentage of participants reaching beginning proficiency levels on the global spirit MITI scale at follow-up. Adopted from Hall et al., 2016.
Figure 2.3. Ohio State University “Train the Trainer” Program - Content Module Layout

1. Introduction to Coaching vs Counseling
2. Positive Psychology and Wellness
3. Communication Skills (rapport, active listening, etc.)
4. Motivational Interviewing
5. Goal Setting
6. Resources and Referrals
7. Practice of Coaching (putting it all together)
8. Self-care
9. Group Coaching

Figure 2.4. Iowa State University Health Coaching Program – Weekly Content Layout

Week 1
- Introduction to Health Coaching
- MI Spirit

Week 2
- Conversational Components
- OARS (Open Questions, Reflections)

Week 3
- Active Listening Strategies
- Roadblocks and Selective Listening

Week 4
- Change Talk
- Sustain Talk (Ambivalence)

Week 5
- Conversation Flow Model
- Engage, Focus, Evoke, Plan, Close

Week 6
- Negotiating a Plan
- Forming SMART Goals

Week 7
- Campus Resources
- Situational Practice (How to Refer)

Week 8-16
- Mock Conversations
- Live Conversations with Participants
Figure 2.5. Brief Motivational Interviewing Training – Weekly Lesson Layout

- **Week 1**
  - Spirit of MI
  - Resisting Righting Reflex (RULE)

- **Week 2**
  - Focusing, Engaging & Listening
  - Responding with autonomy

- **Week 3**
  - OARS (Open Questions & Reflections)

- **Week 4**
  - Change Talk & Sustain Talk
  - Ambivalence

- **Week 5**
  - Managing Resistance
  - Moving Forward

- **Week 6**
  - Planning & Goal Setting

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CHAPTER 3. PROCESS AND IMPACT EVALUATION OF A PRACTICUM IN MOTIVATIONAL INTERVIEWING

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3.1 Abstract

Background: Health coaching is an effective conversational method to assist individuals in gaining motivation to engage in healthy lifestyle behavior changes. A new flipped classroom practicum course was designed to offer undergraduate students the opportunity to learn an important skill called motivational interviewing commonly used in health coaching. The 16-week, 2-credit course consisted of online video lectures, in-class activities, experiential training, and supervised practicum experiences. This study evaluates the process, impact, and fidelity outcomes of this motivational interviewing practicum course. Methods: Surveys were administered to all participants pre and post training (n=53; 74% female; average age 21.9 ± 3.7). Surveys assessed participant satisfaction of the course, and impact of training on communication using 7-point Likert scales and were analyzed descriptively (frequencies and mean ± SD). Recordings of motivational interviewing conversations were obtained immediately after training (Week 8) and again following additional practice (Week 16). Recordings were independently coded using the Motivational Interviewing Treatment Integrity (MITI) Coding Manual 4.2.1 with inter-rater agreement calculated between the two trained coders. A series of paired samples t-tests with Bonferroni post-hoc corrections were conducted to examine differences in pre-post fidelity levels, followed by Cohen’s d effect
sizes. **Results:** Survey results demonstrated that students felt comfortable (5.0 ± 0.7) and confident (4.8 ± 0.6) using motivational interviewing. Students reported that they found the course useful (5.6 ± 0.6) and would most likely use this skill in the future (5.6 ± 0.6). Inter-rater reliability showed high agreement between coders (0.92 [95% CI: 0.90 – 0.93]) with the independent coders score’s being reported. Results from the MITI coding showed that all coaches met competency levels for technical and relational global scores at baseline, with 97.5% meeting proficiency for technical and 90.0% for relational. At the post evaluation call, 100% of trainees met proficiency levels for both technical and global ratings. However, trainees did not meet competency levels for some of the more advanced skill indicators (i.e. percent complex reflections used and reflection to question ratios). Paired sample t-tests showed favorable improvements in fidelity levels from pre to post, but gains were significant only for the reduction of nonadherent techniques (p=0.01; d=0.46). **Conclusions:** This study supports the utility of a flipped classroom practicum course designed to teach undergraduate students the skills of motivational interviewing. Extended real-world practice enhanced fidelity levels over the course of a semester, and trainees reported high likelihood of continued skill use one year after training completion. Future work should develop systematic approaches to evaluating fidelity levels to further refine proper training methods for college student professional development.

### 3.2 Introduction

Health coaching is widely used in worksite, commercial, clinical, and school settings to help individuals adopt healthy lifestyle behaviors or withdraw from unhealthy behaviors (Hill, Richardson, & Skouteris, 2015; Martins & McNeil, 2009). Health coaching is the process of encouraging individuals to play a role in their health-decision making to aid in
health enhancement and risk reduction, such as tracking physical activity and dietary intake.

The conversational skill often encompassed within health coaching is motivational interviewing. This is a client-based approach that uses foundational conversation elements to evoke importance to elicit behavior change (Rollnick & Miller, 1995). The use of motivational interviewing encompassed within health coaching has gained traction as a viable behavior change strategy (Olsen & Nesbitt, 2010; Thomas, Elliott, Rao, Fahey, Paul, & Miaskowski, 2012).

The popularity of motivational interviewing-based health coaching has led to an increased demand for individuals that can effectively provide this service to clients in different settings and contexts. In order to provide well rounded health coaches, proper training protocols and procedures are needed. Thus, there is a need for academic programs within higher education institutions to provide sufficient training to supply proficient health coaches in this expanding field (Fortune, Breckon, Norris, Eva, & Frater, 2018).

Numerous training programs exist and they vary widely in length and contact time (e.g. brief workshops or 6-month intensive courses). However, a limitation in this line of research is that the quality and impact of trainings are not often systematically evaluated. Without proper documentation and evaluation techniques, the most effective training methods remain unknown (Bunyan, Crowley, Smedley, Mutti, Cashen, Thompson, & Foster, 2017; Hohman, Pierce, & Barnett, 2015; Madson, Schumacher, Noble, & Bonnell, 2013; Schwalbe, Oh, & Zweben, 2014). As this conversational behavior change strategy grows in demand, it is important to establish training models that can be studied and refined over time. The skill of motivational interviewing is difficult to learn and meet proficiency criteria, and therefore enhances the need for established training protocols to be available to students in
higher education settings to aid in developing their professional skills (Hall, Staiger, Simpson, Best, & Lubman, 2016; Magill, Graves, Zoysa, Winkley, Amiel, Shuttlewood, Landau, & Ismail, 2018).

This study evaluated fidelity levels among trained peer health coaches completing a 16-week practicum course developed to train upper class undergraduate college students in the skill of motivational interviewing-based health coaching. The study fills an important gap by studying motivational interviewing fidelity levels following a prolonged hybrid training model with standardized assessment methods (Jelsma, Mertens, Forsberg, & Forsberg, 2015). The study also investigated the impact the acquisition of the skill has on opportunities for trained individuals one year after completion of the training.

3.3 Methods

3.3.1 Overview of the Training Course and Recruitment

A flipped classroom practicum course was developed to offer upper level undergraduate students the opportunity to learn the important skill of motivational interviewing commonly used in health coaching efforts. The development of the course stemmed from the rising demand for trained health coaches to promote healthy lifestyle adoption and adherence within ongoing Iowa State University research studies, as well as the general workforce. Faculty and students in the Kinesiology Department expanded a basic training model and took formalized steps to get a practicum course approved and standardized within the Department and College. The course was intentionally designed to meet the needs of a practicum experience for a new interdisciplinary certificate in health coaching that was established at the same time. A partnership between the Kinesiology
Department, Student Wellness, and Thielen Student Health Center at Iowa State University also evolved to provide opportunities for students to gain practical experience through a peer health coach model.

The 16-week, 2-credit course (led by three trained, graduate student health coaches) consisted of online video lectures, in-class activities, experiential training, and supervised practicum experiences in health coaching. The course was offered as an elective course to upper level college students interested in developing skills in motivational interviewing. Students enrolled in upper division courses in health promotion, psychology, and nutrition were informed of the opportunity but it was also promoted by advisors for students that expressed interest in the health coaching certificate. In order to ensure that students had the proper health-related background knowledge, they were required to formally apply for acceptance into the course. Students completed an online form that included questions regarding their current credit status, their current understanding of health coaching, and how they plan to use the skill in the future. Their narrative responses were then reviewed, and individuals were deemed qualified for enrollment based upon determination of the affiliated research coordinators and course instructors.

There were no specific pre-requisites to enroll in the course (other than permission of instructor); however, specific criteria were established for inclusion into the Institutional Review Board (IRB) approved study. Students needed to be at least 18 years of age, junior or senior credit status, and no previous experience being trained in health coaching. Previous experience in health coaching would consist of obtaining a certification in health coaching from a non-Iowa State University health coaching certificate affiliated entity. Students were asked about their willingness to participate in the IRB approved research study prior to the
start of the course. Students that agreed to participate completed surveys (pre, post and 1-year follow-up) and agreed to have their motivational interviewing training sessions recorded and coded; however, students received the same course experience regardless of their involvement in the study. Recruitment efforts are reported in Figure 3.1.

### 3.3.2 Description of Training Course

The course was divided into Parts A and B to first train the coaches (A), and then provide real-life practice opportunities to refine skills (B). Part A is the first 8 weeks of the course of which focused on providing students with an understanding of the spirit of motivational interviewing and the components of skills training (Appendix A). Coaches were taught the main differences in evoking motivation for change rather than telling their client what to do. The major skills of the acronym OARS (open ended questions, affirmations, reflections, summaries) were taught and practiced among peers for several weeks to help individuals become comfortable. This phase of the course used a ‘flipped’ approach to instruction by providing content materials to students online via the university content management system so that they can be prepared prior to coming to class. This allowed students to utilize the full in-class time to practice the conversational skills with instructors and peers. Since motivational interviewing is a conversational skill, trainees require several class periods of practice and individualized feedback from the practicum leaders to help refine skills in specific situations as well as extended practice outside of class time. This is a key part of the model since literature supports feedback from instructors during training as a method to increase proficiency levels among health coaches following training (Miller, Yahne, Moyers, Martinez, & Pirritano, 2004).
Following completion of Part A, students initiated the practicum component of the course, Part B. This phase allowed the now-trained peer health coaches to practice real behavior change conversations with undergraduate students on campus. Each trained peer health coach met with individual coachees (client receiving motivational interviewing-based health coaching sessions) for 4, 30-minute sessions over the course of the second 8-week period in the semester. Health coachees were recruited across campus for support in adopting healthy habits, and either came to the health coach with a behavior change in mind or the health coach worked with the client to collaboratively form a goal. Recruitment of coachees was conducted in partnership with Student Wellness and Thielen Student Health on campus, students were referred to health coaching if they expressed an interest in adopting healthy lifestyles (within the scope of practice of the student coaches). Behavior change goals could include aspects of regular physical activity, eating habits, time management, organization, and stress reduction. Other related topics such as drugs, alcohol or mental health issues were deemed outside of the coaches’ scope of practice. The student coaches met individually with the coachees and supplemental classroom sessions were held to answer questions and to promote further skill development.

3.3.3 Procedures and Assessments

The goal of this study was to evaluate the utility of the 2-credit practicum training course for building proficiency levels in motivational interviewing skills of undergraduate students. Emphasis was placed on objective coding of recorded health coaching sessions to determine student adherence to motivational interviewing principles and practices following training. However, student perceptions of the experience were also captured to obtain specific feedback about the course. Evaluating proficiency levels of coaches following
training is important to understand the viability of training undergraduate students through this type of practicum course. This is an understudied area in the realm of motivational interviewing, as there are currently no consensus on definitions or standards for fidelity assessment or reporting methods (Jelsma, Mertens, Forsberg, & Forsberg, 2015). Thus, the study offers potential to advance research on best practices for motivational interviewing course evaluation and fidelity checks following training.

Objective Coding of Training Fidelity

To evaluate the fidelity of training the peer health coaches, trainees were asked to record two health coaching conversations. Trainees recorded one of their first conversations with a real client shortly after completing the base level practicum training (after 8 weeks of training). Trainees then completed a mock evaluation call with an independent research assistant at the end of the semester to provide a more structured evaluation of their proficiency (16 weeks of training and practice).

The conversations were coded using the latest version of the Motivational Interviewing Treatment Integrity (MITI) coding Manual 4.2.1 (Moyers, Manuel, & Ernst, 2015). Although there are several methods of assessing fidelity, the MITI coding manual is a popular assessment tool in the literature that has undergone several revisions and established good reliability and validity (Moyers, Rowell, Manuel, Ernst, & Houck, 2016). The coding enables evaluation of different facets of motivational interviewing including both global and behavior counts. Global scores indicate levels of change talk, sustain talk, partnership, and empathy elicited by the health coach on a 5-point Likert scale. Behavior counts are individually tallied from verbal use of the coach within coach and client verbal exchanges (volleys). These tallies are summed in each category to total the number of conversational
components utilized (e.g. questions, simple reflections, complex reflections, affirmations, giving information, persuading, emphasizing autonomy, seeking collaboration and confronting) as listed in Table 3.2. Then specific calculations from the MITI coding manual were carried out to report proficiency levels including the reflection-to-question ratio \(((\text{simple reflection} + \text{complex reflection})/\text{questions})\), complex reflections used \((\text{complex reflection}/(\text{simple reflection} + \text{complex reflection}))\), total motivational interviewing adherence \((\text{seeking collaboration} + \text{autonomy} + \text{affirmation})\) and total motivational interviewing nonadherence \((\text{confront} + \text{persuade})\). Appendix B provides an example tally sheet from the MITI that the coder completes while listening to the recorded sessions, and Appendix C provides the global scoring scales to determine technical and relational scores based on a 5-point Likert scale.

Coding was completed by two trained individuals consisting of the primary research assistant (training instructor) and one independent coder. All recordings of motivational interviewing conversations were coded independently by both coders for the full duration of the conversation utilizing the MITI. It was hypothesized that proficiency levels would be further enhanced after the 8-week practicum period that included real behavior change conversation practice with clients.

Subjective Perceptions from Participants

Trainees completed surveys at three time points to assess perceptions of the course. The first survey captured background experiences prior to training. This survey captured demographic information, and specific questions on what students currently knew about health coaching, what they hoped to achieve from completing the training, and how they thought it would help them in their future courses or career (See Appendix D). It was used
primarily to characterize the backgrounds of the participants and their experiences prior to the course. The second survey captured trainees perceptions of the course as well as their perceptions of the usefulness of the course and their own skill level. The survey included items designed to capture the usefulness of the course, future use of skills learned, confidence, comfort, and suggestions for future training improvements (See Appendix E). A one-year follow-up survey was then distributed to trainees to evaluate the long-term impact of training. This survey included trainees reporting if they still use the skill, and rating their level of comfort and confidence if they had continued to use motivational interviewing one year after completion of the practicum (See Appendix F). The focus of the survey analyses was on the responses on the second and third surveys since these assessments capture perceptions of the course from the student’s perspective.

3.3.4 Statistical Analyses

The analyses were primarily descriptive since the focus was on capturing the overall utility of the course. However, the standardized coding of two health coaching sessions enabled a more robust evaluation of gains in motivational interviewing proficiency through the practicum experience. Specific analyses used to evaluate baseline proficiency and changes in proficiency are summarized below along with the analyses of the survey responses from participants (post course and one-year follow-up).

Evaluation of Coded Interviews

The coding results were aggregated by the primary research assistant and calculations from the raw scores were carried out according to standard protocols within the Motivational Interviewing Treatment Integrity (MITI) 4.2.1 coding manual. Inter-rater reliability was
evaluated by directly comparing ratings from the primary research assistant and an independent coder trained in evaluation of motivational interviewing for all recorded sessions using a two-way mixed model intra-class correlation approach with absolute agreement. This is the preferred conservative method of observing agreement among coders for continuous data points (Jelsma et al., 2015). It was hypothesized that inter-rater reliability of coded audio recordings would meet an overall intra-class correlation coefficient of at least “good” agreement among the two coders (0.60-0.74 = good; 0.75-1.00 = excellent). Following the overall inter-rater reliability analyses, each category coded (global and behavior counts) were individually analyzed for agreement between the two coders to identify areas that may need further refinement in determining coding status for future studies as portrayed in a previously mentioned manuscript by Serrano and colleagues (2018) that utilized the MITI version 4.2.1 (Serrano, Serafini, Eller, Torres, Donovan, & Ornelas, 2018).

