DEVELOPMENT OF AN INSTRUMENT MEASURING

ORAL HEALTH LOCUS OF CONTROL:

RELATIONSHIP TO GENERAL HEALTH LOCUS OF

CONTROL, ORAL HEALTH CARE EXPERIENCE,

AND ORAL HEALTH VALUE

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PREFACE

This study was conducted to contribute to empirical knowledge in applying locus of control as a personality construct. The purpose is to help health educators in creating new ways to inspire people to seek oral health treatment and comply with dental provider treatment recommendations. Few studies exist in the literature with regard to oral health treatment and oral health seeking behavior. This study was meant to inspire new research in this area acknowledging the importance of oral health in maintaining overall good health.

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CHAPTER I

INTRODUCTION

The benefits of regular dental visits to receive preventive care as well as for

treatment of episodic and chronic dental problems are generally well established and

accepted within the dental profession. However, it is also known that many adults in the

United States have not visited a dental provider in their lifetime. Many others who have

visited dental providers do not comply with treatment recommendations and may not

return for follow-up visits. Some have never had oral health symptoms but go for care

while others, in spite of the presence of symptoms, do not go for dental care. Beliefs and

values within the general adult population associated with these behaviors are not well

understood.

Health researchers, in addition to health providers, have long recognized that

individual beliefs and values about maintaining or regaining health as evidenced by one's

behavior falls under the theoretical domain of locus of control (LOC) as defined by J.B.

Rotter's social learning theory (Rotter, 1954). After decades and many empirical studies,

this psychological construct was generally accepted as having a three-dimensional

structure: Internal LOC, Powerful Others LOC, and Chance LOC (Wallston, Wallston, &

DeVellis, 1978).   Studies have shown positive correlations between internal locus of

control and health information seeking behavior (Wallston, Maides, & Wallston, 1976) as

well as compliance behavior with recommended medical regimens such as encountered

in hypertension (Lewis, Morisky, & Flynn, 1978) and weight reduction (Balch & Ross,

1975) programs. However, some studies have shown positive correlations between internal locus of control and smoking (Straits & Sechrest, 1963), an association that is inconsistent with other health and risk behavioral theories. Equivocal study findings support an argument that locus of control may be dependent upon expectancy reinforcement experiences associated with specific health conditions rather than being a personality trait invariant across experiences and conditions. The nature of this equivocal result appears to center around values, needs, expectancies, and prior learning history or experiences that represent independent variables excluded from most other studies.

The mechanism by which visit experience with the healthcare system works to impact different expectancy reinforcements may be conceptualized through health behavior models of behavior change and learning. *The Theory of Reasoned Action and the Theory of Planned Behavior* posits that an individual learns or changes behavior because of two major factors: 1) attitude or beliefs about outcomes, motivation, and the value of the outcomes; and 2) norms or the influence of other people and motivation toward compliance with other people's opinions (Ajzen & Fishbein, 1980 and Fishbein & Ajzen, 1975).   The current study incorporated LOC, the influence of an individual's perceived control over the opportunities, resources, and skills necessary to reach the outcome, with the major factors of these behavior change models.

Locus of Control has been related to physical and psychosocial outcomes resulting from chronic illness and treatment, as well as with preventive behavior. Scales to measure both physical and psychosocial outcomes have been developed and utilized with some success (Balch & Ross, 1975; Flowers, B. J., 1993; Galgut, Waite, Todd-Pokropek, & Barnby, 1987; Wallston et al. 1978). Much less attention, however, has

been given to oral health outcomes. One reason for this has been the dearth of adequate measures that assess Locus of Control and its effect on oral health behavior. The most recognized multidimensional health locus of control scale (MHLC) utilized to measure general health (Wallston et al., 1978) was not recommended by its authors for use with other more specific health conditions such as oral health behavior. However, a modification of the general form of the existing MHLC scale may be a useful step toward developing an appropriate tool for assessing oral health behavior as it relates to the locus of control construct.

Among the more important findings from utilization of the MHLC scales was that locus of control was differentially related to various health behaviors and conditions. A limited empirical foundation describes whether locus of control may be related to oral health behavior and in what way. For general health conditions, the MHLC measurement scales have been of some value to healthcare providers and health educators by illuminating more effective pathways and patient-provider communication techniques that may lead to more positive patient behaviors and better health outcomes based on locus of control orientation. An oral health specific locus of control scale may be useful in much the same way for many oral health providers and oral health educators within a number of education, treatment, and outcome settings. Building upon the existing, but limited empirical foundation may contribute to a better understanding of oral health-seeking behavior; whether a matter of belief in random chance, one's own internal beliefs, or through belief in powerful others outside of one's self.

The purpose of this research was to develop a locus of control measurement tool to assess locus of control orientation for oral health specific behavior. This scale, Locus

of Control Oral Health (LOCOH), potentially has usefulness in predicting oral health behaviors. For example, it is generally believed that the more one believes in chance expectancy; the more unlikely one is to comply with provider treatment recommendations; that is, the lower the level of self-reported compliance behavior. An oral health provider able to predict a high likelihood of low compliance behavior before the initial treatment could take action by insuring shorter-interval treatment follow-up visits, increasing intensity of communication with the patient in the office through use of a dental hygienist, or pursuing alternative means to achieve positive oral health outcomes.

The current study will extend the work of Wallston et al. (1978) and others by developing oral health-specific measurement LOC scales. The Locus of Control Oral Health scale (LOCOH) was developed for this study to assess the locus of control dimensions underlying the construct, specifically with regard oral health behavior. Evidence for the validity of this newly developed scale will be presented in this study. The relationship of scores on the LOCOH to participants' health status considering the value they place on oral health value will be examined for evidence of the instrument's usefulness in predicting oral health behavior. Health status classifies persons on the basis of whether or not they have made oral health visits over the previous 12 months and whether or not they are symptomatic. By understanding these associations, future research can be undertaken in other studies to assess the odds of engaging in a certain behavior with graded changes in the multidimensional health locus of control scores specific to oral health. If a specific LOC dimension can be associated with health status and value placed on oral health, then educators, oral health care providers, and others

may be able to increase the effectiveness of oral health messages, prevention practices, treatment seeking, and treatment compliance for oral health regimens.

Formal Statement of the Problem

It is important to assess the locus of control construct across a range of health behaviors to determine differences that may exist in its application to particular behaviors. Oral health education utilizes many principles of behavioral health change along with learning models to affect prevention practices and adherence to treatment regimens. However, the value of the LOC construct as a tool to increase the effectiveness of oral health interventions has not been explored. Aligned with the concern that research studies relative to health behavior and locus of control require more scientific rigor, there is a relatively basic need to develop an understanding of the use of the construct that is specific to oral health behavior. Important variables associated with the construct must be identified and expressed through the development of a measurement tool and examined for prediction purposes.

Oral health care offers opportunity to demonstrate correlates of behaviors with a three-factor LOC construct over a range of health experience behaviors in a way that may not be available using experience behaviors associated with other health conditions. Oral health prevention messages at the community level offer self-care practices of real and practical value (e.g., flossing and brushing) for individuals who may not see a dental professional at all; those who do see dental professionals receive preventive instruction in the provider's office. Dental providers also recommend treatment regimens and follow-up behaviors (e.g., pulling decayed teeth, taking pain medication) for acute oral health problems or symptoms among those who visit dental offices. Treatment of chronic oral

health problems such as gingivitis and periodontitis associated with chronic physical health problems such as diabetes or heart disease require individual compliance behaviors necessitating an ongoing relationship with a dental provider. All three behaviors (preventive, illness or episodic, and sick or chronic) are expressed in the oral healthcare system offering the opportunity to better understand how LOC impacts visit behavior when one may or may not be symptomatic. Many U.S. residents have never seen a dental professional over their lifetime nor considered their oral health or its value in overall physical health. This, too, offers an opportunity to explore oral health value among the general adult population.

The value of oral health is important to prediction of oral health behavior. According to Wallston et al. (1978) and others, unless oral health is valued with some degree of sufficiency such that certain behaviors result, there is no theoretical basis to expect the Locus of Control construct to be associated with behaviors taken to maintain or regain good oral health. Long-term experiences with illness and health habits have been shown to be a function of health habits; thus, health value may be learned behavior (Lau, Hartman, & Ware, 1986). For this reason, health as a value should be an integral part of any research studying health behavior and specifically oral health behavior.

The current study is expected to show differential associations between the three-factor locus of control construct and health status and value ascribed by the individual to oral health. The association of a specific dimension of the construct with a specific experience level indicated through health status, along with an understanding of value placed on oral health may enable health educators, oral health care providers, and others

to increase the effectiveness of oral health messages, prevention practices, treatment seeking, and treatment compliance for oral health regimens.

The work of Wallston, Maides, & Wallston (1976) offers support to the idea that differences in locus of control orientation may be related to the experiences one has had with reinforcement expectancy.   If reinforcement expectancy differs with experience in the health care system, then clinical experience (non-clinical, clinical, post-clinical, and pre-clinical) should provide a way to assess this supposition. Namely, if persons among the clinical group have high internal LOCOH and high health value, but persons among the non-clinical group also have high internal LOCOH and high health value, then the construct has not provided additional information useful in developing health messages or communicating treatment recommendations. However, if persons among the clinical group are more oriented toward powerful others and non-clinical responders are more oriented toward internality given that both groups value oral health highly, then the construct will be useful in developing interventions and health promotion messages, as well as assisting providers to affect treatment compliance.

The current research is designed to add to the literature using three-factor scales representing the oral health LOC construct by identifying four health status groups representing differing reinforcement expectancies specific to oral health visit experience behaviors: pre-clinical (anticipating care), clinical (under care), post-clinical (after care), and non-clinical (not anticipating, not receiving care recently, nor under care). The expected relationships of the LOC dimensions among persons who highly value oral health were reasoned based on the findings from previous investigators. The Powerful Others dimension was expected to be associated with clinical and/or post-clinical oral

health status. Persons with a Chance orientation were expected to be associated with pre-clinical oral health status and persons with an Internality orientation were expected to be associated with non-clinical oral health status.

The problem is that LOC has not been explored with regard to oral health using an oral health specific multi-dimensional measurement tool. Additionally, the association of LOC for oral health has not been examined with regard to the predictability that may exists for some oral health behaviors. Value placed on oral health has not been assessed to determine its usefulness in the prediction of oral health behaviors. The results from this study will increase knowledge with regard to the use of the three-factor LOC construct and how its use may increase effectiveness of oral health interventions. Knowing and understanding oral health value and the perceived agent of control may help providers develop more effective communication tools that increase patient compliance with treatment regimens and help to increase provider and educator knowledge with regard to patient intention and motivation, including attitudes toward oral health.

Purpose of the Study

This study is intended to examine the relationship of the locus of control construct to oral health behaviors using a newly developed instrument designed by the researcher to assess three dimensions, or factors, of the construct for oral health (internality, powerful others, and chance), the Locus of Control Oral Health Scale (LOCOH). The study will also examine the effects that personal value ascribed to oral health has on the relationship between LOC dimensions and the outcome variable for oral health behaviors. The outcome variable (health status) is an important variable that may help to explain how oral health behaviors affect the construct dimensions (or how the construct

dimensions affect experience behaviors). The four levels of the health status variable represent different oral health behaviors. The specific aim of the study is to answer the following research questions:

1. What are the lower bounds of internal consistency reliability for scores on each of the 3 LOCOH scales?

2. What are the lower bounds of internal consistency reliability for scores on the Oral Health Value (OHV) scale?

3. What are the lower bounds of internal consistency reliability for scores on each of the 3 Multidimensional Health LOC scales (MHLC)?

4. What is the relationship between general health LOC and oral health LOC?

5. Do LOCOH and OHV scores predict health status? Among persons who value oral health, does LOCOH predict health status?

Variables of Interest

The variables of interest in this study include oral health provider visit experience (health status), value ascribed to oral health (value), and three dimensions of the oral health Locus of Control (LOC) construct (internality, chance, and powerful others). The health status variable was determined using the number of visits to a dental provider over the previous 12 months along with individual symptoms or lack of symptoms as follows:

- Those who have <u>not</u> seen a dental provider in the past year and who have <u>not</u> reported symptoms are considered *non-clinical*;

- Those who have <u>not</u> seen a dental provider in the past year and who have reported symptoms are considered *pre-clinical*;

- Those who have seen a dental provider in the past year at least once for non-hygiene care and have reported symptoms are considered *clinical*; and,

- Those who have seen a dental provider in the past year at least once for non-hygiene care and have <u>not</u> reported symptoms are considered *post-clinical*.

Reasoning regarding the visit experience health status variable involved rationale supported by the literature. By visiting an oral health provider, the respondent gains experience with the oral healthcare system unless visits were exclusively for prevention purposes, e.g., cleaning. Provider visits increase an individual's understanding of the healthcare system and influence expectancy for oral health outcomes. Preventive visits, however, may or may not influence expectancy for oral health outcomes through provider visits since few or none of these visits are likely to involve serious patient symptoms. Preventive visits may be a way to use dental insurance benefits or take a sick day from work, etc. For this reason, preventive visits were excluded in the development of the health status variable. Pre-clinical and clinical groups were symptomatic but the pre-clinical group reported no hygiene visits to an oral health provider. Non-clinical and post-clinical groups were not symptomatic but the non-clinical reported no hygiene visit to the provider.

The variable, oral health symptoms, was utilized in the study to mean those responders who had the most serious oral health symptoms. Serious oral health symptoms were chosen from among a list of twenty-one symptom descriptors by five community and university-based dentists resulting in the following five symptoms: abscess, difficulty swallowing, toothache, pain, and broken denture/tooth/filling. The purpose of choosing from among the list of descriptor symptoms was to gain more

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specificity in assessing the usefulness of the prediction model in this study. Therefore, the pre-clinical and clinical groups comprised only those who were seriously symptomatic where one or more of the above serious oral health symptoms were indicated by the responder.

The Oral Health Value (OHV) scale was developed to measure oral health value. OHV potentially assesses the importance of oral health to the respondent. Four items on the questionnaire comprising the oral health value scale measured the latent variable 'value'. Items used in the scale were adapted from Lau, et al. (1986) Health As a Value Scale, as a health value scale for general health.

The 75-item instrument developed for this study used a six-choice, Likert-like response format. The instrument comprised seven total scales: three specific to oral health (LOCOH), three specific to general health (MHLC), and one specific to oral health value (OHV). Other items were included to determine health status. Some item stems used for the new instrument were based on the Wallston et al. (1978) Multidimensional Health Locus of Control scales but were phrased for oral health behavior specifically. In addition, other items were also developed and included in the LOCOH scales that had not been a part of the MHLC scales.

This research is designed to describe the relationships among the variables of interest: health status (clinical, pre-clinical, post-clinical, and non-clinical), oral health value, and oral health LOC dimension (internality, chance, and powerful others). If the pattern of the relationships can be identified, oral health care status levels may likely indicate the type of LOC agent believed to most affect the participant's outcome under those circumstances. This prediction may enable providers and health educators to

design interventions specific to the expectancy reinforcement that increases individual

prevention practices or treatment effectiveness.

Definition of Terms

The Locus of Control Construct was theorized by Julian B. Rotter and can be

thought of as the personal (internal) agent where control of expectancy reinforcement

lies. It is a personality construct referring to an individual's belief that success or failure

in behavior choices is determined by one's own actions, the actions of powerful others, or

by chance with an unidentifiable or unnamed agent assumed responsible. Rotter's (1954)

definition was based on the internal versus external control of reinforcement continuum:

> When a reinforcement is perceived by the subject as following some
> action of his own but not being entirely contingent upon his action, then,
> in our culture, it is typically perceived as the result of luck, chance, fate, as
> under the control of others, or as unpredictable because of the great
> complexity of the forces surrounding him. When the event is interpreted
> in this way by an individual, we have labeled this a belief in external
> control. If the person perceives that the event is contingent upon his own
> behavior or his own relatively permanent characteristics, we have termed
> this a belief in internal control (Rotter, 1954).

Reinforcement refers to the negative or positive rewards resulting from beginning,

continuing, or ending a behavior. Expectancy is the belief in 'receiving in the future'

given that one takes certain actions now or that one has taken certain actions in the past.

Combining expectancy with reinforcement then means the perception of receiving

rewards, success, or failure when certain actions or behaviors are carried out.

Value ascribed to oral health can be defined as the belief that attainment or

maintenance of oral health is or is not important within the context of life's circumstances

on a personally defined rating scale. Value placed is based on an individual's normative

beliefs as explained in Rotter's Social Learning Theory (Rotter, 1954) and theorized by

Fishbein in his model of behavior intentions (Fishbein & Ajzen, 1975). Rotter (1966), as well as Wallston, Maides, and Wallston (1976), argued that the value of the reward of the behavior must be taken into consideration when measuring health behaviors.

Oral health behaviors can be considered: a) non-clinical or preventive and subject to expectancy reinforcement and the influence of general (community level) oral health promotion messages; b) pre-clinical and subject to expectancy reinforcement about the oral health system that may be anticipated because of symptoms within the previous 12 months and discussions with others who have used the oral health system; c) post-clinical and subject to previously received reinforcement in past use of the oral health system; and, d) clinical and subject to treatment compliance or sickness response because of experience with the oral health system within the previous 12 months. Kasl & Cobb (1966) offer the basis for identifying and utilizing health status levels in this study. These investigators conceptualized the various health behavior groups: prevention behavior, illness behavior, and sick-role behavior. 'Prevention' is behavior before symptoms appear; 'illness' is behavior once symptoms appear; 'sick-role' is behavior that follows recent health care provider encounters specifically to include diagnosis and treatment of symptomatology. In this study, sick-role behavior was distinguished further by separating clinical from post-clinical. The distinction of post-clinical from clinical was necessary in this study to extend the model which was defined as inclusive of the presence or absence of serious symptoms when oral provider visits had occurred.

Significance of the Study

Little is known about behaviors that contribute to increased effectiveness of common prevention practices in the general adult population, compliance with

recommended prevention practices, adherence to provider treatment recommendations or regimens, nor treatment seeking; including the utilization of health messages for the general public with regard to oral health. Dental caries and periodontal disease are among the most widespread chronic diseases that affect mankind. The importance of healthy teeth and gums cannot be understated. Oral health affects speech, self-esteem, nutrition, and general overall wellness. An estimated 25 million individuals reside in areas lacking adequate dental care services, as defined by Health Professional Shortage Area (HPSA) criteria. Because there are large numbers of persons in the U.S. who have neither had dental problems nor seen a dental provider and others who have had dental problems but may or may not have seen a dental provider, an important opportunity presents itself to us to better understand the relationship between expectancy reinforcement and specific oral health behaviors when high or low value is ascribed to oral health (U.S. Surgeon General, 2000).

This study has important implications for refining the research on the Locus of Control construct. Findings from this study will contribute empirically to the understanding of the three-dimension Locus of Control construct and begin laying a foundation for understanding the three-dimensions of LOC with regard to oral health behavior. Additional research is expected from the findings of this study. It is anticipated that an increased understanding of the construct may enhance future prediction of oral health behaviors as well as increase the effectiveness of oral health interventions and oral health messages based on knowledge about the construct dimensions. For example, internally oriented persons may better adopt positive oral health practices by attending programs or utilizing messages at the community level

focused on providing an increase in knowledge and influence of social norming, or through education from experts. Persons who are more externally oriented may adopt positive oral health practice behavior change through the influence of a type of health message utilizing social influence as the control agent (powerful others).   Chance-oriented persons' health seeking behavior may be more positively influenced through messages utilizing incentives or other inducements to get their attention. Having access to information concerning a population's perceived behavioral outcomes and perceived control agent may enable health educators and providers to tailor approaches to deliver general health messages, reduce delays in seeking treatment, and influence compliance with treatment recommendations for individual patients. Use of the scales may enable dental hygienists and dental providers to deliver treatment regimens for those who seek treatment in a way that increases patient population compliance and contributes to patient satisfaction with the oral health system.

