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CAUSAL MODELING OF PARENTAL COMPLIANCE WITH A MEDICAL REGIMEN FROM PARENTAL HEALTH LOCUS OF CONTROL

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ABSTRACT

CAUSAL MODELING OF PARENTAL COMPLIANCE WITH A MEDICAL REGIMEN FROM PARENTAL HEALTH LOCUS OF CONTROL

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This investigation sought to understand the interrelationships between parents' sense of control over their children's health, their intention to comply with their children's prescribed medication regimen, and their actual compliance with that regimen. Mothers of sixty-one children (aged three months to seven years) diagnosed with acute otitis media, streptococcal pharyngitis, or tonsillitis completed questionnaires at the time of an acute care visit to the doctor's office. The measures assessed mothers' sense of control over their children's health, as well as their intention to comply with the doctor's recommendations. Two measures of compliance (self-report and medication measurement) were collected at a home interview a week later. Path analyses indicated that, contrary to expectations, mothers who felt they could affect their children's health were more likely to say that they intended to comply with the regimen, but actually complied less (according to self-report and measured compliance). Mother's intention, in turn, predicted her self-reported, but not her measured compliance. Reasons for these unanticipated findings, research limitations, and future directions were discussed.

This work is dedicated to my parents

Elton Everett Olmsted, M.A. and Thelma Putman Olmsted.

Their quiet encouragement and support was vital

to its completion.

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INTRODUCTION

Research investigating patient compliance with a prescribed medical regimen indicates that the rate of noncompliance in the pediatric population may be as high as 80 percent (Litt & Cuskey, 1980). When studies on compliance are broken down into acute versus chronic conditions, estimates of noncompliance rates for acute conditions requiring short-term antibiotic therapy range from 18 to 58 percent. Noncompliance rates for chronic conditions such as cystic fibrosis or cancer are similar, ranging from 11 to 88 percent (Dunbar, 1983). The wide range of these estimates is a function of the different assessment methods used to measure compliance; patient reports generally tend to overestimate compliance, whereas methods such as urine chemical assays tend to underestimate compliance (Dunbar, 1983).

Parental noncompliance of the pediatric patient can result in higher and/or unnecessary health costs (patients must be reassessed and retreated), inferior health status (patients do not receive the intended therapeutic benefits), and parental dissatisfaction with health care. Negative medical outcomes such as these may only serve to increase the chances that the parent of the pediatric patient will fail to comply in the future because of a lack of faith in

medical technology. The magnitude of the problem of noncompliance, in addition to its physical and fiscal consequences, have convinced some health professionals that noncompliance is the most serious problem facing medicine today (Becker, 1985).

While the idea that noncompliance is today's most serious health-related difficulty may be somewhat of an overstatement, patient noncompliance has always been recognized as a problem (even Hippocrates cautioned doctors to watch out for patients who lie about their medication-taking). In modern times, compliance has been studied seriously since the mid-1940's (Koltun & Stone, 1986). Over the past four decades researchers have investigated numerous demographic, situational, and psychological variables in an effort to gain an understanding of compliance behavior, as well as to discover ways to identify and treat patients at risk for noncompliance.

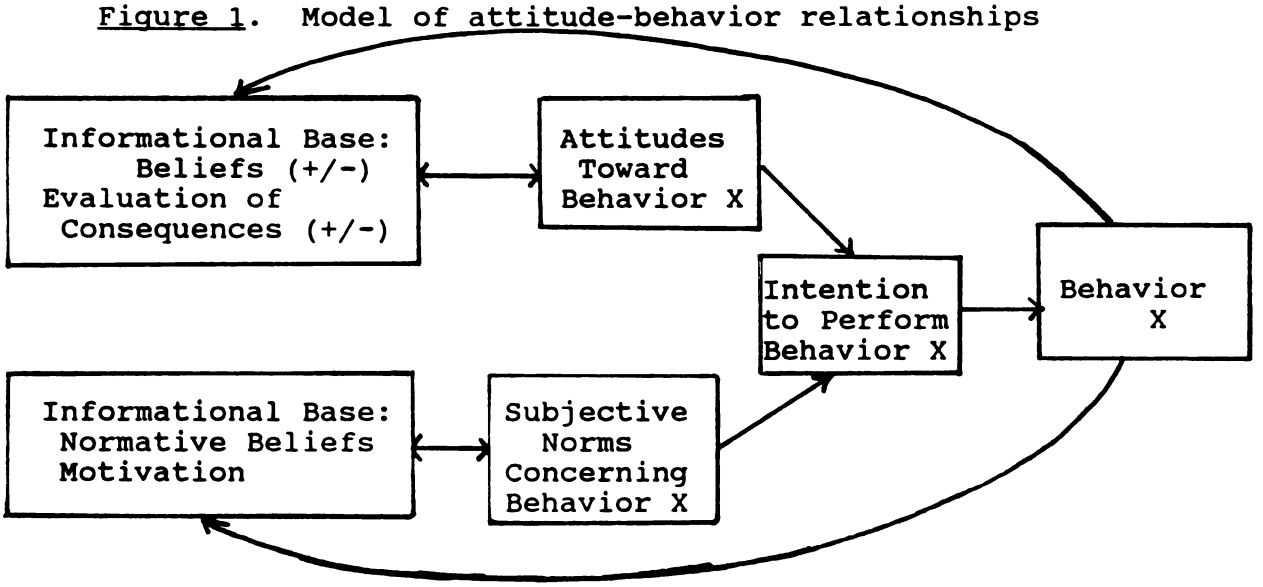
Most researchers interested in the psychological determinants of compliance behavior have conceptualized compliance as an intentional action carried out by rational human beings. Along these same lines, compliance with a medical regimen can be viewed by the patient as a way to gain control over his or her illness. Because of this view of compliance as the outcome of a rational, cognitive process, some researchers have looked at how people's expectations about their abilities to control their life and