Following obtaining proper inter-rater reliability, calculated scores from the MITI 4.2.1 coding manual were reported as mean ± SD from the independent coder. Results include global ratings (technical and relational skills) and behavior counts (reflections, questions, affirmations, etc.) and the number of individuals meeting competency and proficiency levels at both 8-week and 16-week evaluation time points. For example, MITI calculations consist of averaging pairs of raw global scores to form summary global scores (i.e. (cultivating change talk + softening sustain talk) / 2 = technical global summary score). Behavior counts are tallied by the coders as they listen to verbal volleys throughout recorded conversations. Conversation volleys are used to parse the language between the individual using motivational interviewing and the client. Each switch in the conversation from the coach to the client and back again to the coach is considered one volley, in which behavior
counts are tallied. Each behavior count may receive only one tally per volley. Following tallying of behavior counts during volleys, the coder then deems global scores based on a 5-point Likert scale following completion of the recording duration. Behavior count calculations consisted of calculating the reflection to question ratio, percent of complex reflections used compared to simple, and adherent and nonadherent skills elicited by the health coach.

A series of six paired samples t-tests with Bonferroni post-hoc corrections were conducted to evaluate differences in proficiency levels between the evaluation time points among the subsample of participants. Variables were the main calculated scores from the MITI manual including technical and relational global scores, reflection-to-question ratios, percent complex reflections used, and total adherent and nonadherent techniques. Cohen’s d effect sizes were calculated to identify the magnitude of these differences.

*Evaluation of Survey Data*

Responses from the post-survey and one-year follow-up evaluation surveys were collected, aggregated and summarized to obtain perspectives from the participants on the utility of the course and their perceptions of skill following the course. The post training survey and one-year follow-up survey data results are reported as frequencies from a 7-point Likert scale (0 to 6) with the mostly agreed and entirely agreed results summed for descriptive purposes. The overall average scores (mean ± SD) from the Likert scale questions are also reported in specified tables. The post-survey results also include qualitative data reporting themes of what trainees liked and disliked about the course. To explore differences from post training to the one-year follow-up period, several exploratory analyses were conducted. Two paired samples t-tests were conducted to evaluate the differences in levels of
comfort and confidence in using motivational interviewing at post training and one-year follow-up period, followed by Cohen’s d effect sizes to interpret the magnitude of change. A 2 X 2 ANOVA analyses was then carried out to investigate reported outcomes in coaches’ skill comfort and confidence based on the amount of time spent using the skill. The independent variable being time spent using motivational interviewing one year following training (less than 1 time per week vs. more than 1 time per week) and dependent variables being confidence and comfort in skill use.

3.4 Results

A sample of 53 participants agreed to participate in the evaluation across the six semesters the course was offered (Figure 3.1). The sample included 98% of total students enrolled in the course over this time frame. The average age of the sample was 21.9 ± 3.7, consisting of mostly female participants (74%). The majority of participants were Kinesiology majors (85%), with other campus departments including Diet & Exercise, Psychology, and Child Adult Family Services. Participant student status included juniors (37%), seniors (44%), and graduate (19%) level students. The qualitative pre-survey data were analyzed for key themes, resulting in participants hoping to 1) gain experience for enhanced one-on-one communication, 2) experience real life (hands on) health coaching opportunities, and 3) gain information to aid in building client’s motivation for change.

3.4.1 Fidelity of Training Course for Building Motivational Interviewing Proficiency

Fidelity of motivational interviewing directly following training was examined in 40 participants (Week 8) and a post-evaluation assessment was conducted with a subsample of 23 participants (Week 16). The mock evaluation calls at week 16 were added to the study
after the first four cohorts were completed, thus accounting for the reduced sample. All calls were recorded with audio only and coded by the two trained coders. Inter-rater reliability was conducted with all of this available coded data (n=63 total recordings). For the calculated scores according to the MITI 4.2.1 manual (technical and relational global ratings, reflection-to-question ratio, use of complex reflections, and total adherence and nonadherence behavior counts) the two coders overall agreement resulted in an intra-class correlation coefficient of 0.92 [95% CI: 0.90 – 0.93]. For all raw scores prior to manual calculations, the coders reached a reliability agreement of 0.96 [95% CI: 0.95 – 0.97]. Both correlation coefficients were reflective of excellent inter-rater reliability according to established literature in the field of motivational interviewing fidelity assessment (Jelsma et al., 2015). Results for inter-rater reliability analyses are reported in Tables 3.1 and 3.2.

Average raw scores of global ratings and behavior counts at baseline and follow up from the MITI 4.2.1 codings are reported in Table 3.3. This descriptive table summarizes the increase in global ratings of cultivating change talk, partnership, and empathy from baseline to follow up, and a slight decrease in softening sustain talk. Behavior counts from baseline to follow up were in the expected direction for nonadherent techniques showing decreased use of giving information and persuading (without permission). No participants elicited confrontation in any sessions coded at baseline or follow up. Use of adherent tactics such as seeking collaboration and emphasizing autonomy increased; however, decreases in adherent techniques of affirmations and simple and complex reflections were also reported. Tables 3.4 and 3.5 report calculated fidelity scores according to MITI 4.2.1 protocols to evaluate the number of trainees meeting motivational interviewing competence and proficiency thresholds. At baseline, all participants met the basic competence threshold for both technical
and relational global scores, with the majority also reaching proficient levels in technical (97.5%) and relational (90.0%) global scores. At follow up, all participants met the proficiency threshold for both technical and relational global scores. Proficiency levels for behavior counts were more difficult to reach with the majority not meeting competence levels at baseline for percent complex reflections (12.5%) or reflection to question ratios (10.0%). At follow up, the percent of complex reflections increased to 17.4% meeting the competence threshold, and a decrease in the percent meeting the reflection to question ratio competence level (8.7%).

Results from the paired samples t-tests revealed non-significant gains in technical scores (p > 0.05; d=0.13) and relational global scores (p > 0.05; d=0.49) from Week 8 to Week 16, but the changes were in the expected direction. The use of nonadherent techniques was significantly reduced at follow up (p=0.01; d=0.46), however the changes in other indicators were not statistically different [(percent of complex reflections (p > 0.05; d=0.49); adherent techniques (p > 0.05; d=0.15); reflection to question ratios (p > 0.05; d=0.07)]. The changes were in the expected direction as shown in Figure 3.2.

3.4.2 Student Perceptions and Satisfaction

A total of 46 participants completed the post-training survey following the 16-week course. The survey results report high satisfaction from participants with 43 participants (94%) reporting they either mostly agreed (5) or entirely agreed (6) that they were likely to recommend this course to peers (ratings were on a 7-point Likert scale from 0 to 6). Nearly all participants (94%) agreed that the course was useful and nearly all (96%) believed they would use these skills again in the future. Overall, 37 participants (80%) reported they were relatively comfortable with using motivational interviewing, and 30 (65%) indicated that they
were confident in using these skills following training. When asked if they were provided enough time to sufficiently practice the skill during class time, 36 (78%) reported that they either mostly or entirely agreed. However, only 17 participants (37% mostly or entirely agreed) reported that they engaged in enough practice time outside of class. Therefore, there may be potential to further increase comfort and confidence in the use of motivational interviewing if more time is allocated to practicing outside of class as well as during class. Average scores of the survey results are summarized in Table 3.6.

Qualitative responses from the open-ended course feedback items revealed three major themes; 1) students preferred the hands-on style of the course, 2) learned a skill to be used in a future career, and 3) improved necessary communication skills for problem solving capabilities. Students provided feedback to suggest course modifications that resulted in four recommendations: 1) more time to meet with coachees (continuing past 4 sessions in 8 weeks), 2) more individualized practice sessions with trained instructors, 3) more motivational interviewing conversation examples, and 4) more practice overall.

A total of 24 participants (75% of total participants) completed the one-year follow-up survey to report the long-term impact of motivational interviewing training. Of the respondents, 11 reported having graduated while 13 were still in school. Of the 11 students that graduated, current undertakings consisted of being a graduate student (n=3), and careers included rehabilitation technician (n=1), scribe (n=1), wellness coordinator (n=2), disaster program specialist (n=1), restaurant server (n=1), personal trainer (n=1) and unemployed (n=1). Only two individuals pursued further health coach training or experience following completion of the Iowa State University training program. However, when asked to report if they still utilize motivational interviewing skills, 22 of the 24 said yes. Continued skill use
included helping friends or family members with behavior change, incorporating motivational interviewing principles into their work (i.e. personal training, dietetic patients), use as teaching tool within the classroom to help set goals, and within a peer mentorship program. Survey results from the Likert scale questions indicate that 21 participants (88%) with follow-up data either mostly or entirely agreed that their communication skills have improved through completion of the training, and 18 (75%) mostly or entirely agreed they still feel confident and comfortable using the skill one year later. Results of the one-year follow-up survey are summarized as average scores in Table 3.7.

The paired samples t-tests (n=21) revealed significant increases for confidence in using motivational interviewing one year after training completion (Post: 4.8 ± 0.7 vs. 1 Year: 5.3 ± 0.9 p = 0.03; d=0.62); however, comfort level in using motivational interviewing was slightly lower, albeit not-significantly (Post: 5.2 ± 0.7 vs. 1 Year: 5.0 ± 1.05 p = 0.49; d=0.19). The ANOVAs resulted in statistically significant differences in skill comfort and confidence levels between those that utilized motivational interviewing more than one time per week (n=8) compared to those that reported using motivational interviewing less than one time per week (n=13) at the one-year follow-up period (p = 0.02).

3.5 Discussion

Results of this study documented the utility of the practicum course in training upper level undergraduate students the complex skill of motivational interviewing. The course fills an important training need for undergraduate students and provides an opportunity for students to complete the practicum component of the interdisciplinary health coaching certificate offered at the University. The coding of two conversations provides a way to evaluate gains in competence through the practicum experience and the replicate (post and
one-year follow-up) surveys provide a way to capture the student’s perspective of this novel training course. While the focus of this evaluation is on the utility of this specific course, the results and methods also fill gaps in the literature on training methods needed to build competency in this complex and high-demand skill. The results support the utility of offering practicum ‘pre-service’ training in motivational interviewing to proficiently train college students prior to entering the workforce.

**Utility of the Practicum Course in Building Motivational Interviewing Competency**

Following the 8-week training period, trainees met sufficient competency levels for global ratings and further improved with extended practice at follow-up. Based on experience with the course, it was expected that trainees would likely struggle to meet proficiency levels in behavior counts specifically for reflection-to-question ratios and the ratio of complex reflections to simple reflections used. Results reinforce this expectation as coaches tended to use more questions than reflections. The criteria set by the MITI for reaching competency in the reflection-to-question ratio is 1:1, and proficiency is 2:1. However, other studies have also shown this as being difficult to achieve.

Hall and colleagues (2016) reported all individuals meeting proficiency in global ratings after two years of training and feedback on skill use, approximately 50 percent meeting proficiency following a 12-week training, and 34 percent meeting proficiency after 8 weeks of training and supervision (Hall et al., 2016). Serrano and colleagues (2018) evaluated motivational interviewing proficiency in community health educators with the MITI 4.2.1. and reported 25% of participants meeting proficiency criteria (2:1) for the reflection-to-question ratio, and 75.1% meeting competency (1:1) (Serrano et al., 2018). This training included a 2-day live intensive following by approximately 4 weeks of mock
evaluation calls (Serrano, et al., 2018). Another study conducted by Madson and colleagues (2013) used the VASE-R scale to evaluate proficiency in three different types of motivational interviewing training methods, and proficiency levels ranged from 10% to 75% with greater proficiency levels achieved in the extended (16-week) and intensive (1-week) training styles compared to a brief lecture (1-hour) (Madson et al., 2013).

In the present study, health coaches did well with sticking to motivational interviewing adherent components (seeking collaboration, affirming, emphasizing autonomy) with a much higher average score than non-adherent components (confronting, persuading). While this study produced a greater number of individuals meeting proficiency levels in global ratings when compared to a similar recent study (100% vs 74%), the number of individuals meeting proficiency for behavior counts was less (13% vs 34%) (Serrano et al., 2018).

The semester-based curriculum appears to be more effective for meeting adequate fidelity levels (based on the MITI 4.2.1 criteria) compared with other studies describing training of pre-professional college students (Fortune et al., 2018; Hohman et al., 2015; Madson et al., 2013; White, Gazewood, & Mounsey, 2007). The gains in proficiency and adherence to motivational interviewing principles between the 8-week evaluation and the 16-week evaluation call show the importance of prolonged practice for building skills. These results show merit in prolonged use for enhancing and sustaining skill proficiency. Differences did not reach statistical significance for the group comparisons which may be due to high levels of proficiency reached directly following training at Week 8. However, it is important to also consider the variability in scores across individuals to fully appreciate the impact of the training. It was not possible to directly compare individual competence with the
one-year follow-up, but on average, the trainees reported maintaining enhanced communication skills and still felt confident and comfortable in adequately using motivational interviewing in regular communication.

Participants that reported continued regular use of motivational interviewing more than once per week one year after training had slightly higher relational proficiency levels than those that used the skill less than one time per week (4.2 ± 0.4 vs 4.1 ± 0.4). However, more frequent use was not associated with enhanced technical proficiency levels which were lower than those that did not continue weekly practice (4.1 ± 0.2 vs 4.3 ± 0.4). Higher proficiency levels for percent complex reflections and reflection to question ratios were observed in individuals that continued to practice motivational interviewing more often [(percent complex reflections: 0.28 ± 0.1 vs 0.18 ± 0.1); reflection to question ratio: (0.53 ± 0.3 vs 0.51 ± 0.2)]. These preliminary findings may be interpreted as individuals that are more proficient in motivational interviewing are more likely to use the skill within their fields of practice following training. This could also indicate that motivational interviewing may come more naturally to some individuals than others.

**Novel Contributions to the Training Literature**

Research on training methods for motivational interviewing is still in early stages of development and there are few standards to evaluate the utility of training programs. This has been cited as an important need in the field (Madson & Campbell, 2006; Martins & McNeil, 2009; Olsen & Nesbitt, 2010). Several aspects of the study fill gaps including combining training, practice and tailored feedback for enhanced skill acquisition, proper assessment and reporting of proficiency following training using an established protocol at two time-points, and evaluation of agreement among coders for reliable proficiency results.
Several methods are available for proficiency evaluation of motivational interviewing with two being most popular in the literature (Madson & Campbell, 2006). First, the Motivational Interviewing Skill Code (MISC) was developed by Miller and colleagues in 1997 to assess motivational interviewing proficiency levels. The manual has been modified through several versions being released in 2003 and 2008 to further refine reliability and efficiency of the manual (Miller, Moyers, Ernst, & Amrhein, 2008). This method of assessment is deemed appropriate when evaluating outcomes of a motivational interviewing-based treatment, however resources can be a major constraint of this method since coders must pass through all conversation recordings three times. The second widely used coding manual is the Motivational Interviewing Treatment Integrity (MITI) coding manual used in this study. The MITI was created by Moyers and colleagues in 2005 to reduce the complexity and time constraints needed to properly evaluate proficiency levels developed from the MISC (Moyers, Martin, Hendrickson, & Miller, 2005). Other motivational interviewing proficiency assessment methods include the Motivational Interviewing Process Code, Motivational Interviewing Supervision and Training Scale, and the Video Assessment of Simulated Encounters (Madson et al., 2006). Therefore, with several methods of assessing fidelity it is unclear which method is best since each manual assesses different subscales of motivational interviewing tactics, and there is no method of direct comparison. Future work by our health coaching group should investigate differences in proficiency levels among trainees using multiple assessment methods (MITI, MISC, VASE-R). This evaluation would identify if different assessment methods produce different fidelity results, and may be beneficial in developing a systematic evaluation for enhanced interpretation of proficiency levels.
Another key need is to establish methods for evaluating the reliability of the expert coder since this is often not reported. For example, if one expert coder is coding all recordings, a second coder can verify reliable reporting of proficiency levels by also recording all or a subsample of the recordings to conduct inter-rater reliability calculations. The agreement between the two trained coders in this study resulted in excellent inter-rater reliability overall (0.92), with a range of 0.78-0.86 previously shown in similar studies (Jelsma et al., 2015; Kramer Schmidt, Andersen, Nielsen, & Moyers, 2019). Therefore, the expert coder’s results were reported since they were in agreement with the second coder.

Jelsma and colleagues (2015) have noted that if high inter-rater agreement is not reached between coders, it is then best to report the average scores among coders (Jelsma et al., 2015).

Excellent inter-rater agreement levels were reached in the study for overall comparison between two coders, however high agreement for subscales has been proven difficult to achieve. Kramer Schmidt and colleagues (2019) report the subscales of softening sustain talk, persuade with permission, confront, and emphasize autonomy as the areas of difficulty to reach high levels of rater agreement for (Kramer Schmidt et al., 2019). This study showed similar results in these subscales with poor agreement, along with seeking collaboration, affirming, and all four Global ratings. Previous literature has also shown that inter-rater agreement is easier to achieve from raw scores than MITI calculated values due to the enhanced chance of incorporating error within the calculations. This study showed similar results with raw reliability scores (fair to good) between coders being greater than the calculated MITI scores (poor to fair). Proper coding methods warrants further attention to be
able to accurately and reliably assess individuals motivational interviewing fidelity levels among coders.