Assumptions

The underlying paradigm or knowledge claim for the current study is constructivist based on the assumption that truth changes as more information is gained. Socrates (~300 B.C.) expressed this paradigm succinctly when he stated 'knowledge is only perception' and in the opinion of this investigator, current perception. While not a radical constructivist, this investigator holds to the idea that meaning is constructed through social interactions and environmental contexts which stimulate cognition and thusly, current beliefs. Learning is a process, or a journey, and not a product. We come to learn the knowledge of others by interpreting their language and actions through our

own meaning or realities, striving to understand both as we move through the process. In this way, we can never take any reality as fixed.

Primary contributors of the framework for conceptualizing constructivism, in my mind, were Jean Piaget (1985), Lev Vygotsky (1978), and J. Bruner (1986). Vygostky's expression of constructivism more closely approximates what I choose to believe. He believed that human development and learning occurs through interaction with one's environment and the other people in it. In his "Zone of Proximal Development", Vygosky conceptualized that learning is a continual movement from the current intellectual level to a higher level, more closely approximating the learner's potential.

The current research adds value to what I consider to be constructivism. I believe locus of control for oral health may be a construction of meaning, a journey, based on social interactions and environmental contexts. It is clear from other studies that locus of control is not constant across health conditions. Hence, there is a need to study each health condition and the specific association of locus of control on that condition. I believe this research offers new insights building on that foundation.

Limitations

The results and conclusions of this study may be limited by the utilization of the classification approach. The analysis calls for identifying individuals as oriented toward internal, powerful others, or chance as the agent of control, either with high or low health values, and as belonging to different levels of experience groups. While classifying in this way has the advantage of higher order interactions, it may suffer from the somewhat artificial and arbitrary classification procedures. To minimize this limitation, classification procedures have been based on previous empirical evidence and the

utilization of analytical techniques that take these assumptions into consideration. Other researchers have utilized the classifications in other studies with known outcomes (Galgut et al. 1987) and Kneccki, Syrjala, & Knuuttila, 1999).

Some investigators question the use of Likert-like response scales as interval-type data. The instrument developed in this study used a six-point, Likert-like scale response format anchored by 'strongly agree' and 'strongly disagree'. This type of scale has been utilized successfully in other similar studies requiring linearity without significant adverse effects on the expected findings.

Respondents were asked to answer all survey questions honestly and to the best of their ability. There was some concern about acquiescence bias since oral hygiene is considered a socially acceptable behavior. It is believed, however, that acquiescence bias was minimized to some extent by the participant recruitment locations chosen. The locations were community-based as opposed to dental or clinically based (i.e., dental office or clinic, screening clinic, or commercial company location selling its dental product). Recruitment of participants in a community-based setting by a researcher who was not a dentist or dental hygienist also contributed to the minimization of acquiescence bias. The participants were also told that there were no right or wrong answers for the questionnaire. Because of these factors, it is believed that acquiescence bias was substantially reduced.

It is possible that the characteristics of those comprising the sample could limit generalizability. Persons obtained for the study were considered a convenience sample. The study sample consisted of a heterogeneous mix of persons primarily obtained from among students at a small mid-central state university campus in the United States, but

also included persons found in churches, community centers, and at strip shopping malls in three other cities. The sample was chosen to represent a general population of adult persons of mixed age, race/ethnicity, education, and income status.

Organization of the Study

The introduction, statement of the problem, purpose of the study, definition of terms, significance of the study, as well as assumptions and limitations of the study comprise Chapter I. Chapter II consists of results from the review of related literature and findings connected to the psychometric and health education theories serving as the foundation for this work. The methodology and the procedures used to pilot the instrument and collect the data for the study are presented in Chapter III. The methodology section also identifies and provides rationale for the chosen design method utilized to test the hypotheses presented in the study. Chapter IV contains the results of the analyses of the data that emerged from the study. Chapter V contains a summary of the study findings, conclusions drawn from the findings, discussion, and recommendations for further research.

CHAPTER II

REVIEW OF LITERATURE

Introduction

The current research fits within the disciplinary areas of Health Education and

Psychological Measurements involving both health behaviors and psychometrics. Health

Education behavior models utilizing the Theory of Reasoned Action (Fishbein & Ajzen,

1975), The Health Belief Model (Rosenstock, Strecher, & Becker, 1998), and others have

proven useful in providing a theoretical foundation yielding a partial understanding of

how individuals may reach into themselves or tap into others to generate health intentions

and complementary health behaviors or actions. These models stem from the Value-

Expectancy Theory first described by J. B. Rotter in 1954, as does the Locus of Control

personality construct. The Social Learning Theory developed by Rotter (1954) was the

basis for explaining expectancy reinforcement and its role in accounting for individual

behavior and variability in individual behavior. Subsequent researchers have utilized the

construct to develop scales that have been used to predict health behaviors and to design

health education interventions.

The discussion presents literature covering the critical issues of this research

starting with the development and validation of the 2- and 3-dimension locus of control

construct; the development and need for scales specific to oral health; a brief description

of the inconsistent findings from empirical studies over the past years utilizing the

construct and its scales; and exploration of the influence of other major factors (e.g., experience level, value ascribed) that may clarify the use of the construct dimensions in examining variability observed. Psychometric properties of scales specific to different health behaviors were described to include oral health and the psychometric properties of scale development from a theoretical perspective. Lastly, the information known was synthesized and suggestions were provided for current and future research.

Discussion

Development and validation of the 2- and 3-dimension scales

The Locus of Control construct was derived from J.B. Rotter's Social Learning Theory in 1954. The Health Locus of Control (HLC) scale, however, was developed by Wallston, Wallston, Kaplan & Maides (1976) as a unidimensional measure of generalized belief that one's health is or is not controlled by one's own behavior. The HLC was based on J. B. Rotter's work in 1966 developing the unidimensional scale to measure the locus of control construct on an internal and external continuum. In short, according to the social learning theory, the potential for an individual to engage in a set of related behaviors in a given situation is a joint function of the individual's expectancy that the behaviors will lead to a given outcome and the value the individual places on the outcome in that situation. In fact, according to Lau et al. (1986), the utility of the HLC only manifests when it is measured alongside one's view of the value of health among other life values, (e.g., value of having teeth).

Wallston, Wallston, et al. (1976) also encouraged the use of health value in conjunction with assessing locus of control. It is believed that if an individual is faced with the choice between two rewards, all other things being equal, the person will chose

the reward perceived to be of greater personal value. The value of physical health as reported by Ware and Young (1979) was assumed by their research contemporaries to be very high among adults in the United States (U.S.). Ware and Young (1979) studied health perceptions of mainly healthy U. S. adults and found that contrary to general societal assumptions, value placed on health was not uniformly high and of the 18 values ranked, 20% to 40% of the respondents did not rank health among the five highest choices of which the highest ranking value identified was 'freedom'. Measuring the perception of the value of oral health is of particular importance since physical health value was found to be lower than commonly assumed. The value of oral health may also be subject to great variability in the general population.

Rotter's (1966) locus of control construct was not proposed as a means to discriminate types of causal explanations, but to distinguish between two types of beliefs in the control of reinforcement. Control of reinforcement refers to the internal perception of who or what controls a behavioral outcome without regard as to whether the reward (or reinforcement) is positive or negative. Rotter (1966) conceptualized the belief as generalized expectancy ranging from what was described as internality on one end to externality on the other. His description was for generalized beliefs rather than beliefs about situation or condition specific behavior. Rotter (1966) did, however, conceptualize the construct as unidimensional. Of note is the fact that the construct was represented as a continuum, and not dichotomous, internal-external scale (I-E) in spite of the fact that the scale itself utilized a forced choice format with two alternatives per item.

According to Lefcourt (1966), Rotter's (1966) construct measurement scale was comprised of 29-items or statements; 23 that measured the construct and 6 filler

statements. The respondent would choose one of the two alternative statements.   The

scale was designed to indicate higher scores as stronger external orientation. Using the

Kuder and Richardson (1937) formula for dichotomous scales, a measure of internal

consistency of .70 was obtained from a sample of 400 college students (Rotter, 1966).

Test-retest reliability coefficients were computed and, according to Robinson and Shaver

(1969), were .72 for 60 college students after one month.

A plethora of research resulted from the validation and use of Rotter's (1966)

LOC scale including research conducted by Wallston, Wallston, et al (1976) to validate

the unidimensional scale for generalized health behavior. This 11-item scale was the

original health locus of control (HLC) scale using health-internals and health-externals on

the two ends of the scale. What was different about this scale was the rewording of the

items to reflect health behaviors. Wallston, Wallston, et al. (1976) investigated, among

other things, whether or not the psychometric properties of the unidimensional scale

developed by Rotter (1966) would hold when made to measure more specific behavior.

Health Locus of Control (HLC) scale reliabilities ranged from a low of .40 to a high of

.72 across samples. Item content concerned generalized expectancies for the locus of

control of one's general health. The content was more specific than the previous scales,

like Rotter's measuring generalized beliefs, because it was health focused; however, the

content was not specific to a particular health condition, e.g., asthma. The original

sample was 98 college students. Wallston, et al. (1978) reported a validity coefficient

(r=.33) for the 11-item scale with the previous Rotter (1966) 29-item scale. Since the

validity coefficient was low, it may have indicated consistency with the intended

differences between the two scales-- reinforcement expectancies for health as opposed to

generalized reinforcement expectancies. Wallston et al. (1978) subsequently

demonstrated the functional utility of using a more specific measure (health-internals and

health externals) of the locus of control construct in place of the more generalized

internality, externality scale series of validation studies among various populations.

As the HLC was used in various clinical and non-clinical populations, Lewis et al.

(1978) noted that findings had not been consistently in the direction expected; that is,

risky health behaviors were hypothesized to be greater among externals when compared

to internals. Lewis et al. (1978) believed these inconsistent findings among previous

studies for this scale resulted from three factors: 1) not controlling for the value placed

on the reinforcement by the responder; 2) recognition that the construct may be situation

or condition specific; and 3) recognition that the original scale was designed as a global

measure of the reinforcement expectancy.

Almost simultaneous to the work that Wallston, Wallston, et al. (1976) conducted

on the health locus of control scale, Levenson (1974) found evidence supporting the

multidimensionality of the generalized health locus of control thought to be

unidimensional.   Earlier factor analytic findings (MacDonald, 1972) showed that the

correlation between the internal and external scales (the internal scale consisted of five

items worded in the internal direction and the external scale consisted of six items

worded in the external direction) was essentially zero. Further supporting a

multidimensional interpretation was that coefficient alpha for the 6-item external scale

was equal to the alpha for the total scale. Levenson (1974) suggested that not only are

internal and external beliefs orthogonal, but that prediction could be improved by

separating the external dimension into two and exploring a third dimension, chance (fate or luck) as distinct from powerful others.

Levenson (1974) supported her argument by developing 3 eight-item, Likert-like scales (Internal, Powerful Others, and Chance) to measure generalized LOC beliefs and to demonstrate discriminant validity. Levenson's (1974) eight-item, three-factor scale scores had alpha reliabilities of .51 for Internal, .73 for Powerful Others, and .73 for Chance. Without regard to the fact that the new scales did not include items about health, Levenson's (1974) work was intended to support the contention that prediction of behavior could be improved by separating powerful others dimension from the chance dimension out of what was once a single external dimension. Her scales (Chance, Powerful Others), however, were moderately correlated (r=.59). One could argue that the moderate correlation supported the position that the two comprised one common dimension. While this moderate correlation only partially supported her contention, it did pave the way for further exploration of LOC multidimensionality as three factors rather than two. And, as Levenson (1974) pointed out, a more refined distinction between three types of beliefs in the control of reinforcement would be of even greater value in the prediction of behavior when compared to the two types.

Based on the earlier work of Levenson (1974), Wallston, et al. (1978) set out to develop and validate the Multidimensional Health Locus of Control Scales (MHLC), and to create alternate forms of the instrument since many research designs call for repeated measures of the construct. Prior to this work, the HLC scale was two-dimensional. The research of Wallston, et al. (1978) resulted in the creation of three scales: Internal Health Locus of Control (IHLC), Powerful Others Health Locus of Control (PHLC), and Chance

Health Locus of Control (CHLC). The alpha reliabilities of the scale scores were

moderate, ranging from a low of .67 of the PHLC to a high of .86 for IHLC. These

investigators also found positive health behavior to be significantly correlated positively

with IHLC ($r = .40$, $p < .001$), negatively with CHLC ($r = -.28$, $p < .01$), and not at all with

PHLC ($r = 0.06$).

The three-factor Health Locus of Control construct continues to receive attention

in the literature after more than three decades of investigation. The dimensions studied

were external or powerful others, internal, and chance (fate or luck). Within both

physical and mental health disciplines, having an external locus of control was related to

personal powerlessness to change situations or circumstances and thus the belief in

dependence upon others as change agents in maintaining or re-establishing good health.

Internal locus of control has been related to personal power to change situations or

circumstances and thus affect one's own health or improve one's circumstances. Chance

is interpreted as behavior resulting from fate or some other unidentifiable source outside

of any orderly or organized agent's control, e.g., genetics. The relatedness of the

dimensions, what researchers perceive as positive or negative behavioral intentions, is

less important to the current research than is the usefulness of how the relatedness of the

dimension can be used under specific health roles to predict oral health behaviors. In the

current study, having a particular LOC dimensional orientation (e.g., internality) is

neither desirable nor undesirable as a personality trait or state. The dimensional

orientation simply provides an anchor by which effective interventions or treatment plans

can be developed.

Development and need for health-condition specific scales

The Wallston, et al. (1978) Multidimensional Health Locus of Control (MHLC) scale has been used to measure the construct for many different types of health conditions and treatments. Flowers (1993) studied how perceived control might affect recovery and stress associated with cardiac illness. According to Flowers (1993) and others, persons with an internal LOC were said to be more likely to adopt healthful behaviors and to comply with provider recommendations. In one of the few oral health related research studies found in the literature, Galgut, et al. (1987) demonstrated positive correlations between scores from the Powerful Others scale of the MHLC and the effectiveness of an oral plaque control program. The Galgut, et al. study suggested differences in expected LOC orientation for oral health as opposed to general health LOC orientations usually associated with positive preventive health behaviors for general health. These differences may be based in the oral healthcare experience accounting for the Powerful Others orientation as opposed to the expected internality orientation usually associated with positive preventive health behaviors. The reason for these differences remains unexplained, but may be further clarified through the current research.

Other researchers have found construct dimensionality orientation varies by age as well as specific health condition. Shewchuk, Foelker and Niederehe (1990) concluded that the multidimensional model proposed by Levenson (1974) did not fit the data well and that the data varied by participant ages, suggesting that age may interact with the construct dimensions. Coelho (1985) found that among cigarette smokers, the two-factor structure assessed by items measuring the internal and the powerful others dimensions rather than the three-factor structure provided better fit for the models explored.

Coelho's (1985) study suggests that care must be taken in drawing conclusions about the value of the construct's dimensions for health specific behavior.

Locus of Control factor structure has been investigated across clinical and non-clinical populations with equivocal results (Balch & Ross, 1972; James, Woodruff, & Werner, 1965). Talbot, Nouwen, and Gauthier (1996) discussed research procedure inadequacies, e.g., not including variables such as health value and bias in selection of clinical subjects, as responsible for some of the inconsistent results with regard to the Multidimensional Health Locus of Control Scale (MHLC).

Talbot, et al. (1996) also compared a three-factor with a two-factor structure for the MHLC in a non-clinical group using confirmatory factor analysis and assessed the equivalence of the factor structure of the MHLC across clinical and non-clinical groups. The findings suggested that the structure of the health locus of control varied between the two groups but the three-factor structure better fit the data when compared to a two-factor structure. These results suggest that the three-factor structure may be more appropriate in conducting an exploratory factor analysis for oral health across both clinical and non-clinical groups.

Health behaviors vary in a number of ways. Health maintenance behaviors are carried out primarily to preserve current health status (e.g., eating right, brushing and flossing). Health enhancing behaviors are carried out to re-cover health status (e.g., complying with provider recommendations). Health seeking behaviors are carried out to obtain access to a treatment or relieve symptoms that may be gained through health care providers or the health care system (e.g., information about providers, new procedures, etc.). Steptoe and Wardle (2001) hypothesized that internal health locus of control might

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be expected to affect behaviors that are predominantly carried out for reasons of health maintenance but may be less influential for other behaviors that may be determined through mediating behaviors, for example, health seeking behavior.

Steptoe and Wardle (2001) evaluated locus of control dimensions and ten health behaviors to better understand the correlations of the construct and the behaviors. These researchers used the MHLC Scale (form B) developed by Wallston, et al. (1978) to assess all three dimensions of the construct. The Health as a Value Scale (Lau, et al. 1986) was also used. The sample was large and consisted of persons from 18 countries. They found that for five of the behaviors, the odds of healthy behavior (of which daily tooth brushing was one) were more than 40% greater among individuals in the highest vs. lowest quartile of internal locus of control dimension after adjusting for sex, age, health value, and the other variables included in the study. Of note, however, was that the confidence interval for the point estimate for internals was narrower and statistically significant only for the third highest quartile. High Chance scores were associated with reductions of greater than 20% in the likelihood of healthy options for six of the behaviors, while Powerful Others scores were not clearly associated more with either healthy or unhealthy actions. This study represented one of few found in the literature relating to oral health.

Development and use of scales specific to oral health

As previously demonstrated, generalization of the MHLC to specific health behavior may not be appropriate since the scale was developed for generalized health. Some researchers have suggested that Locus of Control must be health behavior specific (Knecki, et al. 1999). That is, it may be dependent on the specific health problem or on the specific behavioral action pursued. Numerous studies have been conducted on a

wide-variety of health conditions and across the range of health behaviors, but there has been little research on oral health behavior and locus of control. Previous studies did conclude that LOC, when used in a health specific context, was useful in explaining behavioral outcomes or in predicting treatment adherence (Dabbs & Kirscht, 1971).

The Social Learning Theory (Rotter, 1954) conceptualizes the nature and effect of the expectancy reinforcement with regard to outcomes. Based on this theory and health behavior theories (Glanz & Oldenburg, 2001; Gochman, 1997), one could posit that individual expectancy differs by the need for and dependency upon the oral health care system. That is, a person who has not had symptoms or recently utilized the oral health care system may have different expectancy beliefs about who or what controls the potential behavior outcome than either a person who is either currently under care (previous symptoms and has recently seen a provider) or who has symptoms but has not recently seen a provider. Individual behaviors may be affected by these differing expectancies (who or what controls the potential behavior outcome). This could account for the inconsistent findings among previous studies with regard to the Locus of Control Construct.

Influence of other variables on the LOC construct

Quite a few studies exist with regard to culture, age, gender, education, and income in relation to locus of control (Malikiosi, 1977 and Vecchio, 1981). In studies where samples could be divided by age, internality was found to be more associated with older participants when compared to younger participants; with males when compared to females; with higher socio-economic status when compared to lower socio-economic status; and with higher educational levels when compared to lower educational levels.