health affect their compliance behavior. This particular theoretical approach to the study of compliance behavior is but one example of the many theories proposed in behavioral research to explain the link between an individual's attitudes about an object, and his or her behavior with regard to that object. The implicit assumption underlying all of these theories is that an individual's expectations or attitudes shape or "cause" his or her subsequent behavior (behavior also being a object of attitudes).

Numerous empirical investigations based on this assumption have found, however, that people's overt behavior is at best only weakly related to their expressed attitudes (Fishbein & Ajzen, 1975; Sample & Warland, 1973; Wicker, 1969). The way these findings have typically been explained is that attitudes have three different components (the cognitive, affective and conative), and that all of these help to determine an individual's overt response. Because only one of each of these components has generally been measured in these investigations (the affective component), many researchers have reasoned that this is why very little of the variance of overt behavior is explained in these investigations (Fishbein & Ajzen, 1975).

In their meticulous review of the literature, Fishbein and Ajzen (1975) have formulated a somewhat different theory about the role of cognition, affect, and conation in the determination of behavior (see Figure 1). They postulate that the sum of an individual's positive and negative

Figure 1. Model of attitude-behavior relationships



Note. From Belief, Attitude, Intention, and Behavior (p. 17) by M. Fishbein and I. Ajzen, 1975, Reading, MA: Addison-Wesley. Reprinted by permission.

cognitions (or beliefs) about the consequences of a behavior (behavior X), provides an informational base which determines an individual's affective attitude toward performing that behavior. Thus, if the consequences of a behavior are perceived by the individual as being predominantly negative, then the attitude that the individual has toward performing that behavior should also be negative. The same relationship holds with the individual's perceived consequences about not performing a behavior; if the consequences of not performing the behavior are seen as being predominantly negative by the individual, then the individual's attitude (toward not performing the behavior) should also be negative. In turn, an individual's attitude helps to determine his or her intention of performing behavior X, along with the individual's subjective norms about the desirability of performing X. Finally, intention to perform behavior X is seen as the immediate determinant of an individual's subsequent behavior.

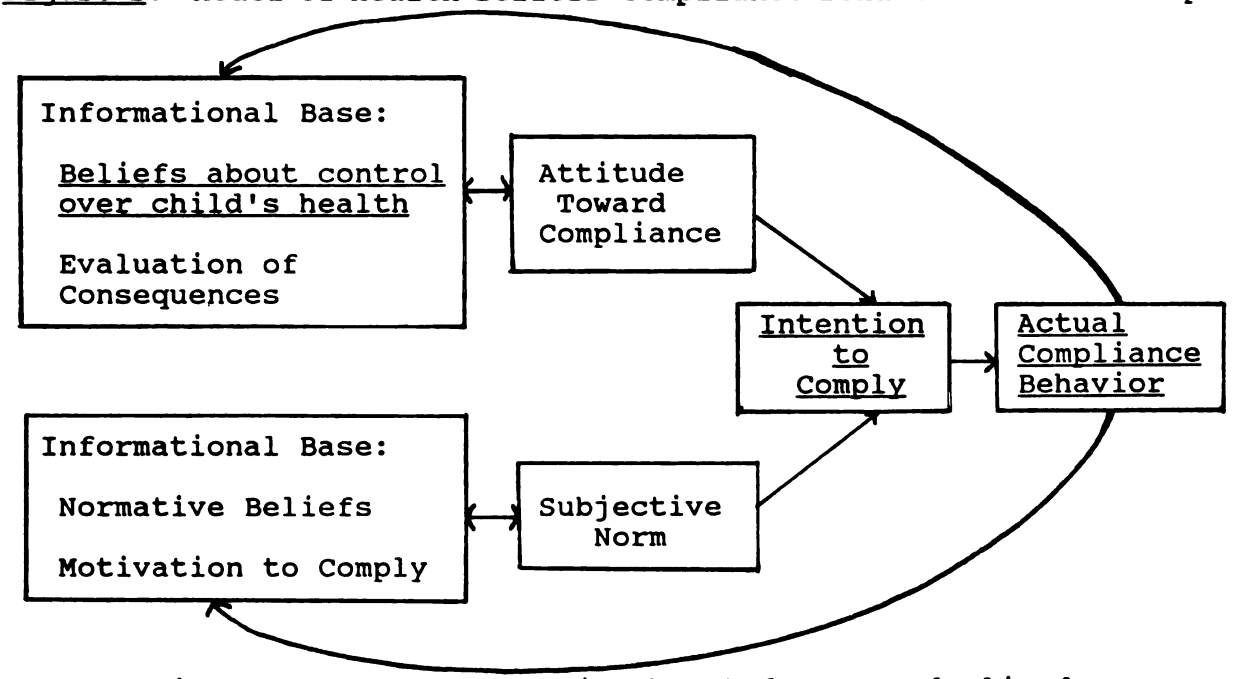
In addition to articulating the relationships between beliefs, attitudes and intentions, Fishbein and Ajzen (1975) have effectively argued that these components are highly intercorrelated. Therefore, measuring all three components does not increase behavioral prediction. An abbreviated example supporting their argument (see Fishbein & Ajzen, 1975, for the full explanation) is highlighted in a study conducted by Ostrom (1969), which found that independent measures of cognition, affect, and conation about church and