**Strengths and Limitations of the Study**

This study demonstrates the capacity for upper level undergraduate students to successfully learn and implement motivational interviewing techniques in a real-world application. This opportunity for students to be trained in motivational interviewing-based health coaching should be widely disseminated into higher education to help meet the rising demand for trained health coaches and the capability to improve college student health and wellbeing.

A key strength of this study is the use of an independent coder to provide the opportunity to calculate agreement levels with the primary instructor of the course, and report accurate results for fidelity utilizing a popular coding manual (Moyers et al., 2015). Both coders also coded the full duration of all available recordings, which is not typically achieved in fidelity assessment studies due to limited study resources such as time and personnel (Jelsma et al., 2015). This study also included two evaluation time points to assess fidelity levels directly following the training, and again after additional real-world practice sessions. A novel approach to providing the learning content online in a ‘flipped’ classroom approach aided in providing students with the full class period for skill practice to enhance skill acquisition.

Although there are specific strengths to this study, there are also some limitations to note. This study includes a small sample size of students that completed this training through several sequential semesters. Training was improved and conducted in a more effective
manner as feedback was gained from students on helpful methods to improve their experience learning motivational interviewing. Another limitation results from the 8-week evaluation call being a live session recorded with a coachee client, while the 16-week evaluation was carried out as a mock call with the independent coder playing the role of an older, overweight adult as an alternate hypothetical scenario. This may have led to some differences in fidelity levels due to the live session lasting approximately 30 minutes, while the mock call was instructed to last approximately 15 minutes in duration.

Looking across the literature, longer training protocols such as the semester-based course detailed in this paper appear to be the most effective method for reaching proper proficiency levels in college students. Future research should work to develop and refine a systematic way to evaluate and report motivational interviewing fidelity levels. Having several methods of assessing proficiency based on different criteria does not allow for direct comparison or accurate understanding of overall fidelity levels, and therefore limits generalizability of findings among varying training protocols (Lord, Can, Yi, Marin, Dunn, Imel, Georgiou, Narayanan, Steyvers, & Atkins, 2015). Motivational interviewing-based health coaching seems to be an obtainable skill for college students to master and provides an opportunity to further their professional development skills.

3.6 References


### 3.7 Tables and Figures

Table 3.1. Summary of Inter-Rater Reliability Scores Between Coders for MITI 4.2.1 Calculated Items.

<table>
<thead>
<tr>
<th>Item</th>
<th>ICC [95% CI]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Summary Global Measures</td>
<td>0.53 [0.32, 0.69]</td>
</tr>
<tr>
<td>Technical Global</td>
<td>0.03 [-0.52, 0.39]</td>
</tr>
<tr>
<td>Relational Global</td>
<td>0.22 [-0.29, 0.53]</td>
</tr>
<tr>
<td>Summary Behavior Counts</td>
<td>0.12 [-0.01, 0.27]</td>
</tr>
<tr>
<td>Percent Complex Reflections</td>
<td>0.05 [-0.37, 0.37]</td>
</tr>
<tr>
<td>Reflection-to-Question Ratio</td>
<td>0.84 [0.74, 0.90]</td>
</tr>
<tr>
<td>Total MI-Adherent</td>
<td>0.49 [0.16, 0.69]</td>
</tr>
<tr>
<td>Total MI-Non adherent</td>
<td>-0.26 [-1.12, 0.24]</td>
</tr>
</tbody>
</table>

Table 3.2. Summary of Inter-Rater Reliability Scores Between Coders for MITI 4.2.1 Raw Scores.

<table>
<thead>
<tr>
<th>Item</th>
<th>ICC [95% CI]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2 Coders</td>
</tr>
<tr>
<td>Summary Global Measures</td>
<td>0.69 [0.56, 0.79]</td>
</tr>
<tr>
<td>Cultivating Change Talk</td>
<td>-0.01 [-0.67, 0.39]</td>
</tr>
<tr>
<td>Softening Sustain Talk</td>
<td>-0.09 [-0.65, 0.30]</td>
</tr>
<tr>
<td>Partnership</td>
<td>0.09 [-0.51, 0.45]</td>
</tr>
<tr>
<td>Empathy</td>
<td>0.32 [-0.12, 0.59]</td>
</tr>
<tr>
<td>Summary Behavior Counts</td>
<td>0.34 [0.19, 0.51]</td>
</tr>
<tr>
<td>Giving Information</td>
<td>0.65 [0.42, 0.79]</td>
</tr>
<tr>
<td>Persuade</td>
<td>-0.25 [-1.07, 0.25]</td>
</tr>
<tr>
<td>Persuade with Permission</td>
<td>0.59 [0.32, 0.76]</td>
</tr>
<tr>
<td>Question</td>
<td>0.88 [0.79, 0.93]</td>
</tr>
<tr>
<td>Simple Reflection</td>
<td>0.76 [0.60, 0.86]</td>
</tr>
<tr>
<td>Complex Reflection</td>
<td>0.46 [0.11, 0.67]</td>
</tr>
<tr>
<td>Affirm</td>
<td>0.28 [-0.15, 0.57]</td>
</tr>
<tr>
<td>Seeking Collaboration</td>
<td>0.21 [-0.16, 0.49]</td>
</tr>
<tr>
<td>Emphasizing Autonomy</td>
<td>0.15 [-0.35, 0.47]</td>
</tr>
<tr>
<td>Confront</td>
<td>1.00</td>
</tr>
</tbody>
</table>
Table 3.3. Average MITI 4.2.1 scores between pre and post check-points for global measures and behavior counts.

<table>
<thead>
<tr>
<th>Item</th>
<th>Baseline Mean ± SD</th>
<th>Range</th>
<th>Follow Up Mean ± SD</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Range</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Global Measures</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cultivating Change Talk</td>
<td>4.20 ± 0.41</td>
<td>4 - 5</td>
<td>4.39 ± 0.50</td>
<td>4 - 5</td>
</tr>
<tr>
<td>Softening Sustain Talk</td>
<td>4.08 ± 0.35</td>
<td>3 - 5</td>
<td>4.04 ± 0.21</td>
<td>4 - 5</td>
</tr>
<tr>
<td>Partnership</td>
<td>4.23 ± 0.48</td>
<td>3 - 5</td>
<td>4.39 ± 0.50</td>
<td>4 - 5</td>
</tr>
<tr>
<td>Empathy</td>
<td>4.05 ± 0.50</td>
<td>3 - 5</td>
<td>4.26 ± 0.45</td>
<td>4 - 5</td>
</tr>
<tr>
<td><strong>Behavior Counts</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Giving Information</td>
<td>1.03 ± 1.27</td>
<td>0 - 4</td>
<td>0.22 ± 0.42</td>
<td>0 - 1</td>
</tr>
<tr>
<td>Persuade (Permission)</td>
<td>0.80 ± 1.16</td>
<td>0 - 4</td>
<td>0.22 ± 0.52</td>
<td>0 - 2</td>
</tr>
<tr>
<td>Questions</td>
<td>25.15 ± 1.94</td>
<td>9 - 77</td>
<td>19.26 ± 4.44</td>
<td>9 - 27</td>
</tr>
<tr>
<td>Simple Reflections</td>
<td>11.45 ± 6.16</td>
<td>2 - 29</td>
<td>8.70 ± 3.11</td>
<td>4 - 15</td>
</tr>
<tr>
<td>Complex Reflections</td>
<td>2.80 ± 2.65</td>
<td>0 - 11</td>
<td>2.70 ± 1.78</td>
<td>0 - 7</td>
</tr>
<tr>
<td>Affirmations</td>
<td>1.00 ± 0.22</td>
<td>0 - 5</td>
<td>0.74 ± 1.32</td>
<td>0 - 5</td>
</tr>
<tr>
<td>Seek Collaboration</td>
<td>2.80 ± 0.25</td>
<td>0 - 7</td>
<td>3.65 ± 1.95</td>
<td>0 - 8</td>
</tr>
<tr>
<td>Emphasize Autonomy</td>
<td>1.40 ± 1.17</td>
<td>0 - 4</td>
<td>1.43 ± 1.24</td>
<td>0 - 4</td>
</tr>
<tr>
<td>Persuade</td>
<td>0.30 ± 0.76</td>
<td>0 - 3</td>
<td>0.09 ± 0.29</td>
<td>0 - 1</td>
</tr>
<tr>
<td>Confront</td>
<td>0.00 ± 0.00</td>
<td>0</td>
<td>0.00 ± 0.00</td>
<td>0</td>
</tr>
</tbody>
</table>

Global measures based on a 5-point Likert scale. Behavior counts tallied and summed.
Table 3.4. MITI 4.2.1 baseline summary scores reporting levels of basic competence and proficiency in motivational interviewing (n=40).

<table>
<thead>
<tr>
<th>Item</th>
<th>Mean ± SD</th>
<th>Range</th>
<th>Basic Competence Threshold</th>
<th>Proficiency Threshold</th>
<th>% of Trainees Meeting Basic Competence</th>
<th>% of Trainees Meeting Proficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Global Measures</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Technical Global</td>
<td>4.14 ± 0.34</td>
<td>3.5 – 5.0</td>
<td>3.5</td>
<td>4.0</td>
<td>40 (100.0%)</td>
<td>39 (97.5%)</td>
</tr>
<tr>
<td>Relational Global</td>
<td>4.14 ± 0.41</td>
<td>3.0 – 5.0</td>
<td>3.0</td>
<td>4.0</td>
<td>40 (100.0%)</td>
<td>36 (90.0%)</td>
</tr>
<tr>
<td><strong>Behavior Counts</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% Complex</td>
<td>0.20 ± 0.15</td>
<td>0.0 - 0.5</td>
<td>0.4</td>
<td>0.5</td>
<td>5 (12.5%)</td>
<td>2 (5.0%)</td>
</tr>
<tr>
<td>Reflection:Question</td>
<td>0.59 ± 0.23</td>
<td>0.14 – 1.07</td>
<td>1.0</td>
<td>2.0</td>
<td>4 (10.0%)</td>
<td>0 (0.0%)</td>
</tr>
<tr>
<td>Adherent</td>
<td>5.20 ± 2.24</td>
<td>2.0 – 13.0</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Non-Adherent</td>
<td>0.30 ± 0.76</td>
<td>0.0 – 3.0</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Global measures based on a 5-point Likert scale. Behavior counts tallied and summed.

% Complex = Percent complex reflections overall, Reflection:Question = Ratio of reflections to questions used.

Table 3.4.1. MITI 4.2.1 baseline summary scores in motivational interviewing for those participants with follow-up data (n=23).

<table>
<thead>
<tr>
<th>Item</th>
<th>Mean ± SD</th>
<th>Range</th>
<th>Basic Competence Threshold</th>
<th>Proficiency Threshold</th>
<th>% of Trainees Meeting Basic Competence</th>
<th>% of Trainees Meeting Proficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Global Measures</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Technical Global</td>
<td>4.17 ± 0.36</td>
<td>4.0 – 5.0</td>
<td>3.5</td>
<td>4.0</td>
<td>23 (100%)</td>
<td>23 (100%)</td>
</tr>
<tr>
<td>Relational Global</td>
<td>4.11 ± 0.48</td>
<td>3.0 – 5.0</td>
<td>3.0</td>
<td>4.0</td>
<td>23 (100%)</td>
<td>23 (100%)</td>
</tr>
<tr>
<td><strong>Behavior Counts</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% Complex</td>
<td>0.15 ± 0.15</td>
<td>0.0 - 0.50</td>
<td>0.4</td>
<td>0.5</td>
<td>3 (13.0 %)</td>
<td>1 (4.4 %)</td>
</tr>
<tr>
<td>Reflection:Question</td>
<td>0.65 ± 0.24</td>
<td>0.27 – 1.07</td>
<td>1.0</td>
<td>2.0</td>
<td>4 (17.4 %)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Adherent</td>
<td>5.43 ± 2.57</td>
<td>2.0 – 13.0</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Non-Adherent</td>
<td>0.35 ± 0.93</td>
<td>0.0 – 3.0</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Global measures based on a 5-point Likert scale. Behavior counts tallied and summed.

% Complex = Percent complex reflections overall, Reflection:Question = Ratio of reflections to questions used.

Table 3.5. MITI 4.2.1 follow up summary scores reporting levels of basic competence and proficiency in motivational interviewing (n=23).

<table>
<thead>
<tr>
<th>Item</th>
<th>Mean ± SD</th>
<th>Range</th>
<th>Basic Competence Threshold</th>
<th>Proficiency Threshold</th>
<th>% of Trainees Meeting Basic Competence</th>
<th>% of Trainees Meeting Proficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Global Measures</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Technical Global</td>
<td>4.22 ± 0.30</td>
<td>4.0 – 5.0</td>
<td>3.5</td>
<td>4.0</td>
<td>23 (100%)</td>
<td>23 (100%)</td>
</tr>
<tr>
<td>Relational Global</td>
<td>4.33 ± 0.42</td>
<td>4.0 – 5.0</td>
<td>3.0</td>
<td>4.0</td>
<td>23 (100%)</td>
<td>23 (100%)</td>
</tr>
<tr>
<td><strong>Behavior Counts</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% Complex</td>
<td>0.23 ± 0.15</td>
<td>0.0 - 0.54</td>
<td>0.4</td>
<td>0.5</td>
<td>4 (17.4%)</td>
<td>3 (13.0 %)</td>
</tr>
<tr>
<td>Reflection:Question</td>
<td>0.63 ± 0.25</td>
<td>0.21 – 1.20</td>
<td>1.0</td>
<td>2.0</td>
<td>2 (8.7%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Adherent</td>
<td>5.83 ± 2.82</td>
<td>0.0 – 13.0</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Non-Adherent</td>
<td>0.04 ± 0.21</td>
<td>0.0 – 1.0</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Global measures based on a 5-point Likert scale. Behavior counts tallied and summed.

% Complex = Percent complex reflections overall, Reflection:Question = Ratio of reflections to questions used.
Table 3.6. Post-training survey results of motivational interviewing (MI) training impact (n=46).

<table>
<thead>
<tr>
<th>Item</th>
<th>Mean ± SD</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>After completing the health coaching curriculum, I am likely to recommend this experience to a friend.</td>
<td>5.43 ± 0.69</td>
<td>3 - 6</td>
</tr>
<tr>
<td>This course was useful to me.</td>
<td>5.61 ± 0.61</td>
<td>4 - 6</td>
</tr>
<tr>
<td>I am likely to use the skills learned in this course again in the future.</td>
<td>5.63 ± 0.57</td>
<td>4 - 6</td>
</tr>
<tr>
<td>I was provided enough time to use MI skills during class time.</td>
<td>5.15 ± 0.89</td>
<td>2 - 6</td>
</tr>
<tr>
<td>I practiced my MI skills enough outside of class time.</td>
<td>4.26 ± 1.08</td>
<td>1 - 6</td>
</tr>
<tr>
<td>I am comfortable using MI skills in a conversation.</td>
<td>5.02 ± 0.65</td>
<td>4 - 6</td>
</tr>
<tr>
<td>I am confident using MI skills in a conversation.</td>
<td>4.76 ± 0.64</td>
<td>4 - 6</td>
</tr>
</tbody>
</table>

Based on a 7-point Likert scale (0=Entirely Disagree, 6=Entirely agree).

Table 3.7. Survey results of one year follow up impact of motivational interviewing (MI) training (n=24).

<table>
<thead>
<tr>
<th>Item</th>
<th>Mean ± SD</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learning MI has improved my communication skills.</td>
<td>5.38 ± 0.71</td>
<td>4 - 6</td>
</tr>
<tr>
<td>Completing the MI practicum has helped open the door for research, internship, or career opportunities.</td>
<td>4.13 ± 1.48</td>
<td>1 - 6</td>
</tr>
<tr>
<td>I feel confident that I could perform MI effectively one year after completing the practicum course.</td>
<td>5.04 ± 1.04</td>
<td>2 - 6</td>
</tr>
<tr>
<td>I feel comfortable using MI one year after completing the practicum course.</td>
<td>5.29 ± 0.91</td>
<td>3 - 6</td>
</tr>
<tr>
<td>I feel that my MI skills have declined one year after completion of the training.</td>
<td>2.00 ± 1.41</td>
<td>0 - 5</td>
</tr>
</tbody>
</table>

Based on a 7-point Likert scale (0=Entirely Disagree, 6=Entirely agree).
Figure 3.1. Health coach training recruitment and completion by semester.