No clear locus of control orientation has been associated with race/ethnicity but there have been associations with culture and religion. Generally, studies assessing race/ethnicity as an independent variable have also included other factors that may have confounded the precise association of race/ethnicity and locus of control. Wrightson and Wardle (1997) found differences in health locus of control scale scores among different ethnic groups. These investigators studied cultural variation in the two-factor health locus of control scales among women from different ethnic backgrounds, Afro-Caribbean, Anglo European, and Asian.   Asians scored highly on both the external and internal health locus of control scales presenting something of a paradox when compared to the other two ethnic groups. Levin and Schiller (1986) found significant differences between ethnic groups with regard to health value scores after controlling for occupation and health status. Interactions between religion and health locus of control scores were found to modify the effect of health education, such that those with a religious affiliation responded differently to a health intervention program than those with no religious affiliation among Christians of various religious denominations.

Since the construct involves chance and powerful others, it is not surprising that both religion and culture have been found to influence expectancy reinforcements and therefore locus of control as well. Religiosity has been notably related to locus of control with higher scores on internality associated with those who were more religious than with those who were less religious. Religion and culture are bound together in race/ethnicity and require separate studies to understand differences that may exist. The current study acknowledges that these factors are present and may have meaning within the current research.

Research Questions

Research questions related to this study include the following:

1. What are the lower bounds of internal consistency reliability for scores on each of the 3 LOCOH scales?

2. What are the lower bounds of internal consistency reliability for scores on the OHV scale?

3. What are the lower bounds of internal consistency reliability for scores on each of the 3 Multidimensional Health LOC scales (MHLC)?

4. What is the relationship between general health LOC and oral health LOC?

5. Do LOCOH and OHV scores predict health status? Among persons who value oral health, does LOCOH predict health status?

Oral health behaviors are an important study area since behaviors identified with oral health can potentially be viewed across the full range of clinical roles: pre-clinical, clinical, post-clinical, and non-clinical. Oral health may be one of few health care areas where one can observe the full range of health behaviors in the general population allowing for a more comprehensive study regarding the dimensions of the locus of control construct.

CHAPTER III

METHODS

Introduction

This study seeks to investigate the relationship between health status, oral health value, and a three-dimensional latent construct for oral health, locus of control. The three dimensions (internality, powerful others, and chance) posited to underlie the oral health LOC construct required a measurement tool where scores could be measured reliably and with validity. Prior to the current study no measurement tool existed to measure dimensions of locus of control for oral health.

This study was conducted in 3 phases: pre-pilot, pilot, and final field study. Over a period of years work was conducted to develop items and to analyze data to reach the intended outcomes of this study. Information was collected with regard to oral health and locus of control dimensions. The methods used in this study consisted of a measurement model for the pilot and final instruments as well as a prediction model to assess the value of the LOC dimensions in predicting oral health behavior. In this chapter, the sample, instrumentation, study procedures, and research design utilized in this study will be described within the context of the pilot studies and the final field study. Also discussed in this chapter were the statistical methods used to analyze the psychometric properties (reliability and validity) of the scores and the prediction question.

The first phase of the study consisted of developing an adequate item pool for inclusion on the instrument. Over several years data were collected from existing surveys, interviews with dental professionals and others, and data analyses were conducted. Item stems used for many of the new instrument items were based on the Wallston, et al. (1978) Multidimensional Health Locus of Control (MHLC) scale but were re-phrased to be specific to oral health behavior. In addition to items taken and revised from the MHLC, other items were created and used in the item pool. Prior to inclusion in the item pool, dental professionals and others reviewed the items for consistency with how the variables would be utilized in the study and with the posited LOC dimensions.

Early data collection consisted of friends and acquaintances completing a succession of draft surveys where items were added, deleted, and revised according to responses received. Formal and informal interviews were conducted with dental practitioners, dental hygiene professionals, and other content experts to gain insight into the type of items needed for this study to develop appropriate variables. During this phase, a pre-pilot study was completed to initially collect data from 45 students in available classrooms using the available items. Data analysis was completed and the continued feasibility of the study was assessed. This pre-pilot study provided input for item revisions as well as feedback to the researcher for appropriate study methodology.

The next phase of the study consisted of a small pilot study. Seventy participants selected among community persons comprised the sample. Items chosen for the small pilot study were those found to be important as a result of previous pre-pilot information

collected. Consideration was given to results obtained from the brief pre-pilot study item

analyses. Additional expert review and input was obtained.

The last phase of the study comprised the final field study consisting of 279

persons, both community members and students. Construct validity was assessed in this

phase. Data analyses resulting from the pilot and the final field studies will be described

in Chapter IV, Results.

Pilot and Final Field Study Sample

Study participants for the pilot study were recruited from community centers,

church sites, shopping centers, and non-profit organizations in a large city in a large state.

A total sample size of 70 persons comprised the pilot study. Adults, age 18 and older,

residing in two mid-sized cities of a small state in the mid-western area of the U.S. were

recruited for the final field study; in these cities, two sites of a state university campus

were primary recruitment sites. Additional participants were recruited from non-profit

religious and non-profit secular centers, and strip shopping malls in a larger city in a

relatively large state. A total sample size of approximately 279 persons comprised the

final study sample. Both on-campus and other non-campus sites were utilized for data

collection. Particular on-campus classrooms sites were also utilized. The sample

comprised a convenience sample of persons encountered in the study sites.

For both the pilot and final field study, individuals were approached by the

researcher using the prepared script without regard to any personal characteristics and

asked to participate in the study. Personal demographics of persons encountered in the

community who declined to participate in the study were briefly noted. Those who

declined participation based their refusal on the length of the questionnaire and the

anticipated time expected to complete it (10 to 30 minutes). It was important that the samples be representative of a general population of persons of mixed age, race/ethnicity, and income status. Personal characteristics self-reported for the both samples were: gender, race/ethnicity, residence zip code, education level, dental insurance, and date of birth (age). These characteristics were used to describe participants.

Instrumentation

The 75-item questionnaire developed in the pilot study was also used in the final field study though many of the items were re-phrased for the final field study. The questionnaire comprised seven scales: 3 LOCOH scales, 3 MHLC scales, and 1 Oral Health as a Value (OHV) scale. The seven scales comprised sixty-one items: thirty-nine items measured the 3 LOCOH scales, eighteen items measured the 3 MHLC scales, and 4 items measured the OHV scale. Also included were seven items used to obtain responder characteristics; 3 items used to assess presence or absence of symptoms; 2 items used to assess illness behavior and preventive practices; and 2 items used to assess visits to a dental provider over the past 12 months. All scales utilized a six-choice, Likert-like response format, anchored by Strongly Agree and Strongly Disagree.

The final questionnaire text-difficulty or reading grade level was determined by the Flesch-Kincaid Grade Level statistic included as an option under the Tools menu for Microsoft® Word application software. The average number of words per sentence was 12.9 and the average number of characters per word was 4.4 including all instructions and closing statements on the questionnaire. Using this method the grade level was determined to be at 6.4.

The questionnaire included 3 LOCOH scales (Internality, Powerful Others, and Chance) measured by 39-items consisting of 12 items for the Internality scale, 13 items for the Powerful Others scale, and 14 items for the Chance scale. The final field study retained the 39-items on the pilot study LOCOH instrument, though many of the items had been revised for the final administration.

The OHV scale measuring a single construct included 4 items on the questionnaire comprising the scale for the latent variable 'oral health value'. Items were adapted from "Health As a Value: Methodological and Theoretical Considerations" by Lau, et al. (1986). This study variable determined the importance of oral health to the respondent within the context of other life circumstances. Item stems from this instrument were used to form the OHV scale items for oral health. The same four items were used in both the pilot study and in the final field study.

In addition, the questionnaire included 18 items taken directly without change from the Multidimensional Health Locus of Control (MHLC) scales (Form A) developed by Wallston, et al. (1978). These scales measured three dimensions of the LOC construct for general health. The MHLC Internality scale comprised 6 items; the MHLC Chance scale comprised 6 items; and the MHLC Powerful Others scale comprised 6 items. None of the MHLC items were revised or dropped for the final field study.

The questionnaire measures seven latent variables through sixty-one items as described above. Table 1 shows the possible range of scores for each of the scales. This table describes the range of scores prior to any analysis conducted and prior to deletion of items.

Table 1.

Score Range for Latent Variables

Name of Scale	Possible Range of Scores for Initial Scale Items	Initial/Final Number of Scale Items
Health as Value	4-24	4/3
Internality-LOCOH	12-72	12/10
Powerful Others-LOCOH	13-78	13/10
Chance-LOCOH	14-84	14/11
Internality-MHLC	6-36	6/6
Powerful Others-MHLC	6-36	6/6
Chance-MHLC	6-36	6/6

Aside from the seven scales described above, other variables measured by items on the questionnaire were used in this study. Three items on the questionnaire determined the variable 'health status'. Two items asked about visits made to an oral health provider over the previous 12 months consisting of the number of visits made and how many of the visits made were made only for preventive exams. Another item asked respondents to indicate with a check mark each symptom that the respondents had experienced over the previous 12 months. A panel of five expert dentists was consulted in an effort to identify the most serious of the symptoms included on the questionnaire. Five community based dentists agreed with 92% inter-rater agreement that the most serious symptoms to consider in developing the variable health status were: abscess,

toothache, pain, difficulty swallowing, and broken tooth/denture/filling. This item was used to determine the presence or absence of serious symptoms. Levels of the health status variable in relation to a respondent's symptoms can be described as shown in Table 2.

Table 2.

Health Status Variable Levels

Visit Status	Serious Symptoms	No Serious Symptoms
Visits	Clinical	Post-clinical
No Visits	Pre-clinical	Non-clinical

Four health status groups resulted from having symptoms or not and making non-hygiene visits to an oral health provider or not. These four groups were Clinical, Post-clinical, Pre-clinical and Non-clinical. The variable names used for these groups were: clinical, postclin, preclin, and nonclin, respectively. These variables assessed experience or lack of experience with the oral health care system, the health status variable.

The instrument included five descriptive questions regarding respondent characteristics: gender, race/ethnicity, date of birth (age), residence zip code, and highest school grade or level completed. Of the five descriptive responder characteristics, age and zip code were not used in the current study. Other items were included on the questionnaire; however, none of them were used in the current study.

Construct Validity

Before the Pilot Study was conducted the initial questionnaire items were under development. This phase of the study occurred during September through December

2002. As items were created and collected for the questionnaire, the initial concern was to insure face validity and content validity as the items were developed relating as directly as possible to the 3-dimension LOC construct. Face and construct validity was built into the instrument during its development through consultation with professionals in dental health, some with expertise in psychology, as well. Interviews with dental health professionals and others knowledgeable about the LOC construct were conducted. Based on these interviews and literature review items were developed and revised for use in the questionnaire.

In addition to the preliminary work conducted over several years, construct validity was further incorporated by utilizing wording from scales previously developed by other investigators to measure the locus of control for general health and health as a value constructs. A few investigators had conducted validity studies utilizing some of the items that were adapted for use in the current study. Approximately 30 items were utilized in this first phase of the study with 10 items for each dimension. Data analysis was conducted utilizing internal consistency and reliability analysis with the number of items available to the researcher at that time. The sample (n=45) comprised students in a graduate level classroom and others who were friends and acquaintances of the researcher. Reliability coefficients obtained on this data were low, greater than .60 but less than .70. As more information was collected on how persons responded to the items, items were revised and some were added and deleted according to these results and the data analysis.

The Pilot Study conducted after the initial questionnaire development was used to further develop construct validity on a sample (n=70) similar to the population of interest.

This phase of the validity process was used to further refine the items for clarity with the posited dimensions and to increase the potential for the items to hang together within the 3-LOC scales. Item analysis was conducted, as well as reliability analyses. Reliability coefficients obtained on this data were higher than in the pre-pilot phase, but were not yet above the minimal acceptable. Based on this phase of the study, many items were rephrased to increase the potential for the items to measure the construct dimensions of interest. Additional input with dental professionals and others were received after the items were rephrased for use in the final field study.

Convergent validity to assess the relatedness of the 3 LOCOH dimensions in the questionnaire to 3 similar LOC dimensions, in this case MHLC for general health, was conducted for the final field study. This involved correlation analyses. For example, the Chance dimension for the LOCOH and the Chance dimension for the MHLC were expected to correlate more highly than the LOCOH Chance dimension correlated with the internality dimension for the MHLC. In this way, also, divergent validity was assessed where low correlations between unlike dimensions would be evidence of divergent validity. High reliability coefficients obtained through reliability analysis utilized in the final field study provided additional support for construct validity.

Additional evidence of construct validity can be assessed in the future through work of other investigators. This will involve the conduct of validity studies and administration of the scales across different samples. Construct validity evidence will accumulate as the scores show invariance over repeated administrations of the scales.

Research Design

The research design for this study involved developing two measurement tools: one to measure 3 oral health locus of control dimensions and another to measure a unidimensional construct, oral health value. The design was also used to explore whether oral health locus of control scale sum scores and oral health value scale sum scores were predictive of health status. The model consisted of evaluating the construct validity of the newly developed LOCOH scales and estimating the reliability of the scores for the study samples for both the pilot and final field studies. Reliabilities and validities of the scores from the Locus of Control for Oral Health (LOOH), Oral Health Value (OHV) and MHLC scales were also described. This was done through conducting a pilot study of 70 participants, revising the items on the pilot questionnaire, and using the revised questionnaire in a final field study of 279 participants. Three dimensions (Internality, Powerful Others, and Chance) comprised three separate LOCOH scales. Oral Health Value was a unidimensional construct (OHV). The MHLC instrument comprised multidimensional (Internal, Powerful Others, Chance) scales for general health. By utilizing this design, each of the research questions included in this study was addressed.

Sample Size

The literature indicates considerable diversity of opinion among methodologists with regard to the number of cases needed to conduct correlation and multiple regression analyses. Green (1991) suggested the following formula: $n = 50 + 8 * p$ (p = number of predictors). Using this formula and 3 predictors, the sample size would be approximately 74. Stevens (2002) suggested that a reasonable estimate for social science research is a sample size of 50 assuming three predictors and the squared multiple correlation equals

.50 and assuming that we want the loss in predictive power to be less than .05 with probability equal to .90. Seventy respondents were obtained for the pilot study, but no final reliabilities were reported on the small pilot sample. The pilot was primarily conducted to assess the initial internal consistency analysis and revise items for the final field study. The sample size for the final field study was 279 respondents. The final field study was used to assess internal consistency and reliability coefficients and to assess predictive characteristics of the variables. There were relatively few missing item responses from the scales using pair-wise deletions, and therefore, more than enough respondents for the minimum sample size suggested by Green (1991).

Pilot Study and Final Field Study

A small pilot study was conducted during the Fall 2005 among community members of varying ages, race/ethnicities, and educational status. The community members were a convenience sample of persons recruited from churches, community centers, and shopping locations in Dallas Metroplex area. One of the locations in the Dallas Metroplex area comprised African-Americans predominantly, explaining the African-American majority (61.4%) respondents in the pilot study. Seventy questionnaires were collected for data analysis in the pilot study. The purpose of the pilot study was to provide a final review of the study items, to gain a better understanding of the time necessary to complete the questionnaire, and conduct a trial run of other study procedures. As a result of the pilot study, several questionnaire items were revised for the final field study. The final field study was conducted during the months of January and February 2006. The item revisions for the final field study are described in more detail in the Chapter IV, Results.

Pilot Study and Final Field Study Procedure

Approval to administer this study was given by the Oklahoma State University (OSU) Institutional Review Board (IRB) under IRB Application Number ED0612. Approval was received under exempt status to conduct study activities during the period August 18, 2005 to August 17, 2006. A copy of the Informed Consent Cover Sheet with the IRB approval period dates was offered to each study participant in accordance with the research protocol immediately during the time of first encounter with the potential study subject. These documents have been included in the appendix.

Potential subjects for both the pilot as well as the final field study were approached to ask permission to participate in the study by completing the questionnaire using the prepared IRB protocol. Participation in this study was voluntary. Potential participants were asked if they had previously completed the questionnaire. Several potential participants stated that they had previously completed the questionnaire and were excused. Each potential participant was told that they were also ineligible if they had not already reached their 18th birthday. An introductory script was used to invite participation in the study. If consent was given, the participant was asked to read the Informed Consent Cover Sheet developed for this study outlining the purposes, risks, and benefits of participation. After consent was obtained, each participant was given a questionnaire for completion.

After completion of the questionnaire, the participant was thanked for participating in the study. Each completed questionnaire was reviewed superficially for completeness by the investigator and when missing responses were found, participants were asked to take another look at the items left blank. No further review was made for

completeness for that particular questionnaire and for that participant. The data collection period ended on February 17, 2006. The completed surveys were collected and an input key was prepared to provide for coding of the response choices.

Data Analysis

Data obtained from the pilot study instruments, as well as, from the final field study instruments were analyzed using Pearson product moment correlation matrices, and item analyses in *SPSS*® *10.0*. Cronbach's Alpha (Cronbach, 1951) was utilized as the lower bound estimate of internal consistency reliability for the sample scores. Correlation matrices for the LOCOH, MHLC, and Oral Health Value items were computed separately. Visual review of the correlation matrices was conducted for both the pilot and the final field study to assess strong correlations among the items.

The lower bounds internal consistency reliability for the LOCOH, MHLC, and OHV scales to answer research questions 1, 2, and 3 were estimated using coefficient alpha. Reliability analyses were computed for each scale. The pilot study provided the opportunity to consider the functioning of each item within the LOCOH and OHV scales. Descriptive statistics computed and reported include: item means, variances, and inter-item correlations. In addition, item total statistics were obtained to include: scale mean if item deleted, scale variance if item deleted, item-to-total correlation (corrected), squared multiple correlation, and the alpha coefficient if the item was deleted. Pilot study items correlating at or below .30 with the total scale were considered for re-phrasing for the final field study. Nunnally (1967) suggested that corrected item-to-total correlations of .30 or larger are desirable in a scale that measures a single dimension.

The Pilot Study item analyses were conducted for the purposes of determining the functioning and phrasing of LOCOH and OHV items for the final field study. The MHLC items were not changed in either the pilot or the final field study. Using the Reliability Analyses, Cronbach's alpha coefficients for the three MHLC 6-item scales were .54 for Powerful Others, .73 for Internality, and .69 for Chance. For the OHV scale, all 4 of the scale items were analyzed and the corrected item-to total correlations ranged from a low of .25 for Item #8 to a high of .58 for Item #11. Cronbach's alpha coefficient for the scale was .63. Item #8 could not be re-phrased, but the analysis suggested that Item #8 could be deleted to attain a higher coefficient alpha of .68.

Reliability analyses were computed for the LOCOH 39-item, 3-scale instrument by scale.   In addition to the results from the internal consistency analyses, the item correlation matrix was inspected. To assess an item for wording revision before including it in the final field study administration, item-to-total correlations were inspected. If the scale items correlated at least .30 with the scale total correlation (Nunnally, 1967), the items were generally not re-phrased for the final field study. The wording, however, was also reviewed for phraseology and clarity with regard to the construct hypothesized for that item.

The sample size of the pilot study was not as large as planned. For this reason, all of the items were retained for the final study, but many of the items were re-worded. The re-wording was completed to insure that each dimension was clearly the focus of the item. For LOCOH Internality, six of the twelve items were re-worded. For LOCOH Powerful Others, ten of the thirteen items were re-worded. For LOCOH Chance, 5 of the

fourteen items were re-worded. To recap, twenty-one of the thirty-nine items were re-worded and a total of thirty-nine items were used in the final field study.

The final field study analysis was conducted for the purpose of identifying items that would comprise the final LOCOH and the OHV scales. Item analyses were computed for items included in the final field study. Items were deleted one by one from each LOCOH scale as well as the OHV scale using the computed statistic "alpha coefficient if the item was deleted" until no higher alpha coefficient could be obtained from the analysis to achieve unidimensionality. Each item was also reviewed before deletion to maintain the posited dimension content and construct validity. After deletion, reliability analyses were computed for each scale along with the scale statistics. Additionally, bivariate scales correlation was used to demonstrate the associations between scales in the LOCOH, MHLC and the OHV questionnaires using case scale totals.

Final Field Study-Multiple Discriminant Analysis (MDA)

Multiple discriminant analyses were used to address research question number 5. This research question was: Do LOCOH and OHV scale sum scores predict health status and if so, do these scale sum totals predict health status among persons who value oral health? The analyses were conducted using a multivariate discriminate regression model. The predicting variables were the case sum scores obtained from the LOCOH Internality, Powerful Others, and Chance scales, as well as the scores from the OHV unidimensional scale. The criterion or grouping variables were designated as the four levels of health status (preclin, clinical, postclin, and nonclin). The number of discriminant functions possible as a result of the analysis was the lesser of (g - 1), where g represents the number

of categories in the grouping variable; or *p*, representing the number of predictor variables. Therefore, 3 discriminant functions were possible from the MDA using the 3 LOCOH scales and Oral Health Value scale.

The discriminant analysis utilized Wilks' lambda, an F test, to test whether the discriminant model as a whole was significant, and if the F test showed significance then the individual independent variables were expected to reveal which differed significantly by group mean. Since there were more than two groups, the canonical correlations measuring the association between the discriminant scores and the groups would be used in the results. Classification tables using the leave-one-out cross validation estimate in MDA were to be used to identify the number of correctly classified cases and help diminish the optimistic estimate of the success of classification. Outliers also could be assessed for cases with large values of the higher Mahalanobis distance from their group mean.

Data Exploration

The data were screened for missing values by exploring the data list-wise and pair-wise. Additional exploration was accomplished by reviewing minimum-maximum item values, mean, median, mode, variance, and standard deviation for the data. Distributional assumptions were assessed by graphing the frequency distributions of variables in the study along with displaying histograms with normal curve, and scattergrams to determine outliers, skewness, and kurtosis. Counts, percentages, cumulative percentages, percentiles, and quartiles were also used to describe the data set.

Statistical Assumptions

Pearson's Product Moment Correlation is a parametric statistic requiring certain

assumptions for data analysis. Parametric statistics assume linearity, independence,

normal distribution, at least interval level data measurement, equality of means and

homogeneity of variance/co-variances when more than two samples are being compared.

However, it has long been established that moderate violations of parametric assumptions

have little or no effect on substantive conclusions in most instances (Cohen, 1969). The

influence of outliers may have a substantive effect on data results.

Statistical Assumptions – Multiple Discriminant Analysis (MDA)

Multiple Discriminant Analysis is very similar to Multivariate Analysis of

Variance (MANOVA), requiring all of the same parametric assumptions.

- Unequal group sample size is acceptable but should not be extreme;
  adequate sample size must exist.

- Proper model specification must exist.

- There must be homoscedasticity.

- The data can be represented through a multivariate normal distribution
  (violations of this assumption are not "fatal" (Tabachnick and Fidell,
  1966).

- Measurement errors are randomly distributed.

These assumptions were all considered in the current study and appropriate data

exploration methods were employed to assess violation of assumptions. Statistical

assumptions were tested by several statistics. A non-significant Box's M test suggests

the assumption of equal variances and covariances was met provided the data do not

contain important outliers.   It was difficult to assess all aspects of multivariate normality

and according to Stevens (2002) assessing univariate normality is ordinarily sufficient.

Categorical variables were assessed for independence through the use of Pearson chi-

square tests for independence. Frequency histograms were examined for each of the

variables for univariate normality. Outlier cases identified by large squared Mahalanobis

distance (MD^2) to group centroids were examined.

CHAPTER IV

RESULTS

Final Field Study Participants

Data was collected for the MHLC, OHV, and the LOCOH scales in a final field study conducted during January and February 2006. A total of 279 persons comprised the final study sample. Table 3 provides a demographic profile comparison of responders in the pilot study versus the final field study.

Table 3.

Demographic Profile – Pilot and Final Field Study

Responder Characteristics	Pilot Study	Final Field Study
Gender	Female (70.0%)	Female (57.3%)
Race	Caucasian (22.9%)	Caucasian (71.0%)
Residence Zip Code	75243 (Mode 1)	74074 (Mode 1)
Age Category	Mean = 34.5	Mean = 27.3
Education	1-3 College (30.0%)	1-3 College (64.2%)
Dental Insurance	Afford (62.9%)	Afford (59.9%)
Prosthodontics (e.g. dentures)	None (77.1%)	None (87.1%)
Symptoms (< 12 months)	Yes (94.3%)	Yes (82.1%)

Table 3 cont'd

Responder Characteristics	Pilot Study	Final Field Study
Serious symptoms (< 12 months)	Yes (42.9%)	Yes (32.6%)
Symptoms Ever	Yes (92.9%)	Yes (83.5%)
Symptoms Today	No (54.3%)	No (76.0%)
Illness Behavior (< 12 months)	No Events (15.7%)	No Events (82.4%)
Preventive Behavior (< 1 week)	Yes (98.6%)	Yes (100%)
Any visit (< 12 months)	2 visits (28.6%)	2 visits (36.9%)
Preventive only visit (< 12 months)	2 visits (25.7%)	2 visits (38.4%)

Of the total respondents in the final field study, 57.3% were female; 64.2% reported having 1-3 years of college education. Average age of the sample was 27.3 years. Ethnic composition of the sample was 12.5% African/African American, 71.0% Caucasian/European American, and 7.2% were Hispanic/Hispanic American. The majority, 59.9%, reported having dental insurance and the ability to afford the co-pay. Most of the sample (87.1%) reported not having partials, dentures, implants or bridges; 8.2% reported having partials or bridges. In the previous 12 months, 82.1% of the sample reported having at least one of the symptoms listed on the questionnaire. Of note is that only 32.6% report having serious symptoms over the previous 12 months (e.g., toothache, pain, abscess, difficulty swallowing, and broken denture/tooth/filling). The percentage of the sample reporting 'ever' having symptoms was 83.5% and 24% reported having at least one of the oral symptoms on the day the questionnaire was completed. A

majority of respondents reported illness behavior over the previous 12 months (82.4%) and 100.0% reported preventive behavior over the prior week (e.g., tooth brushing). Respondents reported 1 (20.8%) or 2 visits (36.9%) to a dental professional over the previous 12 months; 24% reported no visit. Of the respondents, 33.0% reported none of the visits were preventive visits only; 22.2% reported 1 visit was preventive only; and 38.4% reported 2 visits were preventive only. While the sample reported 452 total visits to a dental professional over the previous 12 months, 303 (67.04%) of those visits were for preventive purposes only.

Final Field Study Instrumentation

An item pool was assembled for the final field study as a result of the pilot study analyses. Many items from the pilot study were re-worded for use in the final field study. Twenty-one of the thirty-nine pilot study items were re-worded for the final field study. Eighteen of the thirty-nine pilot study items were used unchanged in the final field study. Three separate constructs (7 scales) were measured by 61-items on the 75-item questionnaire: 1) oral health value (OHV scale) comprised 4 items, 2) Health Locus of Control (MHLC scales) comprised 18 items, and 3) Locus of Control Oral Health (LOCOH scales) comprised 39 items. Other items in the questionnaire were included to collect data for other variables to be used in the current study and in future studies.

Final Field Study Data Analysis

In this phase of the study, lower bounds internal consistency reliability coefficients for all seven scales were obtained. Cronbach's alpha was used to estimate internal consistency reliability of the scales. The criteria used in the Pilot Study to retain items in the scales were item-to-total correlations greater than .30. The Pilot study

resulted in the final field study item analyses comprising the LOCOH Internality scale--

12 items (6 reworded items), LOCOH Powerful Others scale--13 items (10 reworded

items), and LOCOH Chance scale--14 items (5 reworded items). In the final field study,

items were reviewed prior to deletion to insure retention of items thought to clearly

measure the construct dimensions for the OHV and LOCOH scales.

The OHV scale sum scores were used to develop an independent predictor

variable for use in the discriminant analysis. Discriminant analysis was performed using

OHV scale sum scores, LOCOH scale sum scores, and 4 levels of health status (pre-

clinical, clinical, post-clinical, and non-clinical designated by variable names: preclin,

clinical, postclin, and nonclin, respectively). OHV and LOCOH scale sum scores served

as predictor variables and health status served as the categorical grouping variable.

Research questions posed were addressed from results obtained only in the final field

study.

Assessing Statistical Assumptions

Violations of multivariate assumptions were tested. It was to verify aspects of

multivariate normality but in most analyses, according to Stevens (2002), univariate

investigation serves as sufficient. Missing data was minimized by physically reviewing

the questionnaire upon completion by the responder. Also, after the data was input,

missing values were also re-assessed. Missing data did not pose a serious threat to the

validity of the analysis. The useable data set for conducting the multiple discriminate

analyses included 279 cases. Using a pair-wise deletion, the minimum number of cases

to be analyzed was 262.

Collinearity diagnostics in SPSS® were used to perform a linear regression for each independent variable on all other independent variables to identify large squared multiple R's. The largest bivariate correlation between any two scales in the study was .47 between LOCOH Powerful Others and LOCOH Internality factors. These correlations were not large enough to characterize any of the variables as redundant. According to Tabachnick and Fidell (2001), the suggested bivariate correlation value of .70 or more is the maximum value to allow in the same analysis.

The observations were independent; and, for the most part, followed a multivariate normal distribution. The variables were observed to have high tolerance levels resulting from regression collinearity statistics: oral health value was .81; LOCOH Internality was .72; LOCOH Powerful Others was .68; and LOCOH Chance was .78. Zero-order correlations, as well as, partial correlations between the dimensions were low with the highest zero-order correlation for LOCOH Powerful Others at .08. Normality was assessed through frequency histograms with the normal curve overlays as well as skewness and kurtosis statistics. When the ratio of the statistic to the standard error is greater than 2.0, which was the case for LOCOH-Chance dimension score for the skewness and for all three LOCOH scales for kurtosis, this may indicate a level of non-normality for some of the variables. Lachenbruch (1975) indicates that MDA is relatively robust even when there are modest violations of normality.

Internal Consistency Analyses by Scale

Separate scale reliability analyses were conducted for the MHLC, OHV, and LOCOH. Research questions 1, 2, and 3 were addressed by these results. The research questions were:

1) What are the lower bounds of internal consistency reliability for scores on each of the 3 LOCOH scales?

2) What are the lower bounds of internal consistency reliability for scores on the Oral Health Value (OHV) scale?

3) What are the lower bounds of internal consistency reliability for scores on each of the 3 Multidimensional Health LOC scales (MHLC)?

LOCOH Reliability Analyses

Internal consistency analysis was completed for the thirty-nine items on the LOCOH scales. Reliability analysis (Cronbach's Alpha) for this sample revealed the LOCOH lower bounds internal consistency reliability coefficients for the LOCOH scales. A minimum item-to-total correlation of .30 was utilized in determining whether or not an item would be included in the final analysis of the scale. In the final analysis, items were deleted one by one from each scale using the alpha-if-item-was-deleted coefficients and the retained items comprised the final scale.

For the LOCOH Internality scale, the original number of items was 12. Item #43 had a corrected item-to total correlation of .10, lower than desired to attain unidimensionality for this scale. If this item was deleted the alpha would increase to .81. Item #43 reads, "Sometimes I find my own new ways to take better care of my teeth and mouth." The phrasing of this question appeared to be consistent with deletion primarily because of the words 'new ways'. Table 4 shows the item-to-total correlations and alpha if an item was deleted.

Table 4.

Reliability Analysis LOCOH Internality-12 Items (Final Sample)

	Corrected			Impact on scale if item deleted		
	Item-Total	Item	Squared			
Variable	Correlation	Mean	Multiple R	Mean	Variance	Alpha
Item 13	.44	4.71	.24	46.64	36.72	.78
Item 14	.38	4.05	.24	47.31	38.53	.79
Item 19	.37	4.21	.24	47.15	39.08	.79
Item 20	.53	4.82	.50	46.54	37.08	.77
Item 21	.66	4.70	.60	46.66	35.92	.76
Item 32	.32	3.72	.16	47.64	39.55	.79
Item 36	.51	4.40	.31	46.96	37.26	.78
Item 38	.42	4.21	.24	47.15	38.21	.78
Item 43	.10	3.41	.05	47.95	41.87	.81
Item 44	.36	4.60	.23	46.77	38.25	.79
Item 45	.62	4.16	.45	47.20	35.94	.76
Item 47	.61	4.38	.45	46.97	35.69	.76

Note. Summary statistics for the Internality scale: Mean=51.36; Variance=44.22;

Standard Deviation=6.65; Valid n=265; Cronbach's alpha: .80; Standardized alpha: .80;

Mean inter-item correlation: .25; Items = 12

After deleting one item from the LOCOH Internality scale, 11 items remained.

Item #32 had a corrected item-to total correlation of .31 just over the minimally

acceptable and possibly low enough to negatively influence unidimensionality for this scale. If this item was deleted the alpha would increase to .81. Item #32 reads, "How soon I recover from dental problems usually depends on me alone." The phrasing of this question appeared to be consistent with the posited dimension but was deleted. Table 5 shows the item-to-total correlations and alpha if an item was deleted.

Table 5.

Reliability Analysis LOCOH Internality-11 Items (Final Sample)

Variable	Corrected Item-Total Correlation	Item Mean	Squared Multiple R	Impact on scale if item deleted		
				Mean	Variance	Alpha
Item 13	.45	4.72	.24	43.23	34.473	.80
Item 14	.39	4.05	.23	43.90	36.19	.81
Item 19	.38	4.21	.23	43.74	36.71	.81
Item 20	.54	4.82	.50	43.13	34.78	.79
Item 21	.66	4.70	.60	43.25	33.72	.78
Item 32	.31	3.72	.15	44.23	37.46	.81
Item 36	.51	4.40	.31	43.55	35.02	.79
Item 38	.41	4.21	.24	43.74	36.12	.80

Table 5 cont'd

	Corrected			Impact on scale if item deleted		
	Item-Total		Squared			
Variable	Correlation	Item Mean	Multiple R	Mean	Variance	Alpha
Item 44	.37	4.59	.23	43.35	35.93	.81
Item 45	.61	4.16	.44	43.79	33.85	.78
Item 47	.62	4.38	.45	43.56	33.52	.78

Note. Summary statistics for the Internality scale: Mean=47.95; Variance=41.87; Standard Deviation=6.47; Valid n=265; Cronbach's alpha: .81; Standardized alpha: .82; Mean inter-item correlation: .28; Items=11

After deleting another item from the LOCOH Internality scale, 10 items remained. No other item had a corrected item-total correlation of less than .30. In addition the Cronbach's alpha attained with 10 items could not be improved upon by the deletion of another item using this analysis. The final lower bounds internality consistency reliability alpha for the ten-item scale is .81. This alpha is higher than the minimum expected of .70. Table 6 shows the final scale for the LOCOH Internality items resulting from the item and reliability analyses.

Table 6.

Reliability Analysis LOCOH Internality-10 Items (Final Sample)

Variable	Corrected Item-Total Correlation	Item Mean	Squared Multiple R	Impact on scale if item deleted		
				Mean	Variance	Alpha
Item 13	.45	4.72	.24	39.53	30.39	.80
Item 14	.39	4.05	.23	40.21	32.11	.81
Item 19	.36	4.21	.20	40.05	32.80	.81
Item 20	.56	4.82	.50	39.43	30.60	.79
Item 21	.68	4.70	.59	39.56	29.61	.78
Item 36	.51	4.41	.31	39.85	31.00	.79
Item 38	.41	4.21	.23	40.05	32.05	.80
Item 44	.38	4.60	.22	39.66	31.71	.81
Item 45	.61	4.16	.43	40.09	30.02	.78
Item 47	.61	4.38	.44	39.87	29.67	.78

Note. Summary statistics for the Internality scale: Mean=44.26; Variance=37.49; Standard Deviation=6.12; Valid n=266; Cronbach's alpha: .81; Standardized alpha: .82; Mean inter-item correlation: .31; Items = 10

For the LOCOH Powerful Others scale, the original number of items was 13. Item #37 had a corrected item-to total correlation of .18, lower than desired to attain unidimensionality for this scale. If this item was deleted the alpha would increase to .80. Item #37 reads, "Sometimes I take the advice of family and friends in caring for my teeth

and mouth." The phrasing of this question did not appear inconsistent with the posited

dimension, but was deleted after review. Table 7 shows the item-to-total correlations and

alpha if this item was deleted.

Table 7.

Reliability Analysis LOCOH Powerful Others-13 Items (Final Sample)

| | Corrected | | | Impact on scale if item deleted | | |
| | Item-Total | | Squared | | | |
Variable	Correlation	Item Mean	Multiple R	Mean	Variance	Alpha
Item 12	.29	4.06	.20	47.6343	46.38	.80
Item 22	.49	3.83	.29	47.86	45.48	.78
Item 23	.55	4.35	.36	47.36	44.29	.77
Item 24	.47	3.69	.33	48.00	45.29	.78
Item 25	.46	3.46	.37	48.24	45.34	.78
Item 26	.54	3.87	.36	47.82	45.83	.77
Item 29	.54	4.46	.41	47.24	45.37	.77
Item 35	.42	3.36	.22	48.33	46.39	.78
Item 42	.45	4.07	.28	47.62	45.48	.78
Item 48	.46	3.59	.29	48.10	45.32	.78
Item 49	.25	4.28	.13	47.41	48.83	.80

Table 7 cont'd

Variable	Corrected Item-Total Correlation	Item Mean	Squared Multiple R	Impact on scale if item deleted		
				Mean	Variance	Alpha
Item 39	.49	4.64	.37	47.06	46.06	.78
Item 37	.18	4.05	.11	47.65	50.31	.80

Note. Summary statistics for the Powerful Others scale: Mean=51.69; Variance=53.29; Standard Deviation=7.3001; Valid n=268; Cronbach's alpha: .80; Standardized alpha: .80; Mean inter-item correlation: .23; Items = 13

After deleting one item from the LOCOH Powerful Others scale, 12 items remained. Item #49 had a corrected item-to total correlation of .24.   If this item was deleted the alpha would increase to .80. Item #49 reads, "In this day of modern dentistry, everyone should have good oral health." The phrasing of this question appeared to be inconsistent with the posited dimension so deletion was probably justified. Table 8 shows the item-to-total correlations and alpha if this item was deleted.

Table 8.