Figure 3.2. Pre and post differences in MITI 4.2.1 fidelity ratings.
CHAPTER 4. EFFECTS OF A PEER HEALTH COACHING PROGRAM ON COLLEGE STUDENT LIFESTYLE BEHAVIORS

A paper for submission to the Journal of American College Health
Kathryn J. DeShaw, Jeni E. Lansing, Maria Perez, Laura D. Ellingson, & Gregory J. Welk

4.1 Abstract

**Background:** The transition from high school to college often leads to poor health decisions such as insufficient physical activity and poor eating habits in students. Motivational interviewing-based health coaching may be an effective strategy to promote adoption and adherence to healthy lifestyle behaviors as well as aiding in accountability for behavior change among lower division college students. **Methods:** A sample of 187 Freshmen and Sophomore undergraduate students (79% female; age 18.6 ± 1.6; BMI 25.1 ± 5.4) participated in an evaluation of a peer health coaching program designed to support the campus student wellness program. Participants received 4 health coaching sessions in an 8-week period and were encouraged through motivational interviewing techniques to work toward self-selected goals related to either increasing physical activity, healthy dietary habits, or managing stress. Changes in each goal were assessed pre and post health coaching sessions using established surveys. Physical activity was assessed using the International Physical Activity Questionnaire Short-Form, diet with the Eating Habits Confidence Survey, and stress levels via the Perceived Stress Scale. **Results:** A total of 130 participants completed the study protocol and were included in the primary analyses (Physical Activity: n=72, Diet: n=29, Stress: n=29). Three group x time repeated measures ANOVAs with Bonferroni post-hoc corrections were conducted to investigate differences in lifestyle behavior changes based on the participant-selected goal. Effect sizes (partial eta squared)
were reported to capture the magnitude of the lifestyle changes. Significant main effects of
time were observed for all three goals with participants having a 39.6% gain in physical
activity, 9.9% increase in dietary habit, and 16.3% decline in stress levels with moderate to
large effect sizes ($\eta^2_p$: 0.07 - 0.17) following health coaching sessions ($p < 0.01$). The main
effect for goal was statistically significant for physical activity, ($p < 0.01; \eta^2_p$: 0.07) but there
were no significant group X time interactions. **Conclusions:** The results support the
effectiveness of the peer health coaching model for promoting healthy lifestyles in college
students. However, gains were not specific to goals as improvements in physical activity, diet
and perceived stress did not vary by group. Additional research is needed to understand the
effects of motivational interviewing specifically for each lifestyle goal, as well as student
reactions to peer-led health coaching in college settings.

### 4.2 Introduction

Regular engagement in healthy lifestyle behaviors such as physical activity, healthy
eating habits, and stress management skills are linked to reductions in chronic disease risks
(Booth, Roberts, & Laye, 2012). College students tend to engage in poor health behaviors
such as high amounts of sedentary time and low amounts of physical activity, often leading
to health risks such as rapid weight gain (Deforche, Van Dyck, Deliens, & De
Bourdeaudhuij, 2015). This has been deemed as an ‘at-risk period’ for young adults due to
these significant lifestyle changes in addition to environmental and social changes
accompanied with moving away from home and family (Deforche et al., 2015). Previous
literature has reported associations in childhood physical activity patterns carrying over into
greater likelihood of maintaining an active lifestyle later in life (Desai, Miller, Staples, &
Bravender, 2008). With an overwhelming majority (~%70) of U.S. high school graduates
transitioning to attend college (Bureau of Labor Statistics, 2016), this is an important population to target for adoption or continued adherence to healthy habits.

A study of 65,000 college students that completed the National College Health Assessment conveyed that meeting the recommended amount of moderate to vigorous physical activity (MVPA) was associated with healthy dietary habits, body mass index (BMI), adequate sleep, and fewer symptoms of depression (Dinger,Brittain, & Hutchinson, 2014). Research has also shown college students self-reporting accumulations, on average, of 10 hours per day of sedentary time from activities such as playing video games, watching television, and school work (Peterson, Sirard, Kulbok, DeBoer, & Erickson, 2018). Prolonged periods of sedentary time are related to higher prevalence of diabetes, arthritis, heart failure, obesity, and stroke (Loprinzi, 2015). The abundance of literature deems the college transition as a period of poor health-decision making, and behavior change strategies are needed at the institutional level to combat negative health consequences.

Health coaching is a popular and effective method to assist individuals in gaining motivation to engage in healthy lifestyle behavior changes, and may be of great benefit to college student health and wellbeing efforts (Frost, Campbell, Maxwell, Carroll, Dombrowski, Williams, Cheyne, Coles, & Pollock, 2016; O’Halloran, Blackstock, Shields, Holland, Iles, Kingsley, Bernhardt, Lannin, Morries, & Taylor, 2014; Rash, 2008). Health coaching provides an individual with the knowledge, motivation, or tools needed to enhance their health. Individuals wanting to learn health coaching do not need to obtain a degree, however proper training is required (Huffman, 2016). Specific training programs are available to teach individuals health coaching and ensure proper understanding of scope of practice. For example, health coaches are not able to prescribe medication or provide medical
treatment in any format. If an individual receiving health coaching is seeking this type of treatment, it is the health coach’s responsibility to refer the client to the appropriate resource.

Health coaching often incorporates the conversational tool of motivational interviewing that harnesses an individual’s autonomy for personal decision-making to work toward goals such as increasing physical activity, healthy eating habits, and stress management skills (Schumacher, Madson, & Nilsen, 2014). Evaluations of motivational interviewing as a treatment within research studies often focus on addictive behaviors such as alcohol and drugs, or mental health issues (Lundahl, Kunz, Brownell, Tollefson, & Burke, 2010; Weinstock, Petry, Pescatello, & Henderson, 2016). These areas may lie outside of a health coach’s typical scope of practice if they are only trained as a health coach, and do not have the proper credentials needed. For motivational interviewing-based health coaching in this present study, the focus is on lifestyle behavior changes such as physical activity, and does not cover more severe health issues such as mental health factors. Students trained as peer health coaches through the CydeKicks peer health coaching program were instructed on how to properly refer a participant to suitable campus resources if a situation should arise outside their scope of practice.

Motivational interviewing-based health coaching has increasingly been used on college campuses to help students adopt healthy lifestyle behaviors and these programs are typically handled through peer health coach programs (Larcus, Gibbs, & Hackmann, 2016). Research has supported the use of health coaching to better understand how to influence behavioral habits in college students, since healthy decision-making is often not a priority during this stressful phase of newly gained independence (Dinger et al., 2014; Racette, Deusinger, Strube, Highstein, & Deusinger, 2008). Previous literature evaluating health-
related outcomes such as enhanced health status due to increased physical activity levels, has primarily focused on adult and clinical populations to reduce health risks after they are present (Lundahl et al., 2013; Rubak, Sandbaek, Lauritzen, & Christensen, 2005) However, less research has evaluated change in health behaviors and outcomes of college students receiving health coaching sessions.

It has been stated that motivational interviewing is likely to aid in helping relationships (Iarussi, 2013) and overall wellbeing in college students (Larcus et al., 2016), however few studies actually investigate and report college student lifestyle behavior changes following health coaching sessions. A recent randomized trial in nontraditional college students aimed to work toward positive lifestyle behavior change during an 8-week telephonic motivational interviewing intervention (Quintiliani & Whitely, 2016). The intervention was successful in significantly increasing fruit and vegetable consumption, but there was a nonsignificant decrease in physical activity levels between the treatment group and control group (Quintiliani & Whitely, 2016). Although this study is beneficial in evaluating and reporting the effectiveness of motivational interviewing in college students for lifestyle behavior change, the nontraditional college students were much older on average than traditional college students (32 years old on average), and do not have the same transition directly from high school.

This study evaluated the lifestyle behavior changes of incoming college students that completed a peer health coach program offered in partnership with Iowa State University Student Wellness. The CydeKicks peer health coaching program pairs students who are seeking support with a trained peer health coach to provide accountability, collaboration, and guidance in working toward healthy decision making. Consistent with motivational
interviewing approaches, students had choices about which goals they wanted to work on with their coach. The focus of the evaluation was on capturing the nature and magnitude of changes in lifestyle behaviors resulting from a campus-based peer health coaching program. It was hypothesized that students would benefit from receiving health coaching through improvement in their lifestyle behaviors. It was also hypothesized that larger improvements in self-selected goals that were targeted during individualized health coaching sessions.

4.3 Methods

4.3.1 Overview of Program and Recruitment

The CydeKicks peer health coaching program was coordinated in collaboration with the Iowa State University Student Wellness Department as part of normal offerings for students. The peer health coaches were of Junior or Senior status, and were enrolled in a formalized, semester-long, practicum course (KIN 494A/B: Practicum in Motivational Interviewing), coordinated through the Department of Kinesiology. The training consisted of teaching upper class undergraduate students the skills and techniques associated with motivational interviewing-based health coaching and prepared students to assist their peers with lifestyle behavior change. The course progressed from introducing the spirit of motivational interviewing to learning the specific skills to use within a conversation such as forming simple and complex reflections, making affirmations, and asking open-ended questions. The students practiced the skills of motivational interviewing and were trained in overall principles of health coaching specifically for use on campus with lower division undergraduate students. This included the scope of practice and procedures that a health coach is trained to cover, as well as information on resource referral as needed (e.g. recreation services, student counseling services, or academic success center). Student
coaches recorded mock conversations that were scored by an instructor prior to serving as a peer health coach to ensure that they met basic proficiencies.

The availability of the CydeKicks program was promoted through a dedicated website, brochures and flyers, referrals from Student Wellness and student health leaders and direct mass email communications. Interested students were referred to the Student Wellness home web page to complete a brief registration/application form. This process allowed Student Wellness representatives to track applications and to then forward them to the CydeKicks health coaching team for scheduling. Before receiving health coaching, students were asked if they would be willing to participate in an ongoing research evaluation of the CydeKicks program. The study was approved by the university Institutional Review Board (IRB) and provides a way to evaluate the impact of the programming under real-world conditions. Inclusion criteria were: being between the ages of 18 and 25, in their first two years on campus at Iowa State University, and with no current or previous support from a health coach. Students who met criteria were asked to complete an informed consent. If students did not meet study inclusion criteria and/or were not interested in participating in the study were still provided the opportunity to complete health coaching sessions on campus independent of the IRB approved study (n=5). Figure 4.1 shows participant recruitment over the span of the 6 semester cohorts including the number of participants that were initially recruited each semester and those that completed the full study protocol. Enrollment numbers increased over time; however, the percentage of students that completed the follow-up evaluation remained relatively constant.

4.3.2 Design and Procedures for Data Collection and Health Coaching
The health coaching evaluation used a pre-post design to assess the effectiveness of the programming on student lifestyle behaviors. Following informed consent, participants completed a baseline battery of surveys to assess lifestyle behaviors. This baseline assessment included demographics, physical activity levels, dietary habits, perceived stress, and indicators of personality type.

Following baseline assessments, participants were paired with a peer health coach based on scheduling and availability. Each study participant received four, 30-minute health coaching sessions over the course of 8 weeks. This period of time was selected by affiliated researchers due to the ability to fit within one academic semester and provide sufficient evidence of the adoption of lifestyle behavior change. The health coaching sessions took place in either a designated health coaching room within the Kinesiology Department home building or in a mutually agreed upon campus location such as a reserved room in the campus library, campus coffee shop, or lounge areas within campus buildings.

Participants were given the autonomy to decide what type of lifestyle behavior they would like to work toward to progress toward goal formation with the health coach. Following the foundations and spirit of motivational interviewing, the participant was guided to a self-selected goal by the coach but was not told what to do. Goals were set and refined over the 8-week period by the participant in collaboration with the health coach.

Following completion of the four health coaching sessions, participants were prompted to complete the post-survey. The post-assessment consisted of the same battery of questionnaires as the pre-assessment excluding demographics and the personality assessment. Health coaches were also asked to complete a survey after completion of the four sessions to report the average length of sessions, goal(s) formed, ratings of resistance, and ease of
collaboration. One year following completion, all participants that agreed to be contacted again in the future as part of the study were re-contacted to complete the same post-assessment surveys to report long-term adherence to self-determined goals set during participation in health coaching.

4.3.3 Descriptions of Instruments and Data Processing

The primary outcomes were evaluated using a comprehensive battery of established surveys to assess lifestyle behaviors (Appendix G).

Physical activity was assessed via self-report utilizing the International Physical Activity Questionnaire Short-Form (IPAQ-SF). This self-report measure is widely used, and has shown good reliability and validity against other self-report physical activity methods (Craig, Marshall, Sjostrom, Bauman, Booth, Ainsworth, Pratt, Ekeland, Yngve, Sallis, & Oja, 2003). The brief assessment consists of 7 questions asking the individual to report the number of days and minutes per day of an average week that they perform vigorous physical activity, moderate physical activity, and walking. The primary outcome measure from this survey was total self-reported minutes of physical activity per week.

Perceived stress levels were evaluated with the 10-item Perceived Stress Scale inventory. This instrument is well known for its reliable and valid psychometric properties for use in identifying perceived stress levels among college students (Roberti, Harrington, & Storch, 2006). This survey consists of 5-point Likert scale questions to identify perceptions of stress in the last month, including potential causes of stress such as unexpected happenings, nervousness, control, and coping methods. The data were coded according to survey instructions of which includes reversing Likert scale scores to the positively stated
items, and then summing across all 10 scale items. Averaged totals were then compared to norms for college students in the age range of 18 to 29.

The Eating Habits Confidence survey was used to assess individual’s perceptions of trying to change their eating habits, focusing on how confident and motivated they are to do so consistently. This inventory includes 5 questions that are scored using 5-point Likert scales to assess self-efficacy and confidence in “sticking to a healthy diet”. The development and testing of this survey shows that self-efficacy regarding dietary behaviors are significantly associated with reported diet along with high criterion-related validity (Sallis, Pinski, Grossman, Patterson, & Nader, 1988). Therefore, survey data for this specific study includes summing items 1-5 and reporting averages for participant confidence in “sticking to a healthy diet”. This survey assessed behaviors that fall within the confines of the peer health coaches scope of practice due to the fact that they are able to aid participants in making healthier food choices. However, they are unable to prescribe dietary regimens or provide information on nutritional aspects.

4.3.4 Statistical Analyses

The primary research question was to evaluate the changes in self-reported lifestyle behaviors relative to each participant’s stated goal for lifestyle change. For the primary analyses, a series of group X time (3 X 2) repeated measures ANOVAs followed by Bonferroni post-hoc corrections were conducted to examine differences in the self-selected goal (physical activity, stress, diet) pre and post health coaching. Another series of group X time (3 X 3) repeated measures ANOVAs were conducted to incorporate a smaller sub-sample of one-year follow-up data (n=30) to investigate long-term adherence. Total average
percent change scores were calculated among lifestyle variables to explore potential differences in goal progress based on the health coach providing the sessions.

### 4.4 Results

A sample of 187 student participants agreed to participate in the evaluation of the health coaching sessions through the CydeKicks initiative over the span of six semesters. However, due to high attrition rates, the primary analyses were conducted with 130 participants that completed the full study protocol consisting of the pre-survey, four health coaching sessions, and the post-survey. Common reasons for drop out were time constraints, not fully understanding what health coaching entailed until after the first session was complete (e.g. wanting a personal trainer or specific regimen prescribed), or failing to complete the post-survey. Drop out often consisted of a participant not responding to the health coach to set up the next session, and therefore would be counted as a dropped participant after three failed attempts at communication. Each semester of data collection typically consisted of 8 to 10 trained peer health coaches offering sessions to an average of 30 to 40 participants. Participant characteristics are described in Table 4.1.

The summary of sessions survey completed by the health coach reported an average duration of each individual motivational interviewing conversation to be approximately 23 minutes. When identifying level of resistance on a scale from 0 (no resistance) to 100 (high resistance) the average score was 25.3, showing low resistance to change from participants. The majority of health coaches also reported reflective listening to be their most used “tool” to effectively carry the conversation forward (69%) with open-questions being second (31%). Coaches also reported 98% of the first conversations ending in some sort of goal or plan formation, with 88% of these clients actually meeting this set goal at a follow up visit. These
results portray ease of collaboration and progression between peer health coaches and their undergraduate clients.

Goal Achievement

Three (3 X 2) repeated measures ANOVAS were conducted to examine differences in participant selected goals pre and post health coaching sessions (Physical Activity: n=72, Diet: n=29, Stress: n=29). Significant main effects of time were observed for all three goals with participants having a 39.6% gain in physical activity (p < 0.01), 9.9% increase in dietary habit (p < 0.01), and 16.3% decline in stress levels (p < 0.01) with moderate to large effect sizes ($\eta^2$: 0.07 - 0.17) following health coaching sessions. There were no significant group X time interactions, indicating that students had similar outcomes regardless of the goal being focused on. Table 4.2 and Figures 4.2 to 4.4 summarize the ANOVA results.

Follow Up Survey

A sample of 34 participants completed the follow-up survey one year after completing health coaching sessions (Physical Activity: n=24, Stress: n=10). One participant response was recorded for the self-selected goal of diet, and was therefore excluded from the follow up analyses. For physical activity, there was a significant effect for time (p < 0.05; $\eta^2$: 0.11), but not for the goal X time interaction or the main effect of goal. There were no statistically significant results for stress. Results of the ANOVA analyses for long-term adherence are shown in Table 4.3.

Outcomes Based on Health Coach

On average, each trained peer health coach (n=47) worked with 3 to 4 coachee participants for the duration of the data collection. Therefore, further exploratory analyses
were conducted to investigate if participant outcomes varied based on their health coach. Total percent change scores were calculated for each health coachee pre and post intervention, and then paired with their specific peer health coach since inadequate sample sizes did not allow for statistical analyses. Figure 4.5 reports varying levels of health coachee participant goal achievement for each health coach.

4.5 Discussion

The results of this study support the benefits of a peer-based health coaching model for promoting healthy lifestyle behaviors in college students. The results revealed significant gains in physical activity and diet and declines in stress following health coaching. It was hypothesized that participants working toward a pre-determined goal of their choice would achieve larger progress toward that goal. Although these findings were not observed, differences in specific goal achievement could potentially be attributed to overlap. For instance, an individual may want to increase their physical activity levels to reduce stress. This individual may also have to work on time management skills to schedule in those bouts of physical activity to then reduce stress. Therefore, the mix of behavioral and habitual changes may intertwine with each other and lead to reporting increases in several areas of lifestyle behavior realms.

Overall stress levels of this sample were high, with an average of 19.5 at baseline and 16.9 following health coaching sessions. The norms in college students between the ages of 18 to 29 is 14.2 according to the Perceived Stress Scale (Roberti et al., 2006). However, the one-year follow-up survey reported perceived stress levels increasing to 18.1 when they are no longer receiving health coaching. Health coaching may be a positive influence for
reducing stress levels among college students, but continued sessions may be necessary to maintain gains.

A frequent issue in the field of health promotion is maintaining long-term adherence to healthy decision-making (Rothman, 2000). This study reports similar findings to other lifestyle behavior interventions showing the difficulty in long-term adherence (King, Mainous, Carnemolla, & Everett, 2009; Linke, Gallo, & Norman, 2011). In this study, the low levels of follow up adherence could be attributed to the lapse in accountability from the health coach, and the sporadic schedules of college students. For example, a participant may form a goal to incorporate exercise into their weekly schedule, however when a new semester begins this may conflict with a new course schedule and lead to discontinuing the newly formed habit.

It should be noted that participant outcomes may also vary based on the health coach. This relates to previous work that reported the skill level of the individuals performing motivational interviewing may affect the outcomes of the client (Gaume, Gmel, Faouzi, & Daeppen, 2009). Motivational interviewing is a difficult skill to obtain adequate proficiency levels in, and it is anticipated that a health coach that has greater proficiency in the conversational skill may elicit greater change in their clients. Although this study did not have adequate sample sizes or power for appropriate statistical analyses, the average change in outcomes was 117% among all coaches. Figure 4.4 portrays the specific variation in outcomes based on the health coach for descriptive purposes. While the coach may have an impact, the variation of outcomes may be more contingent on the intrinsic motivation of the individual receiving health coaching since all coaches received the same training and followed a standardized protocol.
Strengths

This study has documented the utility of a peer health coach model for positively impacting college student health and wellbeing. A strength of the study is that it was conducted under naturalized conditions in direct collaboration with the student wellness department. While still in its early stages, this program has successfully reached a large sample of college students and has gained traction with a structure in place for sustainability. Another strength is the multiple time points for evaluation. Outcomes are evaluated after an 8-week time period, as well as a long-term follow up to investigate adherence to set goals after the health coach is no longer holding the participant accountable.

Limitations

Limitations of the study design include the lack of a control group to compare the effectiveness of the health coaching intervention to, and therefore limits the interpretation of the intervention results. The outcomes of the health coaching intervention are also reliant on the ability of participants to accurately self-report their lifestyle behaviors via survey. Previous research has shown that self-report is a viable method of assessment due to feasibility and limited resources needed. However, it is often not as accurate as objective assessments specifically in the field of physical activity assessment due to the level of difficulty in the general population interpreting intensity and duration (Celis-Morales et al., 2012; Cerin et al., 2016; Tucker, Welk, & Beyler, 2011). With batteries of surveys, it is always a possibility that participants could experience survey fatigue or social desirability leading to inaccurate responses. This study also had a high attrition rate which can lead to biased results, although lifestyle behavior interventions typically result in larger attrition rates (Dumville, Torgerson, & Hewitt, 2006). The attrition may be higher than observed in normal
controlled studies due to the nature of the participants and the way the program was promoted on campus.

Increased research investigating the effects of health coaching on college student lifestyles is needed. Future work should include stronger study designs incorporating randomized experimental and control groups to allow direct comparison of health coaching effects on outcomes. In addition, stronger assessment methods such as using accelerometry for physical activity evaluation would provide a more reliable estimate of behavioral changes due to the health coaching intervention. This would also allow enhanced interpretation of specific outcomes based on self-selected goals, and who benefits more from receiving health coaching. Future work should also focus on continuing health coaching sessions long-term to understand the participant’s capabilities to stick to a goal if the accountability is maintained, in addition to the facilitation of habit formation toward goal obtainment. It is necessary to understand the amount of health coaching time needed to aid college students in adopting and adhering to healthy lifestyle behaviors for overall health and wellbeing.

4.6 References

https://doi.org/10.1002/cphy.c110025


https://doi.org/10.1371/journal.pone.0036345

https://doi.org/10.1249/MSS.0000000000000870


Lundahl, B., Moleni, T., Burke, B. L., Butters, R., Tollefson, D., Butler, C., & Rollnick, S. (2013). Motivational interviewing in medical care settings: A systematic review and


4.7 Tables and Figures

Table 4.1. Participant demographics and characteristics (n=187).

<table>
<thead>
<tr>
<th>Percent (%)</th>
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<tbody>
<tr>
<td>Gender (Female)</td>
</tr>
<tr>
<td>Race/Ethnicity (White)</td>
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<tr>
<td>Student Status (Freshman)</td>
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<td>Home State of Iowa</td>
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<tr>
<td>Live in Residence Hall</td>
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<tr>
<td>Admission (Non-Transfer)</td>
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<table>
<thead>
<tr>
<th>Mean ± SD</th>
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<tbody>
<tr>
<td>Age</td>
</tr>
<tr>
<td>Body Mass Index (kg/m^2)</td>
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<tr>
<td>GPA</td>
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Table 4.2. Short-term (8-week) ANOVA results for physical activity, stress, and dietary habit goals.

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<thead>
<tr>
<th>Source</th>
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<th>MS</th>
<th>F</th>
<th>p</th>
<th>Effect Size</th>
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</thead>
<tbody>
<tr>
<td><strong>Physical Activity</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time</td>
<td>1</td>
<td>1721719.52</td>
<td>8.76</td>
<td>&lt; 0.01*</td>
<td>0.07</td>
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<tr>
<td>Goal</td>
<td>2</td>
<td>1576258.68</td>
<td>4.80</td>
<td>&lt; 0.01*</td>
<td>0.07</td>
</tr>
<tr>
<td>Goal*Time</td>
<td>2</td>
<td>26342.02</td>
<td>0.13</td>
<td>0.86</td>
<td>0.01</td>
</tr>
<tr>
<td>Error</td>
<td>127</td>
<td>196592.49</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Stress</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time</td>
<td>1</td>
<td>252.57</td>
<td>26.26</td>
<td>&lt; 0.01*</td>
<td>0.17</td>
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<td>0.04</td>
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<td>14.93</td>
<td>1.55</td>
<td>0.22</td>
<td>0.02</td>
</tr>
<tr>
<td>Error</td>
<td>126</td>
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<td></td>
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</tr>
<tr>
<td><strong>Diet</strong></td>
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</tr>
<tr>
<td>Time</td>
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<td>20.28</td>
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<td>0.14</td>
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<td>1.03</td>
<td>0.36</td>
<td>0.02</td>
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<tr>
<td>Goal*Time</td>
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<td>0.04</td>
<td>0.14</td>
<td>0.87</td>
<td>0.01</td>
</tr>
<tr>
<td>Error</td>
<td>125</td>
<td>0.27</td>
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</table>

*p < 0.05. df = degrees of freedom, MS = Mean squares, effect size = partial eta squared (ηp²).
Table 4.3. One year follow up ANOVA results for physical activity and stress.

<table>
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<tr>
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<th>F</th>
<th>p</th>
<th>Effect Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical Activity</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Time</td>
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<td>3.92</td>
<td>*0.03</td>
<td>0.11</td>
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<td>0.55</td>
<td>0.02</td>
</tr>
<tr>
<td>Error</td>
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<td>154054.69</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Stress</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Time</td>
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<td>2.57</td>
<td>0.06</td>
<td>0.08</td>
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<td>3.69</td>
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<td>Goal*Time</td>
<td>2</td>
<td>13.94</td>
<td>0.90</td>
<td>0.41</td>
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<tr>
<td>Error</td>
<td>62</td>
<td>15.46</td>
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</tr>
</tbody>
</table>

*p < 0.05. df = degrees of freedom, MS = Mean squares, effect size = partial eta squared ($\eta^2$).

**CYDEKICKS RECRUITMENT**

- Recruited
- Completed

Figure 4.1. CydeKicks participant recruitment and study completion by semester.
Figure 4.2. Pre and post self-reported physical activity levels by self-selected goal.

Figure 4.3. Pre and post perceived stress levels by self-selected goal.
Figure 4.4. Pre and post confidence in sticking to healthy dietary habits by self-selected goal.

Figure 4.5. Health coachee total percent change in goal achievement (physical activity, diet, stress) based on paired peer health coach.
Background: Motivational interviewing is a popular conversational health promotion strategy used to evoke intrinsic motivation for behavior change. While a number of training programs have been described to build skills in motivational interviewing there are few examples of controlled studies that evaluate the fidelity of training. The present study helps to fill this gap by evaluating the utility of an online training program designed to build motivational interviewing skills. Methods: This study was conducted as an ancillary component of a school wellness training initiative called SWITCH that focused on building capacity for schools to plan and lead school wellness programming. A quasi-experimental design was used to evaluate the impact of brief motivational interviewing training on a sample of 16 extension field specialists that facilitated the SWITCH implementation process. Extension workers were provided with written guidelines and suggestions for using motivational interviewing to elicit change talk and promote motivation and goal setting by school leaders. A subsample of 8 voluntarily agreed to participate in supplemental motivational interviewing training prior to interacting with the schools. Thus, the study evaluated generalized proficiencies in motivational interviewing of trained workers compared to the untrained sample. The extension workers recorded checkpoint calls with the schools as part of the standard (quality control) practice in the SWITCH project, and a
trained assistant blinded from group allocation coded them for motivational interviewing proficiency levels using the Motivational Interviewing Treatment Integrity Coding Manual 4.2.1. **Results:** A one-way ANOVA followed by Bonferroni post-hoc corrections were conducted to examine differences in motivational interviewing tactics between trained and untrained extension workers. No statistically significant results were found. However, differences between groups for technical global scores (F (1, 14) = 8.9, p = 0.05, d = 1.5) and reflection to question ratios (F (1, 14) = 5.3, p = 0.19, d = 1.15) were approaching statistical significance with large effect sizes. Relational global components (d = 0.76) and total adherence (d = 0.38) resulted in moderate effect sizes. **Conclusions:** This study demonstrates the ability of extension workers to effectively learn the spirit and relational components of motivational interviewing through a brief training protocol. Although proficiency levels were not met by the majority of extension workers, trained individuals were better at using technical and relational aspects of motivational interviewing than untrained individuals completing the same checkpoint calls. Future work should focus on ways to enhance skill acquisition with this type of distributed online training model as well as testing applications with other professionals and other settings.

5.2 Introduction

Motivational interviewing has proven to be an effective communication strategy to promote intrinsic motivation for lifestyle behavior changes including reducing substance abuse, alcohol consumption, tobacco use, increasing healthy eating habits and physical activity levels (Frost, Campbell, Maxwell, Carroll, Dombrowski, Williams, Cheyne, Coles, & Pollock, 2018; Martins & McNeil, 2009). This conversational strategy typically consists of a one-on-one interaction to evoke motivation and uncover importance to work toward making
a change (Rollnick & Miller, 1995). Although established as an effective strategy for behavior change, outcomes related to receiving motivational interviewing have been shown to be dependent on the quality of experience and capabilities of the individual providing motivational interviewing (Lundahl, Kunz, Brownell, Tollefson, & Burke, 2010). Evidence suggests that the skill of motivational interviewing-based health coaching can currently be obtained by anyone that is willing to take the time to learn it within their scope of practice (Huffman, 2016; Wolever & Eisenberg, 2011). However, mastering the skill of motivational interviewing takes practice, supervision, and some level of tailored feedback (Miller & Rollnick, 2009).

The popularity of motivational interviewing has led to considerable interest in developing and testing training methods that can most effectively build competence and proficiency in the use of this conversational strategy (Madson, Schumacher, Noble, & Bonnell, 2013). The most common instructional format in-person workshops. For example, a 21-hour workshop over a 3-day period was offered as an initial training method for professionals working in correctional education (Iarussi, Vest, Booker, & Powers, 2016). This training included visual examples and small group practice sessions, and motivational interviewing fidelity was evaluated before and after the workshop using a techniques questionnaire. Results showed significant increases in the use of motivational interviewing consistent behaviors, skill confidence, and reductions in inconsistent behaviors following this style of training (Iarussi et al., 2016). While this type of intensive training may be optimal, the volume of training is a barrier to broader adoption and utilization of this approach.

To promote broader applications, related work has sought to develop training methods that can efficiently train community-based workers in skills of motivational
interviewing (Beckman, Forsberg, Lindqvist, Diez, Eno Persson, & Ghaderi, 2017; Naar-king, Outlaw, Green-jones, & Wright, 2009). For example, Naar-kin and colleagues (2009) compared fidelity ratings of peer outreach workers against masters’ level public health leaders and clinical psychology individuals following training. Similar scores were achieved following training showing that it is feasible to train community health leaders to implement motivational interviewing in practice (Naar-king et al., 2009). However, meeting proficiency levels of motivational interviewing is still difficult, and training protocols that include supervised practice sessions seem to be key for enhancing proficiency levels (Beckman et al., 2017). Beckman et al (2017) demonstrated that individuals with higher motivational interviewing proficiency levels achieved greater outcomes with their clients. However, another study reported that the most important determinant of positive motivational outcomes was the frequency with which specific motivational interviewing skills were used (Gaume, Gmel, Faouzi, & Daeppen, 2009). While developing proficiency in motivational interviewing is still the goal, it may be sufficient in some applications to simply refrain from motivational interviewing nonadherent tactics such as confronting, arguing, or telling the client what to do. In fact, accumulating evidence suggests that positive outcomes can be achieved in a variety of contexts by simply becoming experts in the spirit of motivational interviewing and not necessarily meeting all proficiency levels (Eno Persson, Bohman, Forsberg, Beckman, Tynelius, Rasmussen, & Ghaderi, 2016). Additional training or catch-up sessions may be necessary to work towards higher proficiency levels or to sustain skills (Tobey, Marcovitz, & Aragam, 2018).

To continue to advance research on motivational interviewing training methods it is important to evaluate different formats and approaches for training. It is also important to test
methods that could be used to more efficiently train community leaders and public health workers in this skill so that it can be more broadly used in practice.

Thus, the aim of this study is to evaluate the effectiveness of a brief hybrid motivational interviewing training protocol for training extension workers to effectively use and apply motivational interviewing skills in practice. The training protocol was developed from a previously evaluated, in-person training model and included a combination of online content delivery followed by supervised workshop sessions.