Reliability Analysis LOCOH Powerful Others-12 Items (Final Sample)

Variable	Corrected Item-Total Correlation	Item Mean	Squared Multiple R	Impact on scale if item deleted		
				Mean	Variance	Alpha
Item 12	.30	4.06	.18	43.59	43.28	.80
Item 22	.49	3.83	.28	43.81	42.77	.78
Item 23	.55	4.34	.36	43.31	41.56	.78
Item 24	.45	3.69	.30	43.96	42.74	.79
Item 25	.48	3.46	.37	44.193	42.39	.78
Item 26	.54	3.87	.36	43.77	43.01	.78
Item 29	.54	4.46	.41	43.19	42.63	.78
Item 35	.42	3.36	.21	44.28	43.62	.78
Item 42	.45	4.07	.28	43.57	42.66	.79
Item 48	.47	3.59	.29	44.05	42.45	.78
Item 49	.24	4.28	.13	43.37	46.05	.80
Item 39	.48	4.64	.36	43.01	43.37	.78

Note. Summary statistics for the Powerful Others scale: Mean=47.6455;

Variance=50.31; Standard Deviation=7.09; Valid n=268; Cronbach's alpha: .80;

Standardized alpha: .81; Mean inter-item correlation: .26; Items = 12

After deleting another item from the LOCOH Powerful Others scale, 11 items

remained. Item #12 had a corrected item-to total correlation of .31 just over the

minimally acceptable and possibly low enough to negatively influence unidimensionality

for this scale. If this item was deleted the alpha would increase to .81. Item #12 reads,

"When I have a problem with my dental health, I first call the dental office." The words

'first call the dental office" may have been contributed to the lower correlation of this

item with the posited dimension and therefore was deleted. Table 9 shows the item-to-

total correlations and alpha if an item was deleted.

Table 9.

Reliability Analysis LOCOH Powerful Others-11 Items (Final Sample)

| | Corrected | | | Impact on scale if item deleted | | |
| | Item-Total | | Squared | | | |
Variable	Correlation	Item Mean	Multiple R	Mean	Variance	Alpha
Item 12	.30	4.07	.18	39.33	39.30	.81
Item 22	.48	3.83	.28	39.56	38.89	.79
Item 23	.56	4.34	.36	39.06	37.58	.78
Item 24	.45	3.69	.30	39.71	38.88	.793
Item 25	.48	3.45	.36	39.94	38.51	.79
Item 26	.53	3.88	.34	39.52	39.18	.78
Item 29	.55	4.46	.40	38.94	38.62	.78

Table 9 cont'd

Variable	Corrected Item-Total Correlation	Item Mean	Squared Multiple R	Impact on scale if item deleted		
				Mean	Variance	Alpha
Item 35	.44	3.37	.21	40.03	39.44	.79
Item 42	.47	4.07	.28	39.32	38.58	.79
Item 48	.46	3.60	.27	39.80	38.60	.79
Item 39	.46	4.64	.33	38.76	39.64	.79

Note. Summary statistics for the Powerful Others scale: Mean=43.39; Variance=46.09;

Standard Deviation=6.7890; Valid n=269; Cronbach's alpha: .80; Standardized alpha:

.81; Mean inter-item correlation: .28; Items = 11

After deleting another item from the LOCOH Powerful Others scale, 10 items

remained. No other item had a corrected item-total correlation of less than .30. In

addition the Cronbach's alpha attained with 10 items could not be improved upon by the

deletion of another item using this analysis. The final lower bounds internality

consistency reliability alpha for the ten-item scale was .81. This alpha is higher than the

minimum expected of .70.   Table 10 shows the final scale for the LOCOH Internality

items resulting from the item and reliability analyses.

Table 10.

Reliability Analysis LOCOH Powerful Others-10 Items (Final Sample)

| | Corrected | | | Impact on scale if item deleted | | |
| | Item-Total | | Squared | | | |
Variable	Correlation	Item Mean	Multiple R	Mean	Variance	Alpha
Item 22	.46	3.83	.27	35.49	32.64	.80
Item 23	.54	4.34	.35	34.98	31.46	.79
Item 24	.46	3.69	.29	35.63	32.28	.80
Item 25	.48	3.46	.35	35.86	32.07	.79
Item 26	.55	3.88	.35	35.44	.32.54	.79
Item 29	.55	4.45	.40	34.86	32.10	.79
Item 35	.45	3.37	.21	35.95	32.83	.80
Item 42	.49	4.08	.28	35.24	31.88	.79
Item 48	.48	3.60	.27	35.72	32.02	.79
Item 39	.42	4.64	.29	34.68	33.51	.80

Note. Summary statistics for Powerful Others Scale: Mean=39.32; Variance=39.09; Standard Deviation=6.25; Valid n=271; Cronbach's alpha: .81; Standardized alpha: .81; Mean inter-item correlation: .30; Items=10

For the LOCOH Chance scale, the original number of items was 14. Item #15 had a corrected item-to total correlation of .30 (rounded), lower than desired to attain unidimensionality for this scale. If this item was deleted the alpha would increase to .84. Item #15 reads, "I think good teeth and gums are largely a matter of heredity." The

phrasing of this question did appear inconsistent with the posited dimension. Some

responders may not consider heredity and chance to be related. This item was deleted

after review. Table 11 shows the item-to-total correlations and alpha if this item was

deleted.

Table 11.

Reliability Analysis LOCOH Chance-14 Items (Final Sample)

	Corrected			Impact on scale if item deleted		
	Item-Total		Squared			
Variable	Correlation	Item Mean	Multiple R	Mean	Variance	Alpha
Item 15	.30	3.71	.27	38.42	68.12	.84
Item 16	.45	3.06	.33	39.06	65.67	.83
Item 17	.45	2.77	.28	39.36	64.88	.83
Item 18	.42	3.13	.27	39.00	65.39	.83
Item 27	.47	2.69	.65	39.44	65.62	.83
Item 28	.58	2.54	.74	39.58	63.30	.82
Item 30	.53	2.82	.43	39.31	63.59	.82
Item 31	.65	2.75	.56	39.38	61.75	.82
Item 33	.57	2.55	.46	39.58	64.18	.82
Item 34	.66	2.38	.61	39.74	62.00	.81

Table 11 cont'd

| | Corrected | | | Impact on scale if item deleted | | |
| | Item-Total | | Squared | | | |
Variable	Correlation	Item Mean	Multiple R	Mean	Variance	Alpha
Item 40	.34	3.55	.25	38.57	67.8034	.84
Item 41	.45	3.28	.28	38.85	64.9664	.83
Item 46	.43	3.37	.27	38.76	65.9053	.83
Item 50	.34	3.53	.25	38.59	67.5680	.84

Note. Summary statistics for the Chance Scale: Mean=42.13; Variance=74.52; Standard Deviation=8.63; Valid n=268; Cronbach's alpha: .84; Standardized alpha: .84; Mean inter-item correlation: .27; Items = 14

After deleting another item from the LOCOH Chance scale, 13 items remained. Item #50 had a corrected item-to total correlation of .30 (rounded) lower than the minimally acceptable and possibly low enough to negatively influence unidimensionality for this scale. If this item was deleted the alpha would increase to .84. Item #50 reads, "Some people were just born to have good oral health." Some responders may not consider the word "born" to be related to the posited dimension and therefore the item was deleted. Table 12 shows the item-to-total correlations and alpha if an item was deleted.

Table 12.

Reliability Analysis LOCOH Chance-13 Items (Final Sample)

| | Corrected | | | Impact on scale if item deleted | | |
| | Item-Total | | Squared | | | |
Variable	Correlation	Item Mean	Multiple R	Mean	Variance	Alpha
Item 16	.43	3.07	.31	35.38	59.62	.83
Item 17	.47	2.77	.27	35.67	58.35	.83
Item 18	.43	3.13	.27	35.31	58.93	.83
Item 27	.49	2.69	.65	35.75	59.10	.83
Item 28	.60	2.55	.74	35.90	56.93	.82
Item 30	.52	2.82	.41	35.62	57.69	.83
Item 31	.66	2.75	.56	35.69	55.59	.82
Item 33	.58	2.56	.46	35.89	57.88	.82
Item 34	.67	2.39	.61	36.06	55.87	.82
Item 40	.31	3.56	.20	34.89	61.90	.84
Item 41	.45	3.27	.27	35.18	58.72	.83
Item 46	.43	3.37	.27	35.08	59.70	.83
Item 50	.30	3.53	.19	34.92	61.87	.84

Note. Summary statistics for the Chance scale: Mean=38.44; Variance=67.89; Standard Deviation=8.24; Valid n=270; Cronbach's alpha: .84; Standardized alpha: .84; Mean inter-item correlation: .28; Items =13

After deleting another item from the LOCOH Chance scale, 12 items remained. Item #40 had a corrected item-to total correlation of .29 lower than the minimally acceptable and possibly low enough to negatively influence unidimensionality for this scale. If this item was deleted the alpha would increase to .84. Item #40 reads, "If most people in my family have good oral health, it means I should, too." This item may be considered related to heredity and some responders may not consider heredity to be 'chance' or 'luck'. This may have been contributed to the lower correlation of this item with the posited dimension and therefore was deleted. Table 13 shows the item-to-total correlations and alpha if an item was deleted.

Table 13.

Reliability Analysis LOCOH Chance-12 Items (Final Sample)

Variable	Corrected Item-Total Correlation	Item Mean	Squared Multiple R	Impact on scale if item deleted		
				Mean	Variance	Alpha
Item 16	.42	3.06	.30	31.86	53.88	.83
Item 17	.47	2.77	.27	32.15	52.53	.83
Item 18	.44	3.13	.27	31.79	53.00	.83
Item 27	.50	2.69	.65	32.23	53.07	.83
Item 28	.61	2.55	.73	32.37	50.95	.82
Item 30	.52	2.82	.40	32.10	51.91	.83

Table 13 cont'd

	Corrected				Impact on scale if item deleted	
	Item-Total		Squared			
Variable	Correlation	Item Mean	Multiple R	Mean	Variance	Alpha
Item 31	.67	2.75	.56	32.17	49.81	.81
Item 33	.59	2.56	.45	32.37	51.96	.82
Item 34	.66	2.39	.59	32.53	50.29	.81
Item 40	.29	3.55	.14	31.37	56.30	.84
Item 41	.44	3.27	.27	31.65	53.01	.83
Item 46	.42	3.37	.27	31.56	53.92	.83

Note. Summary statistics for the Chance scale: Mean=34.92; Variance=61.64; Standard

Deviation=7.85; Valid n=271; Cronbach's alpha: .84; Standardized alpha: .84; Mean

inter-item correlation: .30; Items = 12

After deleting another item from the LOCOH Chance scale, 11 items remained.

No other item had a corrected item-total correlation of less than .30. In addition the

Cronbach's alpha attained with 11 items could not be improved upon by the deletion of

another item using this analysis. The final lower bounds internality consistency

reliability alpha for the ten-item scale was .84. This alpha is higher than the minimum

expected of .70.   Table 14 shows the final scale for the LOCOH Chance items resulting

from the item and reliability analyses.

Table 14.

Reliability Analysis LOCOH Chance-11 Items (Final Sample)

| | Corrected | | | Impact on scale if item deleted | | |
| | Item-Total | | Squared | | | |
Variable	Correlation	Item Mean	Multiple R	Mean	Variance	Alpha
Item 16	.43	3.06	.30	28.31	48.72	.84
Item 17	.46	2.77	.26	28.59	47.69	.83
Item 18	.44	3.13	.27	28.24	48.02	.84
Item 27	.51	2.69	.65	28.68	47.92	.83
Item 28	.62	2.55	.73	28.82	45.96	.82
Item 30	.52	2.82	.40	28.55	46.95	.83
Item 31	.66	2.75	.55	28.62	45.09	.82
Item 33	.59	2.56	.45	28.81	47.04	.82
Item 34	.67	2.39	.59	28.98	45.36	.82
Item 41	.42	3.27	.24	28.10	48.29	.84
Item 46	.43	3.37	.27	28.00	48.86	.84

Note. Summary statistics for Chance scale: Mean=31.37; Variance=56.30; Standard

Deviation=7.50; Valid n=271; Cronbach's alpha: .84; Standardized alpha: .84; Mean

inter-item correlation: .33; Items = 11

Internal consistency analysis was completed for the four-item OHV scale. Two

negatively worded items in the OHV scale were re-coded for analysis. Cronbach's alpha

for the Health as a Value scale was lower than desired. The value obtained was .48 and a

standardized alpha of .49. However, when item 8 was deleted the alpha value improved

to .52. This value was substantively lower than the minimally acceptable value of .70

and was lower than obtained in the Phase II-Pilot Study. It is unclear why the scale

demonstrated lower reliability in this sample. Table 15 shows the results of the internal

consistency analyses for this scale.

Table 15.

Reliability Analysis Oral Health Value Scale-4 Items (Final Sample)

Variable	Corrected Item-Total Correlation	Item Mean	Squared Multiple R	Impact on scale if item deleted		
				Mean	Variance	Alpha
Item 8	.17	3.69	.12	10.43	6.87	.52
Item 9	.36	2.92	.23	11.19	5.74	.33
Item 10	.25	3.79	.15	10.32	6.09	.44
Item 11	.37	3.71	.20	10.41	6.42	.35

Note. Summary statistics for Oral Health Value scale: Mean=14.12; Variance=9.53;

Standard Deviation=3.09; Valid n=277; Cronbach's alpha: .49; Standardized alpha: .49;

Mean inter-item correlation: .20; Items = 4

Case summaries for item responses were examined to determine possible reasons

the OHV scale exhibited such low reliability. Histograms were inspected and used to

identify any discrepancies, though the results were not very revealing. A visual

assessment of the first 100 cases for consistency of responses by item lead to a

preliminary decision: some responders may not have understood or thoroughly

considered the items. Cronbach's alpha was lower than pre-deletion. This was disappointing since the pilot study achieved a lower bounds internal consistency reliability coefficient of .63 and with item 8 removed .68 for only 70 participants.

Internal consistency analysis was completed for the eighteen-item MHLC scales. Reliability analysis (Cronbach's Alpha) for this sample revealed that the MHLC lower bounds internal consistency reliability coefficients for the MHLC Powerful Others scale was .77. Table 16 shows the reliability analysis for the scale.

Table 16.

Reliability Analysis MHLC Powerful Others-6 Items (Final Sample)

Variable	Corrected Item-Total Correlation	Item Mean	Squared Multiple R	Impact on scale if item deleted		
				Mean	Variance	Alpha
Item 53	.65	3.47	.44	16.49	13.11	.69
Item 55	.50	3.68	.28	16.29	14.96	.73
Item 60	.38	3.44	.16	16.52	15.84	.76
Item 57	.53	2.83	.30	17.13	15.14	.73
Item 64	.50	3.57	.26	16.39	14.78	.73
Item 68	.51	2.98	.28	16.99	14.68	.73

Note. Summary statistics for MHLC Powerful Others scale: Mean=19.96; Variance=20.29; Standard Deviation=4.50; Valid n=277; Cronbach's alpha: .77; Standardized alpha: .76; Mean inter-item correlation: .36; Items = 6

The lower bounds internal consistency reliability coefficients for the MHLC Internality scale was .72 (.74 with item 58 removed). Table 17 shows the reliability analysis for the scale.

Table 17.

Reliability Analysis MHLC Internality Scale-6 Items (Final Sample)

Variable	Corrected Item-Total Correlation	Item Mean	Squared Multiple R	Impact on scale if item deleted		
				Mean	Variance	Alpha
Item 51	.34	4.04	.14	20.80	10.55	.72
Item 56	.523	4.24	.28	20.60	9.66	.66
Item 58	.27	3.18	.12	21.66	10.94	.74
Item 62	.10	4.38	.46	20.46	9.47	.64
Item 63	.60	4.46	.45	20.38	9.30	.64
Item 67	.44	4.53	.34	20.31	10.54	.69

Note. Summary statistics for MHLC Internality scale: Mean=24.84; Variance=13.75; Standard Deviation=3.71**;** Valid n=274; Cronbach's alpha: .72; Standardized alpha: .73; Mean inter-item correlation: .31; Items = 6

The lower bounds internal consistency reliability coefficient for the MHLC Chance scale was .69. Table 18 shows the reliability analysis for the scale.

Table 18.

Reliability Analysis MHLC Chance Scale-6 Items (Final Sample)

| | Corrected | | | Impact on scale if item deleted | | |
| | Item-Total | Item | Squared | | | |
Variable	Correlation	Mean	Multiple R	Mean	Variance	Alpha
Item 52	.37	3.34	.28	15.38	12.36	.66
Item 54	.28	3.16	.11	15.37	13.24	.69
Item 59	.53	2.73	.38	16.00	11.58	.61
Item 61	.42	3.12	.29	16.60	12.25	.64
Item 65	.46	3.38	.24	15.34	11.90	.64
Item 66	.45	2.99	.35	15.74	11.63	.63

Note. Summary statistics for MHLC Chance scale: Mean=18.72; Variance=16.48; Standard Deviation=4.06; Valid n=276; Cronbach's alpha: .69; Standardized alpha: .69; Mean inter-item correlation: .27; Items = 6

These results were consistent with the reliabilities obtained by previous investigators across other samples for the MHLC.

The 4th research question ("What was the relationship of the general health LOC and the oral health LOC scales?") was investigated by constructing a matrix between the 7 scales (3 MHLC, 3 LOCOH, and 1 OHV) using the final scales for each dimension placing the scale correlations on the off-diagonals and scale reliabilities on the diagonals. The LOCOH Powerful Others scale is moderately correlated with both the LOCOH Internality scale and the LOCOH Chance scale shows moderate correlation with the

MHLC Powerful Others Scale. The MHLC Powerful Others and the MHLC Chance

scales also show moderate correlations. The bolded correlations show the largest

correlations between the scales which were as expected. Table 19 shows the results of

this analysis.   Discussion regarding this matrix will be included in Chapter V.

Table 19.

Final Scale Correlations and Reliabilities – 7 scales

	LOCO-I	LOCOH-PO	LOCOH-CH	MHLC-PO	MHLC-CH	MHLC-I	OHV
LOCOH-I	**.81**						
LOCOH-PO	.40	**.81**					
LOCOH-CH	-.18	.22	**.84**				
MHLC-PO	.18	**.49**	.41	**.77**			
MHLC-CH	-.11	.18	**.57**	.37	**.69**		
MHLC-I	**.50**	.25	-.08	.22	-.07	**.72**	
OHV	.20	.12	-11	-01	.09	.14	**.52**

Note. Correlations calculated from final scale sum case totals. Reliabilities are on the

diagonals. Bolded correlations were significant (2-tailed).

Lower bounds internal consistency reliability coefficients obtained in the current

study for the seven scales ranged from moderate (< .70) to high (>.80) with the

exception of OHV scale (< .60). Cronbach's alpha reliabilities for each of the scales

were used in Table 19 on the diagonals. Descriptive information (means, standard

deviations, and alpha reliabilities) for the final field study is shown in Table 20.

Table 20.

Descriptive Data on Scales Utilizing Reliability Analyses (Final Study)

Scale	No. of Items Final Scale	Mean	Standard Deviation	Cronbach's Alpha
MHLC-Internal	6	24.84	3.71	.72
MHLC-Chance	6	18.72	4.06	.69
MHLC-Powerful Others	6	19.96	4.50	.77
Oral Health Value	3	10.42	2.62	.52
LOCOH-Internality	10	44.26	6.12	.81
LOCOH-Chance	11	31.37	7.50	.84
LOCOH-Powerful Others	10	39.32	6.25	.81

Each scale included in the final LOCOH questionnaire and the OHV scale was reviewed for impact upon various population subgroups included in the study. The minimum and maximum potential sum totals on the LOCOH scales for the final ten items for Internality and Powerful Others was 10 and 60, respectively. For Chance, the minimum and maximum potential sum total was 11 and 66, respectively. Case sums closer to 10 indicate stronger agreement and those closer to 60 or 66 indicate stronger disagreement with the dimension. The minimum and maximum sums for the OHV scale for the remaining 3 items in the scale was 3 and 18, respectively. Case sums closer to 3 indicate stronger agreement and sums closer to 18 indicate stronger disagreement with

the dimension.   The expected case mean for Chance LOCOH scales was 38.5.   The

expected case mean for the Internality and Powerful Others scales was 35. Observed

means of less than the expected case mean would tend to indicate agreement with the

scale items and observed means greater than the expected case mean would tend to

indicate disagreement with the scale items. The expected case mean for the OHV scale is

10.5 where observed means of greater than 10.5 tend to indicate stronger disagreement

with the scale items.