5.3 Methods

The study was conducted as an ancillary component to an ongoing school wellness training initiative known as SWITCH (School Wellness Integration Targeting Child Health). The project builds on the legacy of an evidence-based obesity prevention project (Gentile, Welk, Eisenmann, Reimer, Walsh, Russell, Callahan, Walsh, Stricklund, & Fritz, 2009), but a novel feature is that the focus has shifted to building capacity for schools to plan and implement school wellness programming on their own. Recent work has demonstrated the feasibility of the implementation process (Chen, Dzewaltowski, Rosenkranz, Lanningham-Foster, Vazou, Gentile, Lee, Braun, Wolff, & Welk, 2018) and subsequent work has now focused on broader dissemination through the state-based extension network (specifically through 4-H youth development program). In the 4-H dissemination plan, county-based extension workers are positioned to provide some of the training and local support; however a key need was to provide base training in motivational interviewing skills since the skill was central to the system-change process developed for the project (Chen et al., 2018). Therefore, the SWITCH project provided an ideal setting to evaluate the utility of a brief hybrid training course for training health professionals in motivational interviewing.
5.3.1 Design and Sample

The present study used a quasi-experimental design to test the utility of a brief training method designed to promote base level competencies in motivational interviewing. County-based extension specialists were provided with opportunities to enroll in an online motivational interviewing training course as part of their preparatory training for facilitating the SWITCH programming in their county. Eight of 16 extension leaders volunteered to participate in the supplemental training. Thus, the study examined motivational interviewing proficiency in individuals that completed the training compared to a sample of leaders that did not complete the training. All 16 leaders were provided with the same basic training on the SWITCH project and this included written guidelines and suggestions for using motivational interviewing to elicit change talk and promote motivation and goal setting by school leaders. It was hypothesized that individuals that completed the motivational interviewing training would have higher proficiency and greater adherence to the spirit of motivational interviewing when interacting with school leaders than those that did not complete the training. Training was delivered in the Fall of 2018 to the 8 volunteers and data were collected from all 16 individuals during scheduled ‘checkpoint’ calls conducted in the middle of SWITCH implementation in the Spring of 2019.

5.3.2 Brief Motivational Interviewing Training Protocol

The motivational interviewing training protocol consisted of six online modules released within a university learning management system that progressed through the steps of learning the skill. It was anticipated that extension workers would complete one lesson each week for six weeks total of online content, while self-directing their own practice sessions and their exploration of activities and resources provided within the learning management
system. The online video content was provided in a voiced-over power point format ranging from 10 to 20 minutes per lesson, not including the self-directed application and practice activities. Weekly readings were available to coincide with the information being portrayed in the online videos for additional review as needed. The self-directed, online training was provided as a ‘professional development’ experience with training times of approximately one hour a week to fit into the extension workers time constraints.

The first lesson introduced the foundations and spirit of motivational interviewing followed by key aspects of listening, resisting the righting reflex, and the motivational interviewing toolbox consisting of open-ended questions, affirmations, reflections, and summaries (OARS). At the training midpoint (Week 3) the motivational interviewing trainer carried out a webinar check-in to promote learning and engagement. This webinar included a 1-hour overview of all online content introduced and provided answers and feedback to the assigned practice activities. The following three lessons then dove deeper into understanding how to evoke change talk, reduce sustain talk, manage resistance, and goal setting.

Upon completion of the online content, extension workers were invited to attend two, 1-hour live workshops during a conference to practice their motivational interviewing skills. Live sessions were coordinated and conducted by the motivational interviewing trainer and a SWITCH program representative to promote learning and use of key motivational interviewing aspects. The first session consisted of basic motivational interviewing skill use and practice activities in a group format. The second session catered directly to the expectations of the checkpoint calls for SWITCH, and how to incorporate motivational interviewing tactics into the action planning call.

5.3.3 Procedures for Phone Calls
Phone calls were conducted by county extension workers in Spring 2019 to aid school staff and wellness committees in goal setting and planning for the implementation of SWITCH. As part of standard training on SWITCH, extension workers were instructed to use conversational techniques to evoke motivation, affirm progress toward goals, and offer resources for healthy changes in the school environment. A simple page of tips and sample questions were provided to assist the extension workers in initiating the discussion with the school core teams. Training calls in SWITCH are recorded as part of the IRB approved evaluation process for SWITCH and these recordings provided the data to evaluate the motivational interviewing training.

5.3.4 Descriptions of Instruments and Data Processing

The Motivational Interviewing Treatment Integrity coding manual version 4.2.1 was used to assess proficiency levels in motivational interviewing after the brief training protocol (Moyers, Manuel, & Ernst, 2015). This coding manual has been modified through several versions, and has shown good to excellent reliability across several raters when evaluated by developers (Moyers, Rowell, Manuel, Ernst, & Houck, 2016).

Methods recommended for proper assessment of motivational interviewing fidelity were taken into account for data collection, coding, and reporting of the data as outlined by Jelsma and colleagues (Jelsma, Mertens, Forsberg, & Forsberg, 2015). A blind coder was assigned to assess motivational interviewing proficiency levels using the specified coding manual. The blind coder was a certified clinical health coach with several accumulated hours of coding experience. All calls (n=16) were recorded by the extension workers, submitted to a research assistant, and then uploaded into a shared drive with no unique identifiers. The
blind coder was then provided with access to this folder to code the individual audio recordings for evaluation.

For all audio recordings the blind coder tallied behavior counts for the full duration of the recording. Upon completion of the call the coder made note of call length and then determined global ratings on the provided 5-point Likert scale within the manual. Calculations to identify proficiency levels were then carried out according to the MITI 4.2.1 coding manual instructions (Moyers et al., 2015).

Three of the county extension specialists recorded and submitted more than one conversation. Therefore, after all conversations were blindly coded (n=21), participants were matched to their specific group (trained or untrained) and an individual average score was calculated and reported for the individuals that submitted more than one recording.

5.3.5 Statistical Analyses

Mean values and ranges of all global ratings and behavior counts coded within the manual were calculated. Standard calculations were made according to guidelines in the MITI 4.2.1 manual (Moyers et al., 2015) to compute key indicators including overall technical and relational global scores, behavior count scoring of percent complex reflections used, overall reflection to question ratio, and total adherent and non-adherent motivational interviewing tactics. A series of one-way ANOVAs were conducted to compare differences in proficiency levels between the trained extension leaders and the untrained leaders. Bonferroni post-hoc corrections were carried out to adjust for alpha inflation. Cohen’s d effect sizes were then calculated to allow interpretation of the magnitude of the differences observed in motivational interviewing skill levels between the trained and untrained groups.
5.4 Results

Motivational interviewing proficiency levels were examined between a group of trained (n=8) and untrained (n=8) county extension field specialists. A total of 21 calls were recorded and submitted for coding by 16 extension field specialists (10 calls by individuals that completed training and 11 by individuals that weren’t trained). Individuals that completed training materials spent an average of 7 hours within the online course management system throughout the 6-week period. The average checkpoint call length conducted by extension workers trained in motivational interviewing were 48.7% longer in duration than those that did not complete any training (27.5 minutes vs. 18.5 minutes).

Descriptive data of all global measures and behavior counts are shown in Table 5.1 for both groups. Table 5.2 and 5.3 report the number of individuals in each group that were able to reach competency and proficiency levels based on the MITI 4.2.1 coding instructions and thresholds. For trained individuals, there was some variability in proficiency on the global measures with 25% achieving proficiency for technical global scores, and 63% meeting proficiency for relational global scores. In the untrained group, no one reached proficiency for technical global scores, and 25% met proficiency for relational global scores. None of the individuals from either the trained or untrained groups met competence or proficiency levels for behavior counts such as using more reflections than questions.

No significant differences were found between groups from the one-way ANOVA analyses following Bonferroni post-hoc corrections and traditional p value criteria. However, the large effect sizes observed may allow for an alternate interpretation of significance, specifically for technical global scores (F(1, 14) = 8.9, p = 0.05, d = 1.5). The reflection to question ratios (F(1, 14) = 5.3, p = 0.19, d = 1.15) were also in the intended direction with the
consideration of effect sizes providing a different way to interpret significance. The large effect sizes for the technical global rating documents that the trained group was more likely to use motivational interviewing adherence tactics to increase client’s language in favor of change (i.e. affirmations, promoting autonomy, and seeking collaboration). Similarly, the large effect size for the reflection to question ratio indicates that the trained leaders were better able to listen and promote engagement through enhanced interactions with the client. Table 5.4 provides a summary of statistical outcomes from the ANOVA analyses and Cohen’s d effect size calculations report large effect sizes for both technical global scores (d = 1.50) and the reflection to question ratios (d = 1.15) between the trained and untrained groups. A moderate effect size was reported for the relational global scores (d = 0.76), and small effect sizes for both total adherence to motivational interviewing (d = 0.38) and the percent complex reflections (d = 0.15). Figure 5.1 provides visual representation.

5.5 Discussion

A brief hybrid motivational interviewing training consisting of online content lectures, self-directed activities, 1-hour webinar check-in, and a 2-hour live workshop seems to be effective in promoting motivational interviewing spirit and basic tactics in recorded phone calls to county extension workers. While the sample is small, these data suggest that the brief training was effective in increasing several aspects of conversational skill, specifically enhancing the ability to cultivate change talk using the adherent components of affirmations, simple reflections, and open-ended questions.

These findings are similar to previous evaluations of brief training protocols (Copeland, McNamara, Kelson, & Simpson, 2015; Eno Persson et al., 2016) highlighting the ease of learning the spirit of motivational interviewing, as well as the challenges of mastering
the technical skills of simple and complex reflections and open-questions. Both the trained and untrained extension workers refrained from using any non-adherent tactics within the checkpoint calls such as confronting, persuading, or telling the school staff what to do. This can be attributed to the guidance provided on the checkpoint call hand out that provided open-questions for both groups to utilize, and directions to promote a healthy partnership (i.e. forming goals together, offering assistance and resources, etc.). The large effect sizes for the technical global rating documents that the trained group had greater adherence tactics to increase client’s language in favor of change (i.e. affirmations, promoting autonomy, and seeking collaboration). Similarly, the large effect size for the reflection to question ratio indicates that the trained leaders were better able to listen and promote engagement through enhanced interactions with the client.

The present study focused on employing motivational interviewing in a group-based setting (one trained individual conversing with two or more school leaders) to motivate and empower school leaders to take coordinated action on school wellness. This is a novel application format since most studies have focused on individualized, one-on-one interactions. However, the approach used to provide motivational interviewing training to enhance interprofessional practice is consistent with approaches used by others to train nurses, allied health professionals and health educators (Cook, Manzouri, Aagaard, O'Connell, Corwin, & Gance-Clevland, 2017). The use of interprofessional practice trainings and continuing education motivational interviewing workshops is common in clinical professions but the current study demonstrates the potential of supplemental training to enhance the use of motivational interviewing practices by extension workers to facilitate utilization in applied settings.
An advantage of the distributed online training tested in this project is that it can be readily modified and customized to meet different needs. Clinicians and health educators may need more specific health-related training for use in patient encounters to learn how to solve situations with more technical skills. In contrast, extension workers may need a more collaborative approach to foster program implementation, and additional knowledge on school wellness programming to enhance relations. Therefore, the motivational interviewing training protocol may need to be customized depending on the nature of the group being trained and the needs of the targeted programming. For example, the spirit of motivational interviewing may be sufficient for some applications while in others trainees may need to be proficient in the technical skills of complex reflections to promote change. Thus, content modifications may be needed to focus on necessary aspects of training, and to provide specific examples from the setting to prepare individuals to use motivational interviewing in the most effective ways (Hardcastle, Fortier, Blake, & Hagger, 2017). Additional research is needed to evaluate the optimal strategies for customizing the training.

Strengths of this study include the naturalistic, quasi-experimental design that enabled the use of motivational interviewing training to be directly evaluated in the real-world application as well as the use of a blinded coder to assess motivational interviewing fidelity of the trained extension workers. The objective coding of the checkpoint calls based on an established and reliable coding manual (Moyers et al., 2015) provided an unbiased way to evaluate the impact of motivational interviewing training since the coder was not aware of who completed the training. This study documents the value of brief trainings for group based motivational interviewing applications and also advances the evidence base on innovative training methods as the field builds capacity to expand motivational interviewing
capabilities in the workforce (Copeland et al., 2015).

Limitations of the current study include a small sample size and limited guidance and accountability for individuals completing the training protocol. The extent of effort to which the extension workers put into the brief training protocol is unknown, however the amount of time spent within the online content management system reports an approximate weekly deduction of one hour. Some individuals also did not complete all of the online content or missed one or more of the in-person workshops. All extension workers conducting the checkpoint calls were given brief overviews of how to conduct the calls using a non-directive approach, which may lead to enhanced results within the untrained group that did not actually complete any of the training. Extension specialists were also able to listen in on the first checkpoint calls conducted by the SWITCH program administrators. During the first checkpoint calls, five of the trained individuals and four of the untrained individuals were present.

Future research should evaluate factors influencing variability in proficiency levels as well as the impact of proficiency on outcomes. This will aid in better understanding of the training protocols needed to obtain favored outcomes. This may also lead to further refinement of systematic evaluation of motivational interviewing proficiency levels. For example, separate assessments could be developed to focus on the specific tactics needed within motivational interviewing trainings to be successful in their field of work. Cook and colleagues (2017) stated that motivational interviewing training has almost become a standard in interprofessional work, and therefore the training duration and fidelity levels anticipated from that determined training warrant further investigation (Cook et al., 2017). Well-powered, controlled studies are also needed to properly evaluate multiple training
strategies. If brief hybrid training protocols are sufficient to train specific groups, it can more readily be disseminated into additional fields of practice for enhanced health and wellness initiatives.

5.6 References


### 5.7 Tables and Figures

Table 5.1. Average MITI 4.2.1 scores between groups for global measures and behavior counts.

<table>
<thead>
<tr>
<th>Item</th>
<th>MI Training Mean ± SD</th>
<th>Range</th>
<th>No MI Training Mean ± SD</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Global Measures</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cultivating Change Talk</td>
<td>4.0 ± 0.8</td>
<td>3 - 5</td>
<td>2.9 ± 0.7</td>
<td>2 - 4</td>
</tr>
<tr>
<td>Softening Sustain Talk</td>
<td>3.3 ± 0.5</td>
<td>3 - 4</td>
<td>2.7 ± 0.5</td>
<td>2 - 3</td>
</tr>
<tr>
<td>Partnership</td>
<td>3.9 ± 1.0</td>
<td>2 - 5</td>
<td>3.5 ± 0.8</td>
<td>2 - 4</td>
</tr>
<tr>
<td>Empathy</td>
<td>3.8 ± 1.0</td>
<td>2 - 5</td>
<td>2.9 ± 0.8</td>
<td>2 - 4</td>
</tr>
<tr>
<td><strong>Behavior Counts</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Giving Information</td>
<td>1.04 ± 0.9</td>
<td>0 - 2</td>
<td>0.8 ± 0.8</td>
<td>0 - 2</td>
</tr>
<tr>
<td>Persuade (Permission)</td>
<td>0.1 ± 0.4</td>
<td>0 - 1</td>
<td>0.04 ± 0.1</td>
<td>0 - 1</td>
</tr>
<tr>
<td>Questions</td>
<td>15.6 ± 8.6</td>
<td>5 - 31</td>
<td>13.4 ± 6.9</td>
<td>6 - 25</td>
</tr>
<tr>
<td>Simple Reflections</td>
<td>6.5 ± 4.4</td>
<td>0 - 12</td>
<td>2.5 ± 1.3</td>
<td>0 - 4</td>
</tr>
<tr>
<td>Complex Reflections</td>
<td>0.5 ± 0.9</td>
<td>0 - 2</td>
<td>0.04 ± 0.1</td>
<td>0 - 1</td>
</tr>
<tr>
<td>Affirmations</td>
<td>2.7 ± 1.8</td>
<td>0 - 6</td>
<td>1.5 ± 1.3</td>
<td>0 - 4</td>
</tr>
<tr>
<td>Seek Collaboration</td>
<td>0.3 ± 0.5</td>
<td>0 - 1</td>
<td>0.9 ± 0.8</td>
<td>0 - 2</td>
</tr>
<tr>
<td>Emphasize Autonomy</td>
<td>0.3 ± 0.5</td>
<td>0 - 1</td>
<td>0.1 ± 0.4</td>
<td>0 - 1</td>
</tr>
<tr>
<td>Persuade</td>
<td>0.0 ± 0.0</td>
<td>0</td>
<td>0.0 ± 0.0</td>
<td>0</td>
</tr>
<tr>
<td>Confront</td>
<td>0.0 ± 0.0</td>
<td>0</td>
<td>0.0 ± 0.0</td>
<td>0</td>
</tr>
</tbody>
</table>

Global measures based on a 5-point Likert scale. Behavior counts tallied and summed.
MI = Motivational interviewing.

Table 5.2. MITI 4.2.1 summary scores, basic competency and proficiency in motivational interviewing of trained individuals (n=8).

<table>
<thead>
<tr>
<th>Item</th>
<th>Mean ± SD</th>
<th>Range</th>
<th>Basic Competence Threshold</th>
<th>Proficiency Threshold</th>
<th>% of Trainees Meeting Basic Competence</th>
<th>% of Trainees Meeting Proficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Global Measures</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Technical Global</td>
<td>3.7 ± 0.6</td>
<td>3.0 - 4.5</td>
<td>3.5</td>
<td>4.0</td>
<td>6 (75%)</td>
<td>2 (25%)</td>
</tr>
<tr>
<td>Relational Global</td>
<td>3.8 ± 0.9</td>
<td>2.5 – 5.0</td>
<td>3.0</td>
<td>4.0</td>
<td>6 (75%)</td>
<td>5 (63%)</td>
</tr>
<tr>
<td><strong>Behavior Counts</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% Complex</td>
<td>0.04 ± 0.1</td>
<td>0.0 - 0.2</td>
<td>0.4</td>
<td>0.5</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Reflection:Question</td>
<td>0.4 ± 0.2</td>
<td>0.0 - 0.6</td>
<td>1.0</td>
<td>2.0</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Adherent</td>
<td>3.3 ± 2.1</td>
<td>1.0 – 8.0</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Non-Adherent</td>
<td>0.0 ± 0.0</td>
<td>0.0</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Global measures based on a 5-point Likert scale. Behavior counts tallied and summed.

% Complex = Percent complex reflections overall, Reflection:Question = Ratio of reflections to questions used.
Table 5.3. MITI 4.2.1 summary scores, basic competency and proficiency in motivational interviewing of non-trained individuals (n=8).

<table>
<thead>
<tr>
<th>Item</th>
<th>Mean ± SD</th>
<th>Range</th>
<th>Basic Competence Threshold</th>
<th>Proficiency Threshold</th>
<th>% of Trainees Meeting Basic Competence</th>
<th>% of Trainees Meeting Proficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Global Measures</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Technical Global</td>
<td>2.8 ± 0.6</td>
<td>2.0 - 3.5</td>
<td>3.5</td>
<td>4.0</td>
<td>1 (13%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Relational Global</td>
<td>3.2 ± 0.7</td>
<td>2.0 - 4.0</td>
<td>3.0</td>
<td>4.0</td>
<td>6 (75%)</td>
<td>2 (25%)</td>
</tr>
<tr>
<td><strong>Behavior Counts</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% Complex</td>
<td>0.04 ± 0.1</td>
<td>0.0 - 0.3</td>
<td>0.4</td>
<td>0.5</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Reflection:Question</td>
<td>0.2 ± 0.1</td>
<td>0.0 - 0.3</td>
<td>1.0</td>
<td>2.0</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
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<tr>
<td>Adherent</td>
<td>2.5 ± 2.1</td>
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<td>N/A</td>
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<tr>
<td>Non-Adherent</td>
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<td>0.0</td>
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</tr>
</tbody>
</table>

Global measures based on a 5-point Likert scale. Behavior counts tallied and summed.

% Complex = Percent complex reflections overall. Reflection:Question = Ratio of reflections to questions used.

Table 5.4. One-Way ANOVA between groups summary table.

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>p</th>
<th>Effect Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technical</td>
<td>1</td>
<td>2.85</td>
<td>8.92</td>
<td>0.05</td>
<td>1.50</td>
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<tr>
<td>Relational</td>
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<td>1.56</td>
<td>2.32</td>
<td>0.75</td>
<td>0.76</td>
</tr>
<tr>
<td>Total Adherent</td>
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<td>2.51</td>
<td>0.58</td>
<td>2.30</td>
<td>0.38</td>
</tr>
<tr>
<td>% Complex Reflections</td>
<td>1</td>
<td>0.00</td>
<td>0.00</td>
<td>4.96</td>
<td>0.15</td>
</tr>
<tr>
<td>Reflection to Question Ratio</td>
<td>1</td>
<td>0.16</td>
<td>5.30</td>
<td>0.19</td>
<td>1.15</td>
</tr>
</tbody>
</table>

df = degrees of freedom, MS = Mean squares, effect size = Cohen’s d. \( *p < 0.05 \).
Figure 5.1. Motivational interviewing conversational skill (MITI) differences between groups.
CHAPTER 6. CONCLUSIONS

Motivational interviewing-based health coaching is a valuable approach to facilitate communication regarding lifestyle behaviors and health decisions. This collaborative strategy is widely used within several realms of health promotion including worksites, clinics, and schools. In order to meet this rising demand for health coaches, proper training methods should be a priority. This dissertation was designed to develop and assess the effectiveness of a protocol to train health coaches and allow for broader dissemination, as well as aid in understanding lifestyle behavior goal achievement in those receiving health coaching.

Study one (Chapter 3) was designed to test the utility of a training course to provide proficient health coaches. This course offered an important opportunity for students to gain the skill of motivational interviewing while in college to allow them to enter the workforce already equipped with this tool. The training also provided credit hours to students to work toward fulfilling requirements of the new health coaching certificate offered at Iowa State University. Another key contribution of the study included systematic methods in evaluating and reporting fidelity levels of the students completing training. Although the upper-level undergraduate students were capable of effectively learning the skill of motivational interviewing, future work should focus on enhancing their ability to utilize more complex and simple reflections as opposed to questions. This is a main priority of motivational interviewing use since the foundations of the skill are based on the facilitation of intrinsic motivation through primarily reflective listening skills.

Study two (Chapter 4) focused on evaluating the effects of peer health coaching on incoming college student lifestyle behavior goals. This study was conducted in parallel to study one to allow for real world practice of the health coaches after their basic training, in
addition to an opportunity to intervene to promote wellbeing in college students. Research reports that the high prevalence of health risks and unhealthy lifestyle behaviors among adults’ warrants intervening at a younger age. Young adults transitioning from high school to college have been labeled an at-risk population due to poor health-decision making likely attributed to the newly gained independence obtained in the transition. Universities need to advocate for college student health and wellbeing for enhanced success during college in addition to throughout adulthood. More universities are starting to offer health coaching programs, but few evaluate the outcomes of lifestyle behaviors that are needed to understand the impact it may have on the health of students. Findings from this study show that students receiving health coaching from peer coaches reported improvements in areas of physical activity, stress management, and dietary habits. Future research should compare outcomes to college students receiving alternative strategies for improvement in lifestyle behaviors to better understand the impact of peer health coaching on college student health-decision making.

Study three (Chapter 5) was conducted to test the dissemination of a brief version of the motivational interviewing training. The training materials from study one were condensed into a brief, 6 lesson online training protocol. This brief training was offered to a group of county extension specialists to aid in effectively communicating with school wellness collaborators. Although this method is not meant to produce experts in motivational interviewing, the extension specialists that completed the brief training elicited enhanced technical, relational and motivational interviewing adherent communication skills. This shortened training protocol could be useful for individuals who would benefit from enhanced communication but may not need to be experts in motivational interviewing. Future work
should continue to investigate the usefulness in providing this style of brief training to other health promotion entities that may benefit from enhanced communication such as student health and wellness coordinators and medical staff.

Following evaluation of the brief training protocol in study three, the content was refined into a fully online voiced-over video package. This training consisted of approximately two hours of online content for trainees to self-direct themselves through an introductory course in motivational interviewing. The training included 6 brief lessons covering the same content as the previous brief training (study 3), in addition to built-in real-world applications, practice activities, and knowledge tests. Development of the applications and practice activities were carefully considered to aid in general applicability of motivational interviewing components into a variety of settings (clinics, higher education, workplaces, etc.). Broad dissemination efforts were then formed to transition the training into a professional development course within a translational research network. The “Motivational Interviewing Training Hub” is a systematically tested and developed online brief training protocol now offered through Iowa State University’s Learn@ISU course management system. This online course provides opportunities to train a wide audience of both Iowa State University affiliated and non-affiliated individuals.

Collectively, this dissertation supports motivational interviewing-based health coach training in both upper level college students and health-related affiliates that have the opportunity to impact and enhance the field of health promotion. Peer health coaching in higher education also provided positive aspects of accountability and support to incoming college students. Recommendations for future work in the field of health coaching include systematic evaluation and interpretation of motivational interviewing proficiency levels,
proper training protocols for specific groups being trained, investigation of the amount of
time needed to receive health coaching to elicit benefits, and differences in long-term
adherence to health behaviors whether or not the accountability of the health coach is
present.
APPENDIX A: KIN 494AB: PRACTICUM IN MOTIVATIONAL INTERVIEWING
COURSE OUTLINE

Lesson 1: Introduction to Health Coaching
▪ Key components of Health Coaching
  o Collaborative, patient-centered, solution-focused
▪ MI Spirit
  o Autonomy, Collaborative, Evocative
▪ Goals of MI
  o Overcoming ambivalence, Evoking motivation, Collaborative support of autonomy

Lesson 2: Introduction to key conversational components
▪ OARS
  o Open-ended Questions, Affirmations, Reflective Listening, Summaries

Lesson 3: Introduction to Active Listening Strategies
▪ Roadblocks to Active Listening
  o Ordering, directing, Commanding, Disagreeing, Judging
▪ Active Listening
  o Encouragements, Reflecting, Effective Pauses
▪ Selective Listening
  o Hearing and interpreting only parts of a message that seem relevant to you

Lesson 4: Introduction to Change Talk and Sustain Talk
▪ Change Talk
  o Client’s statements indicate the person is oriented toward making a positive change, Primary vehicle for resolving ambivalence
▪ Sustain Talk (Ambivalence)
  o Rolling with Resistance, Decisional Balance Strategies

Lesson 5: Introduction to the Conversational Flow Model
▪ Engage, Focus, Evoke, Plan, Close

Lesson 6: Introduction to Negotiating a Plan
▪ SMART goal formation

Lesson 7: Ongoing Situational Practice of Skills (Volunteers)
APPENDIX B: MITI 4.2.1 CODING SHEET

Recording #: ___________________ Coder: ___________________ Date: __/__/____

Global Ratings

<table>
<thead>
<tr>
<th>Technical Components</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>Target Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cultivating Change</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Talk</td>
<td></td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>Softening Sustain</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Talk</td>
<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Relational Components</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Partnership</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Empathy</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Behavior Counts

<table>
<thead>
<tr>
<th></th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Giving Information (GI)</td>
<td></td>
</tr>
<tr>
<td>Persuade (Persuade)</td>
<td></td>
</tr>
<tr>
<td>Persuade with Permission (Persuade with)</td>
<td></td>
</tr>
<tr>
<td>Question (Q)</td>
<td></td>
</tr>
<tr>
<td>Simple Reflection (SR)</td>
<td></td>
</tr>
<tr>
<td>Complex Reflection (CR)</td>
<td></td>
</tr>
<tr>
<td>Affirm (AF)</td>
<td></td>
</tr>
<tr>
<td>Seeking Collaboration (Seek)</td>
<td></td>
</tr>
<tr>
<td>Emphasizing Autonomy (Emphasize)</td>
<td></td>
</tr>
<tr>
<td>Confront (Confront)</td>
<td></td>
</tr>
</tbody>
</table>

Start time and sentence: ____________________________________________________________

End time and sentence: _____________________________________________________________
### APPENDIX C: MITI 4.2.1 GLOBAL SCORING SCALES

#### Cultivating Change Talk

<table>
<thead>
<tr>
<th>Low</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Clinician shows no explicit attention to, or preference for, the client's language in favor of changing</td>
<td>Clinician shows a marked and consistent effort to increase the depth, strength, or momentum of the client's language in favor of change</td>
</tr>
</tbody>
</table>

| 2   | 4    |
| Clinician sporadically attends to client language in favor of change - frequently misses opportunities to encourage change talk | Clinician consistently attends to the client's language about change and makes efforts to encourage it |

| 3   |      |
| Clinician often attends to the client's language in favor of change, but misses some opportunities to encourage change talk |      |

#### Softening Sustain Talk

<table>
<thead>
<tr>
<th>Low</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Clinician consistently responds to the client's language in a manner that facilitates the frequency or depth of arguments in favor of the status quo.</td>
<td>Clinician shows a marked and consistent effort to decrease the depth, strength, or momentum of the client's language in favor of the status quo.</td>
</tr>
</tbody>
</table>

| 2   | 4    |
| Clinician usually chooses to explore, focus on, or respond to the client's language in favor of the status quo, but may show some instances of shifting the focus away from certain talk. | Clinician typically avoids an emphasis on client language favoring the status quo. |

| 3   |      |
| Clinician gives preference to the client's language in favor of the status quo. |      |

#### Partnership

<table>
<thead>
<tr>
<th>Low</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Clinician actively assumes the expert role for the majority of the interaction with the client. Collaboration or partnership is absent.</td>
<td>Clinician actively fosters and encourages power sharing in the interaction in such a way that client's contributions substantially influence the nature of the session.</td>
</tr>
</tbody>
</table>

| 2   | 4    |
| Clinician superficially responds to opportunities to collaborate. | Clinician fosters collaboration and power sharing so that client's contributions impact the session in ways that they otherwise would not. |

| 3   |      |
| Clinician incorporates client's contributions but does so in a lukewarm or erratic fashion. |      |

#### Empathy

<table>
<thead>
<tr>
<th>Low</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Clinician gives little or no attention to the client's perspective.</td>
<td>Clinician shows evidence of deep understanding of client's point of view, not just for what has been explicitly stated but what the client means but has not yet said.</td>
</tr>
</tbody>
</table>

| 2   | 4    |
| Clinician makes sporadic efforts to explore the client's perspective. Clinician's understanding may be inaccurate or may detract from the client's true meaning. | Clinician makes active and repeated efforts to understand the client's point of view. Shows evidence of accurate understanding of the client's worldview, although mostly limited to explicit context. |

| 3   |      |
| Clinician is actively trying to understand the client's perspective, with modest success. |      |

| 4   |      |
|      |      |
APPENDIX D: PRE HEALTH COACH ASSESSMENT SURVEY

Pre Health Coach Assessment Survey

Thank you for choosing to participate in the Health Coaching Practicum Course! Please answer the following questions to help us get some more information about you and your experience in our curriculum. Please answer these questions to the best of your knowledge.

1. Age: __________
2. Gender: __________
3. Year in college: _______________
4. Major: ______________________
5. Career goal: ___________________
6. How did you hear about this class? ____________________________

7. What do you hope to get out of this class?

8. How do you think this will help you with your future college courses or career?
9. Please indicate which courses you have completed or intend to complete in the future.

<table>
<thead>
<tr>
<th>Course</th>
<th>Completed</th>
<th>Plan to Complete</th>
</tr>
</thead>
<tbody>
<tr>
<td>KIN 458: Principles of Fitness Assessment and Exercise Prescription</td>
<td></td>
<td></td>
</tr>
<tr>
<td>KIN 467: Exercise &amp; Health: Behavior Change</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Psych 422: Counseling Theories and Techniques</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Psych 485: Health Psychology</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FSHN 265: Nutrition for Active and Healthy Lifestyle</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FSHN 364: Nutrition and Prevention of Chronic Disease</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FSHN 361: Nutrition and Health Assessment</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

10. Have you received any previous training in Motivational Interviewing? Yes No

11. Are you aware that there is a Health Coaching Certificate available for students to receive at Iowa State University?  

12. Are you interested in getting a Health Coaching Certificate at Iowa State University? Yes No

13. What other previous experiences or skills do you have that may aid you with learning health coaching?
APPENDIX E: POST HEALTH COACH ASSESSMENT SURVEY

Post Health Coach Assessment Survey

Thank you for participating in the Health Coaching Practicum Evaluation study! Congratulations on completing the course. Please answer the following questions regarding your experiences in the course.

1. After completing the health coaching curriculum, I am likely to recommend this experience to a friend.

   0 1 2 3 4 5 6
   Entirely Disagree Mostly Disagree Somewhat Disagree Neither Agree nor Disagree Somewhat Agree Mostly Agree Entirely Agree

2. This course was useful to me.

   0 1 2 3 4 5 6
   Entirely Disagree Mostly Disagree Somewhat Disagree Neither Agree nor Disagree Somewhat Agree Mostly Agree Entirely Agree

3. I am likely to use the skills learned in this course again in the future.

   0 1 2 3 4 5 6
   Entirely Disagree Mostly Disagree Somewhat Disagree Neither Agree nor Disagree Somewhat Agree Mostly Agree Entirely Agree

4. I was provided enough practice time to use motivational interviewing skills during class time.

   0 1 2 3 4 5 6
   Entirely Disagree Mostly Disagree Somewhat Disagree Neither Agree nor Disagree Somewhat Agree Mostly Agree Entirely Agree
5. I practiced my motivational interviewing skills enough *outside* of class time.