Table 21 below shows the LOCOH and OHV scales' descriptive statistics for

gender using scale case totals.

Table 21.

*Descriptive LOCOH & OHV Scale Statistics -- Subgroup **Gender***

	Mean		Standard Deviation		*n*	*n*
Scale Name	Female	Male	Female	Male	Female	Male
LOCOH Internal	43.17	44.79	6.49	6.21	160	117
LOCOH Chance	30.96	31.47	7.61	7.59	160	117
LOCOH Powerful	39.16	38.72	6.55	7.29	160	117
Oral Health Value	10.61	10.16	2.79	2.39	160	117

Black/African-American was race group 1, Caucasian/European American was

race group 2, Hispanic American was race group 3, and all others were placed in race

group 4. Table 22 shows descriptive statistics for the subgroups using scale case totals to

include the number in each group as well as the mean and standard deviation.

Table 22.

*Descriptive LOCOH & OHV Scale Statistics -- Subgroup **Race/Ethnicity***

Scale Name	Race	*n*	M	SD
Oral Health Value	1	34	11.47	2.39
	2	198	10.15	2.68
	3	20	11.15	2.93
	4	26	10.42	1.94
LOCOH Chance	1	34	35.26	9.75
	2	198	30.63	6.88
	3	20	30.80	6.95
	4	26	30.58	8.77
LOCOH Internality	1	34	42.79	6.12
	2	198	44.15	6.31
	3	20	47.05	5.81
	4	26	40.62	6.62
LOCOH-PO	1	34	39.12	7.19
	2	198	39.38	5.95
	3	20	39.10	7.63
	4	26	35.69	10.80

Note. 1=Black/African American; 2=Caucasian/European American; 3=Hispanic American; 4= All Others; Valid = 278 (Race is missing for one responder)

The descriptive statistics for the education category were shown in Table 23. Education group where responders indicated that the highest grade completed was high school was group 3, responders indicating the highest grade completed was 1-3 years of college were group 4, responders indicating 4-6 years of college or college graduation were group 5. Table 23 shows descriptive statistics for the education subgroups using scale case totals to include the number in each group, mean, and standard deviation. Table 23.

Descriptive LOCOH &OHV Scale Statistics -- Subgroup **Education**

Scale Name	Education	n	Mean	SD
Oral Health Value	3	43	10.65	2.65
	4	178	10.40	2.58
	5	51	10.24	2.95
LOCOH Chance	3	43	30.58	7.35
	4	178	31.30	7.68
	5	51	32.14	7.09
LOCOH Internality	3	43	43.93	7.24
	4	178	44.29	6.24
	5	51	42.14	6.07
LOCOH-PO	3	43	39.93	8.35
	4	178	39.03	6.91
	5	51	38.25	5.27

Note. 3=high school graduation; 4=1-3 years of college; 5 = 4-6 years or college graduation. Other education categories are not shown.

Table 24 shows the LOCOH and OHV scales descriptive statistics for the health status (*seristat*) category variable. A small number of responders for each scale had at least 1 variable missing so that the *seristat* grouping could not be made. The health status variable comprises pre-clinical, non-clinical, clinical, and post-clinical groupings. Table 24 shows descriptive statistics for the health status groups to include the number in each group, mean, and standard deviation using scale sum totals.

Table 24.

*Descriptive LOCOH & OHV Scale Statistics for **Health Status***

Health Status	Statistic	LOCOH Internality	LOCOH Powerful	LOOCH Chance	Oral Health Value
Invalid	*n*	5	5	5	5
	Mean	41.20	38.20	37.00	12.40
	SD	2.17	3.27	4.18	1.52
Preclin	*n*	56	56	55	56
	Mean	44.16	38.11	31.18	10.54
	SD	7.35	9.54	8.28	2.94
Nonclin	*n*	145	145	145	145
	Mean	43.54	39.04	31.19	10.17
	SD	6.28	6.07	7.62	2.44
Clinical	*n*	32	32	32	32
	Mean	44.34	40.53	30.81	10.81
	SD	5.62	4.36	5.39	2.53

Table 24 cont'd

Health Status	Statistic	LOCOH Internality	LOCOH Powerful	LOOCH Chance	Oral Health Value
Postclin	*n*	40	40	40	40
	Mean	44.53	38.88	30.90	10.53
	SD	6.44	7.05	8.28	3.00
Total	*n*	278	278	278	278
	Mean	43.86	38.99	31.21	10.41
	SD	6.40	6.86	7.59	2.64

The multiple discriminate analyses discussed in the next section will assess differences between the groups comprising the health status variables based on the LOCOH and OHV scales.

Multiple Discriminate Analysis (MDA)

To conduct the MDA analyses, scale sum total scores were saved for the four scales comprising the final scale items: OHV (3 items), LOCOH Powerful Others (10 items), LOCOH Chance (11 items), and LOCOH Internality (10 items) to be used in the subsequent Multiple Discriminate Analysis (MDA). The analysis included LOCOH and OHV scale scores as continuous variables to predict the grouping variable health status comprising four levels: preclin, nonclin, clinical, and postclin. The purpose of the analysis was to assess the predictability of the variables, specifically to see if the grouping variables (preclin, nonclin, clinical, and postclin) could be predicted from the LOCOH and OHV scale sum scores as hypothesized.

MDA Predicting Health Status from LOCOH and OHV

Research question #5 was addressed by conducting an MDA analysis using LOCOH and OHV scale sum scores as continuous. Research question #5 asked, Does LOCOH and OHV predict health status? Health status (preclin, nonclin, clinical, and postclin) was the grouping variable. Three discriminant functions were extracted from the data. For health status, the first function explained 59.3%, the second function explained 38.8%, and the third function explained 1.9% of the variance. Box's M was significant for the analysis indicating the equality of the covariance/variance matrices assumption was violated (72.73; F= 2.33, df1=30, df2=51015.52, p = .000). The Chi-Square test, Wilks' Λ, was not significant for the first function accepting the null that the canonical correlation for the three functions was zero, $\eta = 0$. But Wilks' Λ was also not significant for the other two functions in the model. This indicated there was not a statistically significant difference between the group centroids for any of the three discriminant functions. Since none of the functions were significant, the associated coefficients cannot be used in the interpretation of the effect of the predictor variables on health status.

Findings from the results section will be clarified in Chapter V. Also as a part of the Chapter V, results will be discussed along with any implications for additional research that may contribute to the foundation laid by this study.

CHAPTER V

DISCUSSIONS AND FINDINGS

Summary of Study

There is a growing interest in developing valid and reliable methods that healthcare providers can use to teach and influence positive health behaviors among their patients, particularly in dental health where primary and secondary prevention has been shown to be of substantive value. Empirical research has previously shown Locus of Control (LOC) to be a valuable personality construct in understanding the influence of an internal or external agent on expectancy reinforcement, in spite of the fact that its utility has not been shown to be of consistent value within a healthcare context. The construct has been used in many different healthcare settings including prevention programs and treatment compliance. Hypertension, weight control, smoking prevention, as well as general health-seeking behaviors have been examined to assess the value that LOC may have toward increasing positive health behaviors and therefore health status. Rarely, however, has LOC been examined with regard to oral health behaviors.

Equivocal findings existed in the literature in using LOC for general health. Most of these findings were blamed on methodology, model misspecification, or controversy as to whether the construct is a personality state or a trait. One of the variables believed to be important to the measurement of LOC is the value of health. However, this construct has received little attention from investigators. Researchers have, too often, made the assumption that all people place a very high value on health. Unfortunately,

there is no widely accepted method of measuring the value of health. A summary of the
historical research revealed that LOC is best examined when assessing the construct
within a health condition-specific context. This was an important reason to assess LOC
and oral health care.

The current study sought to develop a measurement tool as an exploratory first
step in assessing LOC for oral health in the general population. The current study also
reports lower bounds internal consistency reliability coefficients of the scales for 3
dimensions thought to underlie oral health locus of control (chance, internality, and
powerful others). Another purpose was to provide preliminary insight into the usefulness
of LOC for oral health in predicting oral health visit experience behaviors.   The scale
sums were also used to report means and standard deviations for the various population
subgroups; that is, by gender, race/ethnicity, and education.

Major Findings

Two samples for this study were selected, a pilot and a final field sample. The
first sample consisted of 70 persons primarily from the general community. This sample
was used to conduct a preliminary analysis to select items for the final study as well as to
assess suitability of the data for further analysis. The second sample, consisting of 279
persons from the community and undergraduate classrooms at a state university,
comprised the final field study. Only the final field study was used to analyze the lower
bounds internal consistency reliability coefficients for the scales and to assess the value
of the LOCOH and OHV scale sum scores as predictor variables.

There were 4 major findings from this study. The first finding was that the three
LOCOH scales demonstrated high reliability coefficients. Second, the LOCOH scales

and the MHLC scales were thought, as expected, to measure the state or condition-specific LOC construct. This study finding suggests that oral health LOC dimensions should be measured separately from general health LOC dimensions. As a third finding, the OHV scale demonstrated poor reliability coefficients in the study sample. And lastly, the LOCOH and OHV variables were not useful in predicting the grouping variable, health status.

Discussion of Major Findings

Relatively large lower bounds internal consistency reliability coefficients were achieved for the three LOCOH scales: internality, powerful others, and chance. The lower bounds reliability coefficient for the LOCOH internality scale was .80; LOCOH Chance scale was .83; and LOCOH Powerful Others scale was .80. The minimum acceptable coefficient alpha for attitude and value scales was thought to be .70 according to Nunnally (1967). The coefficients obtained for this sample were well above the minimally accepted values for all three scales.

In addition, the relatively large lower bounds internal consistency reliability coefficients for the LOCOH scales were well above the alpha coefficients achieved for the MHLC scales in spite of the fact that the LOCOH scale incorporated many item adapted from the MHLC scales. This tends to support what was found in the literature with regard to the utilization of health-condition specific scales as a better, more focused measure of LOC.

There was some difficulty in determining the best set of items that should comprise the final LOCOH Chance scale. Eight items were deleted from the original 39-item scale resulting in 31 items remaining in the final scale. Of the eight items that were

deleted, 3 appeared to measure what one might call heredity as opposed to a chance or luck construct and the other 5 were not discernable to a particular potential LOC dimension. The final LOCOH instrument comprised 3 scales with 31 items: 10 for Internality, 10 for Powerful Others, and 11 for Chance dimension (the final scales were included in the Appendix). With relatively high lower bounds internal consistency reliability coefficients in this sample, the LOCOH instrument may potentially be useful in assessing oral health LOC construct dimensionality for other samples in the general adult population in the U.S.

The Oral Health Value scale was problematic in the current study. No generally accepted instrument could be located from which to select current items and develop new items. It was important that a short scale be developed for quick use in assessing this most important variable. The OHV scale items were adapted from a previous scale developed by Lau, et al. (1986). Previous internal consistency reliability coefficients reported for the Lau, et al. OHV scale were not high, but were near the range of acceptability (Cronbach's alpha = .67). Reliability coefficients obtained during the pilot of the current study substantiated the lower bounds internal consistency reliability coefficients previously reported by Lau, et al. Unfortunately, the lower bounds internal consistency reliability of the OHV scores decreased substantially in the final field study.

The development of the OHV construct was not a direct purpose of this study since it was believed that a scale previously existed for measuring this construct. Because of the low reliabilities and the importance of this variable to the research questions, it was difficult to definitively say whether two of the research questions were fully supported or refuted in this study. A measurement tool that yields more reliable

scores for this construct is needed to assess the value of oral health to the general adult population. In addition, because of errors of measurement, correction for attenuation should be made for items in this scale.

Acceptable lower bounds internal consistency reliability coefficients were achieved in this sample for 2 of 3 MHLC scales: internality, powerful others, and chance. The lower bounds of internal consistency reliability coefficients on the MHLC scales were: .72 for Internality, .69 for Chance, .77 for Powerful Others. These values were within the range of those reported in other samples. Of interest is the fact that higher results were achieved for the LOCOH scales than for the MHLC scales upon which some of the items were originally based.

The current study involved determining whether or not the MHLC scales and the LOCOH scales correlated more highly across complementary dimensions when compared to the other non-complementary dimensions. That is; did the MHLC chance scale correlate more highly with the LOCOH chance scale than it did with the LOCOH internality scale? Correlation analysis was conducted to assess the extent of correlation between MHLC, OHV, and LOCOH scales purported to measure similar dimensions of LOC. This analysis demonstrated that the highest scale correlations were between the expected dimensions across the MHLC and LOCOH scales. That is, MHLC Chance correlated highest with LOCOH Chance, MHLC Powerful Others correlated highest with LOCOH Powerful Others, and MHLC Internality correlated highest with LOCOH Internality. However, one bivariate correlation between LOCOH Powerful Others and LOCOH Internality scales was higher than desired or expected. OHV scale correlations with the other six scales demonstrated very low to no correlational association. These

correlations provided additional support for construct validity for the new LOCOH scales.

The study evidence suggested that oral health locus of control dimensions could be measured separately from general health locus of control dimensions when using the MHLC and LOCOH scales. This finding adds to the theoretical foundation that suggests LOC is health-condition specific. It adds clarity to the concept that the construct may be more conditional on one's state than serving as a personality trait invariant across health conditions and circumstances.

Findings from this study indicated that LOCOH was not useful in discriminating health status groups using LOCOH and OHV scale sum scores. The overall test for the predictive model, Wilks' Lambda, was not significant. The grouping variable was chosen based on the oral health visit experience and serious oral health symptoms. It was posited that LOCOH and OHV could be related to four levels of the health status variable. That is, those considered pre-clinical would exhibit a different LOCOH orientation than those considered post-clinical. This contention was not supported through this study. The predictors could not effectively separate the grouping variables with any degree of accuracy greater than what would be expected by random probability alone. Locus of Control and visit experience appear to be dynamic and may influence one another in a way not yet understood. Additional research is necessary to better operationalize the health status variable using visit experience and symptomotology.

The use of the grouping variable, health status, was an attempt to classify oral health behavior into four distinct categories based on the presence or absence of serious symptoms and the presence or absence of non-preventive visits to oral health providers.

This classification was based on the previous work of Kasl and Cobb (1966) suggesting that behaviors can be classified into preventive, sick-role, and illness. This was a first attempt to apply these classifications to oral health behavior as opposed to general health behavior. It is possible that there may be more overlap in oral health behavior with regard to preventive, sick-role and illness roles than in general health behavior though none have been explored in the current study. For example, acute, chronic and severe tooth, gum, or jaw pain as it relates to the basic human need to eat and varying pain thresholds may provide the impetus to study any potential overlap in these behaviors that may exist. Additionally, individual ideas about prevention and aesthetics (the appearance of the oral cavity) may contribute to the overlap in classification.

This study also assessed potential differences between gender, race, and education categories using means and standard deviations for the LOCOH scales. For the *Internality* scale, the mean case sum totals for males and females were similar as was the variability. The mean indicated that both groups scored more toward strongly disagreeing with the Internality items. For the *Powerful Others* scale both male and females scored higher than the expected mean toward the strongly disagree side, females tended toward this side more than males. The variability for males was higher than for females. For the LOCOH *Chance* scale both groups tended away from the expected mean in the direction of strongly agreeing with the *Chance* items and variability was slightly higher for males than for females. Overall for both genders there was a greater tendency toward disagreement with items on the *Powerful Others* and *Internality* scales and toward agreement with the items on the *Chance* scale. This seems to indicate generally that this sample believes *Chance* is the LOC agent of expectancy reinforcement

for oral health when compared to other LOC agents. Males scored (10.16) less than the expected mean of 10.5 toward agreement and females scored (10.61) a little more than the expected mean toward disagreement. The data suggests that males tended to value their oral health a little more than females in the sample.

The 4 race categories were also reviewed for differences that may be observed in the data. These racial/ethnicities were: Black/African-American, White/Caucasian American, Hispanic American, and all others. The other category included any persons that did not specifically identify with the other three named categories. The LOCOH scales differed based on race/ethnicity.

Black, White, and responders in the Other race category scored higher than the expected mean on the LOCOH *Internality* scale tending toward strong disagreement with those items while Hispanics scored even higher than the other two groups in the direction of disagreement. The population subgroups tended toward strongly disagreeing with items on LOCOH *Powerful Others* scale. The Hispanic subgroup scored further toward disagreement when compared to the other 3 groups. Three of the four population subgroups tended toward strongly agreeing with items on the LOCOH *Chance* scale. Black/African Americans scored closer to the expected mean than any other subgroup for the *Chance* scale indicating less agreement with Chance as the agent of expectancy reinforcement than the other groups. A very strong tendency difference in *Oral Health Value* scale was observed for the racial/ethnic groups.   The expected mean for *Oral Health Value* scale was 10.5; however, Black/African Americans and Hispanics scored higher than the expected mean at 11.5 and 11.2, respectively indicating more disagreement with items in the scale. White/Caucasian Americans and those in the other

category scored less than the expected mean at 10.15 and 10.42, respectively indicating agreement that oral health is valued. For Blacks and Hispanics, oral health tended to be less valued than it was for other groups in the sample.

For those with less education, there was a stronger agreement tendency with both the LOCOH *Powerful Others* and *Chance* scales as the agent of expectancy reinforcement when compared to those with more education. Generally however, all three educational groups tended toward agreement with items on the Chance scale and disagreement on the Powerful Others scale. For those with 1-3 years of college, there was a tendency toward greater disagreement with the LOCOH *Internality* scale items when compared to both the college graduate as well as the high school graduate. However, all three groups tended toward disagreement as a whole with the LOCOH *Internality* scale items. The *Oral Health Value* scale revealed that those with less education tended to not value oral health, disagreeing with the oral health value items, compared to those with more education. This was consistent with what was expected since for general healthcare, the greater the education the more one values health in general.

Using scale sum totals, the grouping variable Health Status revealed that for the *Oral Health Value* scale, the observed mean for the Post-Clinical and the Pre-Clinical group tended to be higher than the OHV total group mean indicating that responders who value oral health tended to be pre or post-clinical as opposed to the other two health status groups, non-clinical and clinical. For the LOCOH *Internality* scale, pre-clinical and post-clinical responders tended to have an observed mean that was higher than the total group mean when compared to the other two groups, non-clinical and clinical. For

the LOCOH *Powerful Others* scale, responders grouped as clinical tended to disagree with the Powerful Others scale items more than the total three groups. This was somewhat unexpected since those who have recently visited oral health providers and had symptoms were expected to agree more with powerful others scale items, have a higher Powerful Others orientation. For the LOCOH *Chance* scale, pre-clinical responders tended to have an observed mean that was higher than the total group mean when compared to the other three groups indicating more disagreement with the scale items. The differences in the observed compared to the total group means for each dimension may indicate that additional work is warranted to better understand the mechanisms at work in distinguishing the health status groups as defined in this study.

Findings Related to Literature

In the literature, many researchers hypothesized that internal health locus of control might be expected to affect behaviors predominantly carried out for reasons of health maintenance, e.g., tooth brushing, flossing, but would be less influential for risky behaviors, such as alcohol consumption. Chance locus of control was thought to negatively relate to health status and maintenance. Powerful Others locus of control seemed more ambiguous in the literature. On the one hand, individuals with strong beliefs in a health professional as the agent of control might take fewer health precautions; that is, engage in more risky behaviors believing that most problems could be effectively managed by the health professional. Conversely, these individuals may believe so strongly in the health professional that health maintenance or treatment recommendations are strongly followed.