<table>
<thead>
<tr>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Entirely Disagree</td>
<td>Mostly Disagree</td>
<td>Somewhat Disagree</td>
<td>Neither Agree nor Disagree</td>
<td>Somewhat Agree</td>
<td>Mostly Agree</td>
<td>Entirely Agree</td>
</tr>
</tbody>
</table>

6. I am *comfortable* using motivational interviewing skills in a conversation.

<table>
<thead>
<tr>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Entirely Disagree</td>
<td>Mostly Disagree</td>
<td>Somewhat Disagree</td>
<td>Neither Agree nor Disagree</td>
<td>Somewhat Agree</td>
<td>Mostly Agree</td>
<td>Entirely Agree</td>
</tr>
</tbody>
</table>

7. I am *confident* using motivational interviewing skills in a conversation.

<table>
<thead>
<tr>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Entirely Disagree</td>
<td>Mostly Disagree</td>
<td>Somewhat Disagree</td>
<td>Neither Agree nor Disagree</td>
<td>Somewhat Agree</td>
<td>Mostly Agree</td>
<td>Entirely Agree</td>
</tr>
</tbody>
</table>

8. What did you like about this class?

9. What did you dislike about this class?

10. What changes would you make to this improve this course?
APPENDIX F: FOLLOW UP HEALTH COACH SURVEY

Follow Up Health Coach Survey

Thank you for participating in the Health Coaching Practicum Course! This follow up survey is to understand how completing the practicum course and acquiring the skills of motivational interviewing has impacted you in the last year. Please answer these questions to the best of your knowledge.

Name: ____________________
Age: _________

Are you still a student at ISU? Yes  No

If you are still a student:

▪ What is your status? Sophomore  Junior  Senior  5th Year  Graduate Program

▪ Major: ____________________

▪ Career Goal: ____________________

If Graduated:

▪ What year did you graduate from college?  _______________

▪ Education Level Obtained:  Bachelors  Masters  Doctorate

Current Occupation: ____________________

Did you obtain the Health Coaching Certificate while at ISU? Yes  No

Did you complete any additional Health Coaching certifications following the completion of the Iowa State Practicum Course (KIN 494)? Yes  No

If yes, what certifications did you complete?

______________________________
Do you still use motivational interviewing skills today?   Yes  No

If yes, how *often* do you use these communication skills on a *regular basis*?

☐ Less than 1 time per month
☐ 1 time per week
☐ 2-3 times per week
☐ Almost every day

In what *situations* do you incorporate the use of motivational interviewing into your daily life?

☐ Professional (career, research)
   Example: ________________

☐ Personal (spouse, friend, family member)
   Example: ________________

☐ Other: ________________
   Example: ________________

The following questions will help us understand how learning motivational interviewing to become a trained peer Health Coach has impacted you in the last year. Please answer to the best of your ability.

1. Motivational interviewing has helped me improve my communication skills.

<table>
<thead>
<tr>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Entirely Disagree</td>
<td>Mostly Disagree</td>
<td>Somewhat Disagree</td>
<td>Neither Agree nor Disagree</td>
<td>Somewhat Agree</td>
<td>Mostly Agree</td>
<td>Entirely Agree</td>
</tr>
</tbody>
</table>
2. Completing a Health Coaching Practicum has helped open the door for research, internship, or career opportunities for me.

3. I have continued providing Health Coaching sessions to individuals following completion of the practicum course at Iowa State University.

4. Completing a Health Coaching Practicum has helped me become more aware of my own health status.

5. Completing a Health Coaching Practicum has helped me adhere to healthier behaviors.

6. I still feel confident I could perform motivational interviewing effectively one year after completing the practicum course.
7. I still feel **comfortable** using motivational interviewing one year after completing the practicum course.

<table>
<thead>
<tr>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Entirely Disagree</td>
<td>Mostly Disagree</td>
<td>Somewhat Disagree</td>
<td>Neither Agree nor Disagree</td>
<td>Somewhat Agree</td>
<td>Mostly Agree</td>
<td>Entirely Agree</td>
</tr>
</tbody>
</table>

8. I feel that my motivational interviewing skills have **declined** one year after completion of the health coaching practicum course.

<table>
<thead>
<tr>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Entirely Disagree</td>
<td>Mostly Disagree</td>
<td>Somewhat Disagree</td>
<td>Neither Agree nor Disagree</td>
<td>Somewhat Agree</td>
<td>Mostly Agree</td>
<td>Entirely Agree</td>
</tr>
</tbody>
</table>
APPENDIX G: LIFESTYLE BEHAVIOR SURVEYS

DEMOGRAPHIC SURVEY
Thank you for choosing to participate in this study! Please answer the following questions to help us get some more information about you and your experience receiving Health Coaching. Please answer these questions to the best of your knowledge.

1. Age: _________

2. Height: ___________ft, inches

3. Weight: __________ lbs

4. Gender: _________

5. How many years have you been at Iowa State University?: ___________

6. Status: (circle one) Freshman Sophmore Junior Senior

7. Major: ________________________

8. Career goal: ___________________________

Please indicate yes, no, or unsure to the following questions regarding your time in high school. Please answer to the best of your knowledge.

9. I was physically active in high school. ____ Yes ____ No ____ Unsure

10. In high school I met physical activity guidelines of 150 minutes of moderate intensity physical activity per week on a regular basis. ____ Yes ____ No ____ Unsure

11. I participated in sports in high school. ____ Yes ____ No ____ Unsure

12. I completed health courses in high school such as Physical Education, General Health Education, Fitness, or Nutrition. ____ Yes ____ No ____ Unsure

13. Physical Education courses were mandatory for me to complete in high school. ____ Yes ____ No ____ Unsure
INTERNATIONAL PHYSICAL ACTIVITY QUESTIONNAIRE (IPAQ) SHORT FORM

1. During the last 7 days, on how many days did you do vigorous physical activities?
   _____ Days per week

2. How much time did you usually spend doing vigorous physical activities on one of those days?
   _____ Minutes per day

3. During the last 7 days, on how many days did you do moderate physical activities?
   _____ Days per week

4. How much time did you usually spend doing moderate physical activities on one of those days?
   _____ Minutes per day

5. During the last 7 days, on how many days did you walk for at least 10 minutes at a time?
   _____ Days per week

6. How much time did you usually spend walking on one of those days?
   _____ Minutes per day

7. During the last 7 days, how much time did you usually spend sitting on a week day?
   _____ Hours per weekday
EATING HABITS CONFIDENCE SURVEY

Please circle one number for each item:

How sure are you that you can do these things?

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>I know I cannot</th>
<th>Maybe I can</th>
<th>I know I can</th>
<th>Does not apply</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Stick to your low fat, low salt foods when you feel depressed, bore, or tense.</td>
<td>1 2 3 4</td>
<td>5</td>
<td>(8)</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Stick to your low fat, low salt foods when there is high fat, high salt food readily available at a party.</td>
<td>1 2 3 4</td>
<td>5</td>
<td>(8)</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Stick to your low fat, low salt foods when dining with friends or co-workers.</td>
<td>1 2 3 4</td>
<td>5</td>
<td>(8)</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Stick to your low fat, low salt foods when the only snack close by is available from a vending machine</td>
<td>1 2 3 4</td>
<td>5</td>
<td>(8)</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Stick to your low fat, low salt foods when you are alone, and there is no one to watch you.</td>
<td>1 2 3 4</td>
<td>5</td>
<td>(8)</td>
<td></td>
</tr>
</tbody>
</table>

PERCEIVED STRESS SCALE

0 = Never   1 = Almost Never   2 = Sometimes   3 = Fairly Often   4 = Very Often

1. In the last month, how often have you been upset because of something that happened unexpectedly? ........................................... 0 1 2 3 4
2. In the last month, how often have you felt that you were unable to control the important things in your life? ................................. 0 1 2 3 4
3. In the last month, how often have you felt nervous and “stressed”? ............ 0 1 2 3 4
4. In the last month, how often have you felt confident about your ability to handle your personal problems? ....................................... 0 1 2 3 4
5. In the last month, how often have you felt that things were going your way? .............................................................................. 0 1 2 3 4
6. In the last month, how often have you found that you could not cope with all the things that you had to do? ..................................... 0 1 2 3 4
7. In the last month, how often have you been able to control irritations in your life? .............................................................. 0 1 2 3 4
8. In the last month, how often have you felt that you were on top of things? .......................................................... 0 1 2 3 4
9. In the last month, how often have you been angered because of things that were outside of your control? ................................. 0 1 2 3 4
10. In the last month, how often have you felt difficulties were piling up so high that you could not overcome them? ....................... 0 1 2 3 4
APPENDIX H: MOTIVATIONAL INTERVIEWING SESSION ANALYSIS SURVEY

The following survey questions will examine specific components of Motivational Interviewing (MI) with participants. Please complete the survey for each individual Health Coachee Participant following the completion of the four Health Coaching sessions. There is no right or wrong answer, please try to recall each conversation to the best of your ability.

Enter the Health Coachee (Participant) ID # or name.

________________________________________________________________

Were you and the coachee able to form a behavior change (SMART) goal during the course of the first session?

- Yes
- No

On the following scale from 0 to 100 (0=no resistance, 100=fully resistant), please indicate the level of resistance to change that you encountered while working with this participant.

Level of Resistance to Change

________________________________________________________________

On the same scale of 0 to 100, how did the level of resistance change during the following sessions with this particular participant?

Level of Resistance to Change

________________________________________________________________

If applicable, how did you deal with the barriers to change of this coachee? Give specific examples of what phrases or Motivational Interviewing components were used.

For Example: "I used reflective statements with the client to weigh the pros and cons of the decision in order to help them see more positive aspects of making this change."
What MI techniques were **most natural** for you to use during your sessions with this coachee? Select your top 3 choices.

- Reflective listening
- Open-ended questions
- Affirmations
- Summaries
- Rolling with resistance
- Resisting the righting reflex

What MI techniques were **most necessary** for you to use during your sessions with this coachee in order to keep the conversation going? Select your top 3 choices.

- Reflective listening
- Open-ended questions
- Affirmations
- Summaries
- Rolling with resistance
- Resisting the righting reflex

Rate the **ease of collaboration** you experienced with this coachee. (Easy collaboration would suggest that you did not struggle to aim for coached-centered conversations and focus on the individual; difficult collaboration would suggest that client-centered conversations took more effort to achieve.)

- Extremely easy
- Moderately easy
- Slightly easy
- Neither easy nor difficult
- Slightly difficult
- Moderately difficult
- Extremely difficult
How would you rate the overall quality of your conversations with this coachee?

Please answer focusing on the coachee response instead of your own coaching efforts.
- Far above average
- Moderately above average
- Slightly above average
- Average
- Slightly below average
- Moderately below average
- Far below average

How easy or difficult was it for you to evoke conversation when talking to this individual?
- Extremely easy
- Somewhat easy
- Neither easy nor difficult
- Somewhat difficult
- Extremely difficult

On average, how much time did you spend coaching this individual? (Please answer in minutes/session.)

____________ Mins/session

Did the coachee accomplish his or her primary goal?
- Yes
- No

Did the coachee verbally communicate that they enjoyed meeting with you?
- Yes
- No

How would you describe the outcome of MI sessions with this individual?
- Extremely effective
- Very effective
- Moderately effective
- Slightly effective
- Not effective at all
APPENDIX I: INSTITUTIONAL REVIEW BOARD APPROVAL FOR STUDY

Iowa State University
OF SCIENCE AND TECHNOLOGY

Institutional Review Board
Office for Responsible Research
Vice President for Research
2420 Lincoln Way, Suite 202
Ames, Iowa 50014
515 294-4566

Date: 04/29/2019
To: Gregory Welk, Ph.D.
From: Office for Responsible Research
Title: Evaluation of a Motivational Interviewing Training Practicum
IRB ID: 16-314
Submission Type: Modification
Review Type: Expedited
Approval Date: 04/29/2019
Approval Expiration Date: 06/20/2020

The project referenced above has received approval from the Institutional Review Board (IRB) at Iowa State University according to the dates shown above. Please refer to the IRB ID number shown above in all correspondence regarding this study.

To ensure compliance with federal regulations (45 CFR 46 & 21 CFR 56), please be sure to:

- Use only the approved study materials in your research, including the recruitment materials and informed consent documents that have the IRB approval stamp.
- Retain signed informed consent documents for 3 years after the close of the study, when documented consent is required.
- Obtain IRB approval prior to implementing any changes to the study or study materials.
- Promptly inform the IRB of any addition of or change in federal funding for this study. Approval of the protocol referenced above applies only to funding sources that are specifically identified in the corresponding IRB application.
- Inform the IRB if the Principal Investigator and/or Supervising Investigator end their role or involvement with the project with sufficient time to allow an alternate PI/Supervising Investigator to assume oversight responsibility. Projects must have an eligible PI to remain open.
- Immediately inform the IRB of (1) all serious and/or unexpected adverse experiences involving risks to subjects or others; and (2) any other unanticipated problems involving risks to subjects or others.
- IRB approval means that you have met the requirements of federal regulations and ISU policies governing human subjects research. Approval from other entities may also be needed. For example, access to data from private records (e.g., student, medical, or employment records, etc.) that are protected by FERPA, HIPAA, or other confidentiality policies requires permission from the holders of

IRB 01/2019
APPENDIX J. INSTITUTIONAL REVIEW BOARD APPROVAL FOR STUDY

**IOWA STATE UNIVERSITY**

**Institutional Review Board**
Office for Responsible Research
Vice President for Research
2420 Lincoln Way, Suite 202
Ames, Iowa 50014
515-294-4566

**Date:** 07/02/2018

**To:** Gregory Wells, Ph.D.

**From:** Office for Responsible Research

**Title:** Effects of Health Coaching on College Students' Lifestyle Behaviors

**IRB ID:** 16-315

**Submission Type:** Continuing Review & Modification

**Review Type:** Expedited

**Approval Date:** 06/29/2018

**Date for Continuing Review:** 06/23/2020

The project referenced above has received approval from the Institutional Review Board (IRB) at Iowa State University according to the dates shown above. Please refer to the IRB ID number shown above in all correspondence regarding this study.

To ensure compliance with federal regulations (45 CFR 46 & 21 CFR 56), please be sure to:

- **Use only the approved study materials** in your research, including the recruitment materials and informed consent documents that have the IRB approval stamp.

- **Retain signed informed consent documents** for 3 years after the close of the study, when documented consent is required.

- **Obtain IRB approval prior to implementing any changes** to the study.

- **Inform the IRB if the Principal Investigator and/or Supervising Investigator end their role or involvement with the project** with sufficient time to allow an alternate PI/Supervising Investigator to assume oversight responsibilities. Projects must have an eligible PI to remain open.

- **Immediately inform the IRB of (1) all serious and/or unexpected adverse experiences involving risks to subjects or others; and (2) any other unanticipated problems involving risks to subjects or others.**

- **Stop all human subjects research activity if IRB approval lapses,** unless continuation is necessary to prevent harm to research participants. Human subjects research activity can resume once IRB approval is re-established.

- **Submit an application for Continuing Review** at least three to four weeks prior to the date for continuing review as noted above to provide sufficient time for the IRB to review and approve continuation of the study. We will send a courtesy reminder as this date approaches.

IRB 03/2018
The project referenced above has received approval from the Institutional Review Board (IRB) at Iowa State University according to the dates shown above. Please refer to the IRB ID number shown above in all correspondence regarding this study.

To ensure compliance with federal regulations (45 CFR 46 & 21 CFR 56), please be sure to:

- **Use only the approved study materials** in your research, including the recruitment materials and informed consent documents that have the IRB approval stamp.

- **Retain signed informed consent documents** for 3 years after the close of the study, when documented consent is required.

- **Obtain IRB approval prior to implementing any changes** to the study or study materials.

- **Promptly inform the IRB of any addition or change in federal funding for this study.** Approval of the protocol referenced above applies only to funding sources that are specifically identified in the corresponding IRB application.

- **Inform the IRB if the Principal Investigator and/or Supervising Investigator end their role or involvement with the project** with sufficient time to allow an alternate PI/Supervising Investigator to assume oversight responsibility. Projects must have an eligible PI to remain open.

- **Immediately inform the IRB of (1) all serious and/or unexpected adverse experiences involving risks to subjects or others; and (2) any other unanticipated problems involving risks to subjects or others.**

- **IRB approval means that you have met the requirements of federal regulations and ISU policies governing human subjects research. Approval from other entities may also be needed.** For example, access to data from private records (e.g., student, medical, or employment records, etc.) that are protected by FERPA, HIPAA, or other confidentiality policies requires permission from the holders of...