In spite of the endorsement of Wallston, et al. (1978) and others as to the importance of the health as a value construct, the current study evidence did not support the influence of this construct in predicting oral health behavior. Taking oral health value into account did not alter the prediction rate of the LOCOH dimensions on health status. Other investigators (Steptoe & Wardle 2001) were also not able to document the influence of this construct in their cross-sectional study with a relatively homogeneous sample.

Discussion

The development of this new scale gives health researchers and oral health providers a set of scales with far greater value and usefulness than was available prior to this study. These new scales have been developed using a more representative sample of respondents than those used in the development of the MHLC scales. As with the MHLC scales, LOCOH use was intended for adults, with at least a 6th grade reading level, and with no functional impairments. Most adults should be capable of understanding and responding to the items.

The scales might be used to increase understanding and prediction of oral health behaviors. The theoretical basis upon which the LOCOH construct was built provides a relevant example. Consider an investigation where the dependent variable is compliance with treatment recommendations with regard to periodontitis. With other variables controlled and in accordance with previous research, persons scoring high on the LOCOH Chance scale should theoretically delay compliance longer or not comply at all with the treatment recommendations of the dental provider, yielding to the idea that he or she has no control over the outcome. To insure success, the provider may institute a

more intense follow-up regimen by telephone or additional visits after initial treatment to insure that the desired patient outcome is achieved. Knowing the agent of control at work for a particular patient allows for more appropriate management of the patient's treatment.

The *Oral Health Value* scale used items adapted from the Lau et al. (1986) scale used to assess general health as a value. This scale was chosen primarily because its response format was similar to the response format desired for the LOCOH instrument. Another scale available to the researcher was a ranking scale for assessing the value of health among other circumstances in life. This ranking scale was not compatible with the proposed format for the LOCOH nor has it been considered superior to the scale used by other investigators. No other generally accepted scale was found in the literature. Additional research is needed to increase the lower bounds internal consistency reliability coefficients of the current OHV scale through development of a more comprehensive and effective item pool.

This study contributed to the understanding of the LOC construct by demonstrating higher reliabilities and validities for this condition specific use than was demonstrated in other studies with health conditions that were more general. One of the interests in obtaining a measurement tool that can yield higher reliabilities and validities for oral health locus of control was the potential usefulness of the construct in predicting oral health behavior. Understanding personality construct orientations can help providers more effectively care for patients and can help health educators prepare and administer health messages with greater impact. This study was one of the first of its kind and

therefore was exploratory. LOCOH had rarely been used to predict specific oral health

behavior in this way to the knowledge of this investigator prior to the current study.

In spite of the fact that we believe the construct is important in understanding

some behaviors, much is still unknown about how we can apply knowledge of the

construct for practical use. Locus of Control as a personality construct, while useful in

some disease related contexts, has seemed more illusive in other contexts for more

complex behaviors such as health seeking, treatment compliance, and health

maintenance. It may be that the conceptual basis upon which locus of control is utilized,

is flawed.   For example, chance locus of control may not only include fate, but genetics

and other environmental contexts over which one has little control. Additionally, beliefs

in supreme or supernatural beings may impact how the chance locus of control

orientation is viewed if the addition of such a scale is offered along with the chance scale.

In heterogeneous samples, these and other beliefs may obscure the value of the construct

within a health context. There is much more to understand about locus of control for oral

health and its associations with oral health behavior.

Unexpected Results

There were a considerably high percentage of responders with oral health

symptoms over the past 12 months. The list of symptoms was comprehensive in scope

and some of the symptoms may have represented other medical conditions as opposed to

oral health exclusive conditions. A panel of expert dentists was consulted to more

specifically address the number of serious oral health symptoms listed that would likely

require an immediate or urgent visit to an oral health provider office. This variable was

used to define the grouping variable health status. For both the pilot and the final study,

about 1/3 of responders indicated the presence of serious oral health symptoms over the past 12 months, 42.9%, and 32.6%, respectively. If this study were conducted again, oral health symptoms should be included in a preliminary investigation to determine what is important versus what is superficial in terms of seeking visits to oral health providers.

The LOCOH included internal and external dimensions as defined by Rotter (1966) where the external dimension could be further divided into Powerful Others and Chance. It was interesting to note moderate correlations between the scales in the pilot and final field study. Higher correlation was expected between the Chance and Powerful Others scales since they were originally considered by Rotter to be external, but not between Internality and either of the other two based on the literature. Interestingly enough, LOCOH Internality and LOCOH Powerful Others demonstrated higher scale correlations than were expected. Reasons for this higher correlation are unclear. The final field study supported only low correlations between the *Powerful Others* and *Chance* scales.

Conclusions

This study contributed to the sparse body of research on this topic. No instrument was available to measure oral health locus of control dimensions prior to this study. This study proposed an instrument that can be used to yield valid and reliable scores for this purpose. Additional use of the instrument across other populations and groups is warranted to add value to construct validity. What is needed, however, is an oral health value measurement tool that can be used to measure this construct reliably. Additional foundational work will be necessary to insure that the construct has been correctly researched to include and exclude all relevant variables.

While Oral Health Value was included as a variable in this study, another interesting question to consider might be how people learn to value health. It certainly is plausible to state that oral health is not as highly valued as one might expect. Certainly the scale reliabilities and, thusly, the validities in this study were suspect. The OHV scale in this sample suggested that Black/African Americans and Hispanics tended to not value oral health as highly as White/Caucasian Americans and Others. Of even greater interest in this study was the high percentage of persons who practiced preventive health behaviors and then were measured as having low oral health value. The two behaviors were certainly not consistent with what has been expressed in the literature for general health.

Some investigators have posited that locus of control beliefs are a function of long-term experiences. This study utilized provider visits and symptoms as a means to show classifications of oral health behavior. The multiple discriminant analysis was not useful in predicting this behavior utilizing the LOCOH dimensions. Other variables in the study may prove more useful in future investigations.

Based on evidence of the study, it can be concluded that LOCOH scores were measured reliably in this sample for the three dimensions studied. The LOCOH comprised separate and distinct dimensions from general health as measured by the MHLC. The predictive value of the LOCOH dimensions included in this model did not prove useful for the intended purpose, that is, to predict health status. It is possible that the variables used for the oral health behavior outcome, health status, were not inclusive of all relevant variables. Additional data collection is necessary in this area, as well.

Limitations

The results of the present study will become more widely generalizable as the LOCOH is used across additional populations and validity and reliability coefficients are reported. The convenience sample utilized for this study did not appear to limit the power of the study. However, sites used to recruit responders may have limited access to some subgroups. Findings from this study should be assessed using additional samples in the population.

The study results to predict oral health behavior may have been limited by the high level of oral health symptoms among the responders. Additionally, the number of visits attended in total as well as the number attended strictly for preventive care may have been subject to recall bias among the responders. These items defined the outcome variables.

Theoretical Implications

The theoretical foundation for this study rests in J. B. Rotter's (1966) social learning theory and specifically in the construct Locus of Control. This theory utilizes expectancy reinforcement as the agent of control in behaviors. It is possible to determine one's Locus of Control orientation based on a three-dimensional construct for oral health. The additional theoretical foundation rests in prior work conducted by Wallston, et al. (1978) in developing a multi-dimensional Locus of Control scale for use in assessing general health. The results of the current study suggest high support for the application of both the locus of control construct for oral health as well as the multidimensional locus of control construct for general health. Support for the health as a value construct was not demonstrated in this study.

In spite of the fact that the LOCOH dimensions could not be used in this study for prediction there is a considerable theoretical foundation in existence for illness, sick, and preventive behavior roles. *Theory of Reasoned Action and Theory of Planned Behavior (*Ajzen & Fishbein, 1980)*, Health Belief Model* (Rosenstock, 1974b)*, and Fishbein's Model of Behavioral Intentions* (Fishbein, 1967) were all used as a foundation for developing the oral health behaviors and the model for this study. There is much work that remains to further explore the application of these theories with regard to oral health behaviors. These theories as well as the LOC construct represent complex models of health behavior. It is, therefore, not surprising that a predictive model lacked effectiveness in this first exploratory attempt.

Practical Implications

The basic problem that the current study was designed to address was the identification of scales and items that could effectively measure Oral Health Locus of Control dimensions. Several practical implications can result from the use of this instrument that may assist both health educators and dental health providers to better educate and treat patients in their care. Knowing a patient's orientation can assist in tailoring health messages as well as tailoring treatment follow-up to increase the likelihood of successful patient outcomes. Successful patient outcome indicators involve the prevention of tooth loss, prevention and treatment of dental caries, gum diseases, pain, and other facial and jaw deficiencies.

The predictive importance of the LOCOH scale sum scores can be best explored in future research. In spite of the fact that this study did not find predictive value in the

scores, there is much work that can be done to improve upon this concept. The ideas

proposed have merit.

Future Research

The use of the LOCOH instrument is encouraged across other populations. It is

expected that the psychometric properties for each administration will be reported. In

addition, variables that may better associate oral health locus of control dimensions with

oral health status outcomes should be explicated. The value of such prediction models

cannot be overestimated. Using information gained from the current study, future

research may include but not be limited to the following questions:

1. In what way is Oral Health LOC associated with Gender or Ethnicity?

2. Are specific oral health behavior outcomes associated with specific Oral Health

   LOC dimensions?

3. Do the LOCOH lower bounds internal consistency reliabilities hold across other

   samples?

4. How does the LOCOH perform in other populations, such as in adult oral clinic-

   based patients?

5. What other research methods can be used more effectively to provide an enriched

   understanding of LOCOH dimensions and oral health behavior outcomes?

Concluding Remarks

The current study suggests that the LOCOH scales may be potentially valuable

and useable tools to assess oral health locus of control orientation. Maintaining oral

health has been suggested as important in diagnosing and controlling diabetes as well as

arterial plaque implicated in heart disease. It is well known among health professionals

that good oral health contributes to good overall health. The Oral Health LOC construct

has potential value to assist those within the healthcare arena to better care for their

patients. The LOCOH instrument may potentially be helpful in making the provider's

job of educating and treating each patient more effective.   It is hoped that the LOCOH

scales can be effectively used in other populations with great success and that new

practical applications of the scales will be found.

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APPENDICES

Dental Health Locus of Control Questionnaire (F)

This questionnaire is designed to assess people's beliefs regarding their own dental health. There are no right or wrong answers to this questionnaire. There are no known risks to completing this questionnaire, but you are encouraged to seek the advice of a professional should it raise any concerns about your physical, mental, or dental health. If you have any questions about the procedures of this study, bring them to the attention of the person(s) named at the end of the Questionnaire. Contact numbers are provided. Your participation in this study is strictly voluntary. If at any time you wish to discontinue, you may do so without penalty. Your answers are anonymous and confidential.

CHECK ONLY ONE BOX FOR EACH OF THE FOLLOWING ITEMS.

A. **Gender**: ☐ Male ☐ Female

B. **Race/Ethnicity**

☐ African/African American

☐ Caucasian/European American

☐ Hispanic/Hispanic American

☐ Other (identify: _____)

C. **Current Age**: _____
    (in years)

D. **Residence Zip Code**:_____

E. **Check the <u>Highest</u> Grade or Year of School Completed**:

☐ Grades 1-8 (elementary)

☐ Grades 9 through 11 (some High School)

☐ Grade 12 or GED (high school graduate)

☐ College 1 year to 3 years (some college or technical school)

☐ College 4 to 6 years (College Graduate)

☐ Graduate School 6-10 years (Masters or Ph.D. Degree)

☐ Professional School (e.g., medicine, dentistry, law)

☐ Post-Graduate School

F. **Dental Insurance:**

☐ I don't have insurance and I can't afford to pay for dental services

☐ I have insurance but I can't afford the dental co-pays

☐ I have insurance and I can usually afford the dental co-pays

☐ I don't have insurance but I can usually afford to pay for dental services

☐ I have access to free dental care

G. **Check all that apply below:**

☐ I have dentures.

☐ I have implants.

☐ I have at least one partial or bridge.

1. **Think about the past year, have you had any of the following?**
(check all that apply)

☐ Sensitive Teeth	☐ Yellowing Teeth
☐ Loose Teeth	☐ Sore Gums
☐ Bleeding Gums	☐ Dry Mouth
☐ Bad Breath	☐ Swollen Face
☐ Swelling Inside Mouth	☐ Difficulty Swallowing
☐ Sore Jaw	☐ Pain (general area of mouth or jaw)
☐ Difficulty Chewing	
☐ Burning Sensation in Your Mouth	☐ Dissatisfaction with Appearance of Teeth
☐ Tartar Build-up	
☐ Toothache	☐ Worry about area in mouth or about teeth
☐ Filling Fell Out	
☐ Abscess	☐ Any Other (oral/dental only)

2. Have you EVER had any of the above dental problems at any time during your life? □Yes □No

3. Are you having any of the above problems today? □Yes □No

4. Think about the past year, have you done any of the following: *[check all that apply]*.

☐ Looked in the mirror to check an area of your mouth

☐ Took Over-the-Counter pain medicine for an oral health problem

☐ Asked a friend or family member to check an area of your mouth

☐ Talked to a friend or family member about a specific oral health problem

☐ Had increased stress, worry, or anxiety about your gums, teeth, or mouth

☐ Chose soft foods to eat as a substitute to prevent oral pain or discomfort

☐ Got more rest because of a oral health problem

☐ Took medicine prescribed by the Dentist

☐ Carried out self-care the dentist told you to do

☐ Made a follow-up visit to another medical provider because of a specific oral health problem (e.g., oral surgeon, internal medicine, cardiac specialist)

5. Most days of the past week I did the following: *[check all that apply]*.

☐ Flossed between my teeth ☐ Brushed my teeth ☐ Brushed my tongue ☐ Used a tooth pick ☐ Used Mouthwash ☐ None of these choices ☐ Ate hard vegetables or fruits like carrots, pears, apples, celery, etc.

6. In the past year, how many times would you estimate you made a dental professional (hygienist or dentist) visit? *(check only one box)*

☐ None   ☐ 1   ☐ 2   ☐ 3   ☐ 4   ☐ 5   ☐ 6   ☐ 7   ☐ 8 or more

7. In the past year, how many visits to a dental professional (hygienist or dentist) were <u>only</u> so that you could get sealants, whitening, cleaning, fluoride treatment, or a general checkup? *(check only one box)*

☐ None   ☐ 1   ☐ 2   ☐ 3   ☐ 4   ☐ 5   ☐ 6   ☐ 7   ☐ 8 or more

Please check the box that best describes how you feel about each of the statements that follow. *(check only one box for each statement)*

8. If you don't have your dental health you don't have anything.

☐ Strongly Agree ☐ Moderately Agree ☐ Agree ☐ Disagree ☐ Moderately Disagree
☐ Strongly Disagree

9.   There are many things I care about more than my dental health.

☐ Strongly Agree ☐ Moderately Agree ☐ Agree ☐ Disagree ☐ Moderately Disagree
☐ Strongly Disagree

10.   Good dental health is only of minor importance in a happy life.

☐ Strongly Agree ☐ Moderately Agree ☐ Agree ☐ Disagree ☐ Moderately Disagree
☐ Strongly Disagree

11. My dental health is highly important compared to other things in my life.

☐ Strongly Agree ☐ Moderately Agree ☐ Agree ☐ Disagree ☐ Moderately Disagree
☐ Strongly Disagree

12. When I have a problem with my dental health, I first call the dental office.

☐ Strongly Agree ☐ Moderately Agree ☐ Agree ☐ Disagree ☐ Moderately Disagree
☐ Strongly Disagree

13. If I take care of myself I can avoid problems with my teeth and gums.

☐ Strongly Agree ☐ Moderately Agree ☐ Agree ☐ Disagree ☐ Moderately Disagree
☐ Strongly Disagree

14. If I have a dental problem(s), other than an injury, it will be because of something I've done or not done.

☐ Strongly Agree ☐ Moderately Agree ☐ Agree ☐ Disagree ☐ Moderately Disagree
☐ Strongly Disagree

15. I think good teeth and gums are largely a matter of heredity.

☐ Strongly Agree ☐ Moderately Agree ☐ Agree ☐ Disagree ☐ Moderately Disagree
☐ Strongly Disagree

16. No matter what I do, I'm likely to have dental problems.

☐ Strongly Agree ☐ Moderately Agree ☐ Agree ☐ Disagree ☐ Moderately Disagree
☐ Strongly Disagree

17. If you have bad dental health when you are young, there is little more you can do.

☐ Strongly Agree ☐ Moderately Agree ☐ Agree ☐ Disagree ☐ Moderately Disagree
☐ Strongly Disagree

18. I think just about everybody looses teeth as they get older.

☐ Strongly Agree ☐ Moderately Agree ☐Agree ☐ Disagree ☐ Moderately Disagree

☐ Strongly Disagree

19. Dental problems happen because of personal neglect.

☐ Strongly Agree ☐ Moderately Agree ☐Agree ☐ Disagree ☐ Moderately Disagree

☐ Strongly Disagree

20. I am directly responsible for keeping my teeth and gums healthy.

☐ Strongly Agree ☐ Moderately Agree ☐Agree ☐ Disagree ☐ Moderately Disagree

☐ Strongly Disagree

21. I control the condition of my teeth and gums.

☐ Strongly Agree ☐ Moderately Agree ☐Agree ☐ Disagree ☐ Moderately Disagree

☐ Strongly Disagree

22. Regarding my dental health, I do only what the dental professionals tell me to do.

☐ Strongly Agree ☐ Moderately Agree ☐Agree ☐ Disagree ☐ Moderately Disagree

☐ Strongly Disagree

23. Having regular contact with my dental professionals is the best way for me to avoid dental problems.

☐ Strongly Agree ☐ Moderately Agree ☐Agree ☐ Disagree ☐ Moderately Disagree

☐ Strongly Disagree

24. My family plays a big part in my dental health recovery.

☐ Strongly Agree ☐ Moderately Agree ☐Agree ☐ Disagree ☐ Moderately Disagree

☐ Strongly Disagree

25. Dental professionals are responsible for keeping my teeth and gums

healthy.

☐ Strongly Agree ☐ Moderately Agree ☐Agree ☐ Disagree ☐ Moderately Disagree

☐ Strongly Disagree

26. The care I receive from dental professionals is the main reason for

how well I recover from dental problems.

☐ Strongly Agree ☐ Moderately Agree ☐Agree ☐ Disagree ☐ Moderately Disagree

☐ Strongly Disagre

27. Luck probably plays a big part in how soon I recover from my

dental problems.

☐ Strongly Agree ☐ Moderately Agree ☐Agree ☐ Disagree ☐ Moderately Disagree

☐ Strongly Disagree

28. Most things that affect my dental health happen because of luck.

☐ Strongly Agree ☐ Moderately Agree ☐Agree ☐ Disagree ☐ Moderately Disagree

☐ Strongly Disagree

29. There is a direct connection between going to the dentist and good dental health.

☐ Strongly Agree ☐ Moderately Agree ☐Agree ☐ Disagree ☐ Moderately Disagree ☐ Strongly Disagree

30. There is little I can do to avoid dental problems.

☐ Strongly Agree ☐ Moderately Agree ☐Agree ☐ Disagree ☐ Moderately Disagree ☐ Strongly Disagree

31. A lot of things that affect my dental health are out of my control.

☐ Strongly Agree ☐ Moderately Agree ☐Agree ☐ Disagree ☐ Moderately Disagree ☐ Strongly Disagree

32. How soon I recover from dental problems usually depends on me alone.

☐ Strongly Agree ☐ Moderately Agree ☐Agree ☐ Disagree ☐ Moderately Disagree ☐ Strongly Disagree

33. Poor dental health is unavoidable.

☐ Strongly Agree ☐ Moderately Agree ☐Agree ☐ Disagree ☐ Moderately Disagree ☐ Strongly Disagree

34. Dental health happens mostly because of luck.

☐ Strongly Agree ☐ Moderately Agree ☐Agree ☐ Disagree ☐ Moderately Disagree ☐ Strongly Disagree

35. Having good dental health can only happen by listening to dental professionals.

☐ Strongly Agree ☐ Moderately Agree ☐Agree ☐ Disagree ☐ Moderately Disagree ☐ Strongly Disagree

36. My dental health can only be good if I take the right actions myself.

☐ Strongly Agree ☐ Moderately Agree ☐Agree ☐ Disagree ☐ Moderately Disagree ☐ Strongly Disagree

37. Sometimes I take the advice of family and friends in caring for my teeth and mouth.

☐ Strongly Agree ☐ Moderately Agree ☐Agree ☐ Disagree ☐ Moderately Disagree ☐ Strongly Disagree

38. I take oral health and disease seriously enough to act on my own knowledge.

☐ Strongly Agree ☐ Moderately Agree ☐Agree ☐ Disagree ☐ Moderately Disagree ☐ Strongly Disagree

39. Most dental problems can be helped by making visits to the dental office.

☐ Strongly Agree ☐ Moderately Agree ☐Agree ☐ Disagree ☐ Moderately Disagree ☐ Strongly Disagree

40. If most people in my family have good oral health, it means I should, too.

☐ Strongly Agree ☐ Moderately Agree ☐ Agree ☐ Disagree ☐ Moderately Disagree

☐ Strongly Disagree

41. When I think of oral health problems, I'm just lucky things are not worse.

☐ Strongly Agree ☐ Moderately Agree ☐ Agree ☐ Disagree ☐ Moderately Disagree

☐ Strongly Disagree

42. If I don't visit my oral health provider regularly, then my oral health will probably get worse.

☐ Strongly Agree ☐ Moderately Agree ☐ Agree ☐ Disagree ☐ Moderately Disagree

☐ Strongly Disagree

43. Sometimes I find my own new ways to take better care of my teeth and mouth.

☐ Strongly Agree ☐ Moderately Agree ☐ Agree ☐ Disagree ☐ Moderately Disagree

☐ Strongly Disagree

44. I learned growing up how to take care of my teeth and mouth for good oral health.

☐ Strongly Agree ☐ Moderately Agree ☐ Agree ☐ Disagree ☐ Moderately Disagree

☐ Strongly Disagree

45. My oral health depends solely on the way I take care of myself.

☐ Strongly Agree ☐ Moderately Agree ☐ Agree ☐ Disagree ☐ Moderately Disagree

☐ Strongly Disagree

46. Dental problems happen in spite of everything I try to do to avoid them.

☐ Strongly Agree ☐ Moderately Agree ☐ Agree ☐ Disagree ☐ Moderately Disagree
☐ Strongly Disagree

47. I make the decision whether to have good oral health or not.

☐ Strongly Agree ☐ Moderately Agree ☐ Agree ☐ Disagree ☐ Moderately Disagree
☐ Strongly Disagree

48. Without the work of dental professionals to care for my teeth and gums, I couldn't have good oral health.

☐ Strongly Agree ☐ Moderately Agree ☐ Agree ☐ Disagree ☐ Moderately Disagree
☐ Strongly Disagree

49. In this day of modern dentistry, everyone should have good oral health.

☐ Strongly Agree ☐ Moderately Agree ☐ Agree ☐ Disagree ☐ Moderately Disagree
☐ Strongly Disagree

50. Some people were just born to have good oral health.

☐ Strongly Agree ☐ Moderately Agree ☐ Agree ☐ Disagree ☐ Moderately Disagree
☐ Strongly Disagree

The next section asks you about your overall health. Please answer each of the following questions thinking about your

overall physical and mental health and NOT just about your oral health. (check only one box for each statement)

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51. If I get sick, it's my own behavior that determines how soon I get well again.

☐ Strongly Agree ☐ Moderately Agree ☐ Agree ☐ Disagree ☐ Moderately Disagree ☐ Strongly Disagree

52. No matter what I do, if I am going to get sick, I will get sick

☐ Strongly Agree ☐ Moderately Agree ☐ Agree ☐ Disagree ☐ Moderately Disagree ☐ Strongly Disagree

53. Having regular contact with my physician is the best way for me to avoid illness.

☐ Strongly Agree ☐ Moderately Agree ☐ Agree ☐ Disagree ☐ Moderately Disagree ☐ Strongly Disagree

54. Most things that affect my health happen to me by accident.

☐ Strongly Agree ☐ Moderately Agree ☐ Agree ☐ Disagree ☐ Moderately Disagree ☐ Strongly Disagree

55. Whenever I don't feel well, I should consult a medically trained professional.

☐ Strongly Agree ☐ Moderately Agree ☐ Agree ☐ Disagree ☐ Moderately Disagree ☐ Strongly Disagree

56. I am in control of my health.

☐ Strongly Agree ☐ Moderately Agree ☐Agree ☐ Disagree ☐ Moderately Disagree

☐ Strongly Disagree

57. My family has a lot to do with my becoming sick or staying healthy.

☐ Strongly Agree ☐ Moderately Agree ☐Agree ☐ Disagree ☐ Moderately Disagree

☐ Strongly Disagree

58. When I get sick, I am to blame.

☐ Strongly Agree ☐ Moderately Agree ☐Agree ☐ Disagree ☐ Moderately Disagree

☐ Strongly Disagree

59. Luck plays a big part in determining how soon I will recover from

an illness.

☐ Strongly Agree ☐ Moderately Agree ☐Agree ☐ Disagree ☐ Moderately Disagree

☐ Strongly Disagree

60. Health professionals control my health.

☐ Strongly Agree ☐ Moderately Agree ☐Agree ☐ Disagree ☐ Moderately Disagree

☐ Strongly Disagree

61. My good health is largely a matter of good fortune.

☐ Strongly Agree ☐ Moderately Agree ☐Agree ☐ Disagree ☐ Moderately Disagree

☐ Strongly Disagree

62. The main thing that affects my health is what I myself do.

☐ Strongly Agree ☐ Moderately Agree ☐Agree ☐ Disagree ☐ Moderately Disagree

☐ Strongly Disagree

63. If I take care of myself, I can avoid illness.

☐ Strongly Agree ☐ Moderately Agree ☐ Agree ☐ Disagree ☐ Moderately Disagree ☐ Strongly Disagree

64. Whenever I recover from an illness, it's usually because other people (for example, doctors, nurses, family, friends) have been taking good care of me.

☐ Strongly Agree ☐ Moderately Agree ☐ Agree ☐ Disagree ☐ Moderately Disagree ☐ Strongly Disagree

65. No matter what I do, I'm likely to get sick.

☐ Strongly Agree ☐ Moderately Agree ☐ Agree ☐ Disagree ☐ Moderately Disagree ☐ Strongly Disagree

66. If it's meant to be, I will stay healthy.

☐ Strongly Agree ☐ Moderately Agree ☐ Agree ☐ Disagree ☐ Moderately Disagree ☐ Strongly Disagree

67. If I take the right actions, I can stay healthy.

☐ Strongly Agree ☐ Moderately Agree ☐ Agree ☐ Disagree ☐ Moderately Disagree ☐ Strongly Disagree

68. Regarding my health, I can only do what my doctor tells me to do.

☐ Strongly Agree ☐ Moderately Agree ☐ Agree ☐ Disagree ☐ Moderately Disagree ☐ Strongly Disagree

END OF QUESTIONNAIRE

Thank you for your participation by completing this questionnaire. The results from this study will be available in about one (1) year. If you believe you would like to have the aggregate results from this questionnaire, please contact Rosita Brown Long @ 405-706-7329 or rositalong@cs.com

Oklahoma State University Institutional Review Board

Date: Thursday, August 18, 2005

IRB Application No   ED0612

Proposal Title: Examining Psychometric Properties of a 3-Factor Locus of Control Oral
                              Health Scale (LOCOH) Against Clinical Group and Value Ascribed to Oral
                              Health, Pilot Project and Final Instrument Validation

Reviewed and   Exempt
Processed as:

Status Recommended by Reviewer(s): Approved   Protocol Expires: 8/17/2006

Principal
Investigator(s
Rosita Brown Long   Laura Barnes
4137 Mangrove Drive   700 N. Greenwood Main H
Carrollton, TX 75007   Tulsa, OK 74145

The IRB application referenced above has been approved. It is the judgment of the reviewers that the
rights and welfare of individuals who may be asked to participate in this study will be respected, and that
the research will be conducted in a manner consistent with the IRB requirements as outlined in section 45
CFR 46.

☑ The final versions of any printed recruitment, consent and assent documents bearing the IRB approval
stamp are attached to this letter. These are the versions that must be used during the study.

As Principal Investigator, it is your responsibility to do the following:

1. Conduct this study exactly as it has been approved. Any modifications to the research protocol
   must be submitted with the appropriate signatures for IRB approval.
2. Submit a request for continuation if the study extends beyond the approval period of one calendar
   year. This continuation must receive IRB review and approval before the research can continue.
3. Report any adverse events to the IRB Chair promptly. Adverse events are those which are
   unanticipated and impact the subjects during the course of this research; and
4. Notify the IRB office in writing when your research project is complete.

Please note that approved protocols are subject to monitoring by the IRB and that the IRB office has the
authority to inspect research records associated with this protocol at any time. If you have questions
about the IRB procedures or need any assistance from the Board, please contact Beth McTernan in 415
Whitehurst (phone: 405-744-5700, beth.mcternan@okstate.edu).

Sincerely,

Sue C. Jacobs, Chair
Institutional Review Board

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Research Proposal

Examining psychometric properties of a 3-factor Locus of Control Oral Health Scale (LOCOH) against clinical group and value ascribed to oral health

Rosita Brown Long, MPH, MS

Script for Recruiting Questionnaire Respondents

"Good afternoon (morning or evening), we are conducting a study about people's beliefs about their oral health. The study entails completing a questionnaire about oral health. The study is confidential meaning that we don't use your name to match it with your responses. The questionnaire only takes about 20 minutes to complete. Your participation in this study is strictly voluntary. Are you at least 18 years old? Do you currently reside in the United States?

Will you help us by completing the questionnaire?"

"There is an Informed Consent Form that I would like to go over with you". Is that Okay?"

APPENDIX - D

Locus of Control for Oral Health (LOCOH) Internality Scale (Final)

1. If I take care of myself I can avoid problems with my teeth and gums.

☐ Strongly Agree ☐ Moderately Agree ☐ Agree ☐ Disagree ☐ Moderately Disagree ☐ Strongly Disagree

2. If I have a dental problem(s), other than an injury, it will be because of something I've done or not done.

☐ Strongly Agree ☐ Moderately Agree ☐ Agree ☐ Disagree ☐ Moderately Disagree ☐ Strongly Disagree

3. Dental problems happen because of personal neglect.

☐ Strongly Agree ☐ Moderately Agree ☐ Agree ☐ Disagree ☐ Moderately Disagree ☐ Strongly Disagree

4. I am directly responsible for keeping my teeth and gums healthy.

☐ Strongly Agree ☐ Moderately Agree ☐ Agree ☐ Disagree ☐ Moderately Disagree ☐ Strongly Disagree

5. I control the condition of my teeth and gums.

☐ Strongly Agree ☐ Moderately Agree ☐ Agree ☐ Disagree ☐ Moderately Disagree ☐ Strongly Disagree

6. My dental health can only be good if I take the right actions myself.

☐ Strongly Agree ☐ Moderately Agree ☐ Agree ☐ Disagree ☐ Moderately Disagree ☐ Strongly Disagree

7. I take oral health and disease seriously enough to act on my own knowledge.

☐ Strongly Agree ☐ Moderately Agree ☐ Agree ☐ Disagree ☐ Moderately Disagree ☐ Strongly Disagree

8. I learned growing up how to take care of my teeth and mouth for good oral health.

☐ Strongly Agree ☐ Moderately Agree ☐ Agree ☐ Disagree ☐ Moderately Disagree ☐ Strongly Disagree

9. My oral health depends solely on the way I take care of myself.

☐ Strongly Agree ☐ Moderately Agree ☐ Agree ☐ Disagree ☐ Moderately Disagree ☐ Strongly Disagree

10. I make the decision whether to have good oral health or not.

☐ Strongly Agree ☐ Moderately Agree ☐ Agree ☐ Disagree ☐ Moderately Disagree ☐ Strongly Disagree

Locus of Control for Oral Health (LOCOH) Chance Scale (Final)

1. **No matter what I do, I'm likely to have dental problems.**

☐ Strongly Agree ☐ Moderately Agree ☐Agree ☐ Disagree ☐ Moderately Disagree ☐ Strongly Disagree

2. **If you have bad dental health when you are young, there is little more you can do.**

☐ Strongly Agree ☐ Moderately Agree ☐Agree ☐ Disagree ☐ Moderately Disagree ☐ Strongly Disagree

3. **I think just about everybody looses teeth as they get older.**

☐ Strongly Agree ☐ Moderately Agree ☐Agree ☐ Disagree ☐ Moderately Disagree ☐ Strongly Disagree

4. **Luck probably plays a big part in how soon I recover from my dental problems.**

☐ Strongly Agree ☐ Moderately Agree ☐Agree ☐ Disagree ☐ Moderately Disagree ☐ Strongly Disagree

5. Most things that affect my dental health happen because of luck.

☐ Strongly Agree ☐ Moderately Agree ☐Agree ☐ Disagree ☐ Moderately Disagree ☐ Strongly Disagree

6. **There is little I can do to avoid dental problems.**

☐ Strongly Agree ☐ Moderately Agree ☐Agree ☐ Disagree ☐ Moderately Disagree ☐ Strongly Disagree

7. **A lot of things that affect my dental health are out of my control.**

☐ Strongly Agree ☐ Moderately Agree ☐Agree ☐ Disagree ☐ Moderately Disagree ☐ Strongly Disagree

8. **Poor dental health is unavoidable.**

☐ Strongly Agree ☐ Moderately Agree ☐Agree ☐ Disagree ☐ Moderately Disagree ☐ Strongly Disagree

9. **Dental health happens mostly because of luck.**

☐ Strongly Agree ☐ Moderately Agree ☐Agree ☐ Disagree ☐ Moderately Disagree ☐ Strongly Disagree

10. **When I think of oral health problems, I'm just lucky things are not worse.**

☐ Strongly Agree ☐ Moderately Agree ☐Agree ☐ Disagree ☐ Moderately Disagree ☐ Strongly Disagree

11. **Dental problems happen in spite of everything I try to do to avoid them.**

☐ Strongly Agree ☐ Moderately Agree ☐Agree ☐ Disagree ☐ Moderately Disagree ☐ Strongly Disagree

Locus of Control for Oral Health (LOCOH) Powerful Others Scale (Final)

1. Regarding my dental health, I do only what the dental professionals tell me to do.

☐ Strongly Agree ☐ Moderately Agree ☐Agree ☐ Disagree ☐ Moderately Disagree ☐ Strongly Disagree

2. Having regular contact with my dental professionals is the best way for me to avoid dental problems.

☐ Strongly Agree ☐ Moderately Agree ☐Agree ☐ Disagree ☐ Moderately Disagree ☐ Strongly Disagree

3. My family plays a big part in my dental health recovery.

☐ Strongly Agree ☐ Moderately Agree ☐Agree ☐ Disagree ☐ Moderately Disagree ☐ Strongly Disagree

4. Dental professionals are responsible for keeping my teeth and gums healthy.

☐ Strongly Agree ☐ Moderately Agree ☐Agree ☐ Disagree ☐ Moderately Disagree ☐ Strongly Disagree

5. The care I receive from dental professionals is the main reason for how well I recover from dental problems.

☐ Strongly Agree ☐ Moderately Agree ☐Agree ☐ Disagree ☐ Moderately Disagree ☐ Strongly Disagree

6. There is a direct connection between going to the dentist and good dental health.

☐ Strongly Agree ☐ Moderately Agree ☐Agree ☐ Disagree ☐ Moderately Disagree ☐ Strongly Disagree

7. Having good dental health can only happen by listening to dental professionals.

☐ Strongly Agree ☐ Moderately Agree ☐Agree ☐ Disagree ☐ Moderately Disagree ☐ Strongly Disagree

8. If I don't visit my oral health provider regularly, then my oral health will probably get worse.

☐ Strongly Agree ☐ Moderately Agree ☐Agree ☐ Disagree ☐ Moderately Disagree ☐ Strongly Disagree

9. Without the work of dental professionals to care for my teeth and gums, I couldn't have good oral health.

☐ Strongly Agree ☐ Moderately Agree ☐Agree ☐ Disagree ☐ Moderately Disagree ☐ Strongly Disagree

10. Most dental problems can be helped by making visits to the dental office.

☐ Strongly Agree ☐ Moderately Agree ☐Agree ☐ Disagree ☐ Moderately Disagree ☐ Strongly Disagree

1. There are many things I care about more than my dental health.

☐ Strongly Agree ☐ Moderately Agree ☐ Agree ☐ Disagree ☐ Moderately Disagree ☐ Strongly Disagree

2. Good dental health is only of minor importance in a happy life.

☐ Strongly Agree ☐ Moderately Agree ☐ Agree ☐ Disagree ☐ Moderately Disagree ☐ Strongly Disagree

3. My dental health is highly important compared to other things in my life.

☐ Strongly Agree ☐ Moderately Agree ☐ Agree ☐ Disagree ☐ Moderately Disagree ☐ Strongly Disagree

VITA

Rosita Brown Long

Candidate for the Degree of

Doctor of Philosophy

Dissertation: DEVELOPMENT OF AN INSTRUMENT MEASURING ORAL HEALTH LOCUS OF CONTROL: RELATIONSHIP TO GENERAL HEALTH LOCUS OF CONTROL, ORAL HEALTH CARE EXPERIENCE, AND ORAL HEALTH VALUE.

Major Field: Educational Psychology (Research and Evaluation)

Biographical:

Education: Completed the Bachelor of Science Degree in Business Education in July 1973 from the University of Oklahoma, Norman, Oklahoma. Completed the Master of Public Health Degree in Social Sciences and Health Behavior in May 1975 from the University of Oklahoma Health and Sciences Center, Oklahoma City, Oklahoma. Completed the Master of Science Degree in Epidemiology in May 2000 from the University of Oklahoma Health Sciences Center, Oklahoma City, Oklahoma. Completed the requirements for the Degree of Doctor of Philosophy in Educational Psychology in December 2006 from the Oklahoma State University, Stillwater, Oklahoma.

Experience: Thirty years professional work experience includes directing and mid-managing large public organizations, founding and operating a small evaluation research practice, directing a multi-disciplinary health center as well as managing physician and dental practices, and teaching part time in community colleges. Additional professional experiences were gained through serving as a visiting lecturer at the University of Oklahoma Health Sciences Center College of Dentistry, and the Oklahoma State University, and through publishing and presenting at numerous professional conferences and seminars.

Professional Membership: American Evaluation Association