churchgoing behavior were all highly interrelated (r = .68 -.77). In addition, using all three components together to predict self-reported church behaviors did not result in more reliable behavioral prediction than when using each component alone (Ostrom, 1969).

Applying Fishbein and Ajzen's (1975) theoretical framework to the research on the relationship between control expectancies and compliance in a pediatric population (see Figure 2) suggests that the sum of a parent's positive and negative expectations (or beliefs) about their control over their child's health affects their attitude toward performing behavior X (compliance with their child's medical regimen). In turn, the parent's attitude toward compliance, in addition to their subjective norms about the desirability of complying, determines their intention to comply with their child's medical regimen. Finally, the parent's intention to comply with their child's regimen is the immediate determinant of their actual compliance behavior.

Many research investigations of the relationship between control expectancies and compliance behavior in adult populations have been conducted; however, only one measured patients' intention to comply with their doctor's recommendations (Cromwell, Butterfield, Brayfield, & Curry, 1977), and none to date have investigated the relationships among parental control expectancies, compliance intent, and actual compliance behavior in a pediatric population.

Figure 2. Model of Health Beliefs-Compliance Behavior Relationship



Key. Variables to be measured in the study are underlined.

Note. From Belief, Attitude, Intention, and Behavior by M. Fishbein and I. Ajzen, 1975, Reading, MA: Addison-Wesley. Adapted by permission.

Furthermore, although research documenting the relationship between control expectancies and compliance behavior has been promising, most studies have only investigated the control expectancies and compliance behavior of adult patients. In spite of the fact that compliance with a child's medical regimen is generally up to the parents (who are adults), conclusions drawn from research investigating the control perceptions of adult patients may not generalize to compliance in a pediatric population. For instance, in addition to remembering to give the medication, parents may then be confronted by a child who is reluctant (or refuses outright) to take it. Repeated episodes such as these may affect parents' perceptions of the extent to which they can control their children's health and illness. Thus, the first aim of this study is to develop a questionnaire designed specifically to measure parental expectations of control over their children's health.

Although discovering the relationship between parental control expectancies and compliance behavior is undoubtedly important, and may be useful in identifying those parents who will not comply with their child's regimen, explication of the process by which control expectancies are hypothesized to affect compliance behavior is equally important. In fact, extrapolation from the model put forth by Fishbein and Ajzen (1975) suggests that the relationship between intention to comply and compliance behavior may be stronger than the relationship between control expectancies

and compliance because intention is the immediate determinant of the actual behavior. Therefore, a second aim of this investigation is to test a path model linking parental expectations for control over their child's health and their intention to comply with their child's medical regimen with their actual compliance behavior.

REVIEW OF THE LITERATURE

Psychological Variables

Some of the psychological predictors of compliance that are studied from the parent's perspective are health attitudes and beliefs. Most of these studies have arisen out of a particular conceptual framework called the Health Belief Model (HBM), which suggests that patient noncompliance is the result of faulty decision-making which has been guided by several different classes of patient health attitudes and beliefs: (1) patient health motivation; (2) patient perceptions regarding his or her individual susceptibility or resusceptibility to an illness; (3) patient perceptions about an illness' severity; and (4) patient perceptions of the benefits and the costs (both physical and fiscal) of complying with the medical treatment (Becker, 1985). Some investigations of the HBM have been done on adult populations, but many more have investigated health beliefs and their relationship to compliance in pediatric populations. For instance, some studies have documented the fact that parents' (usually mothers')

perceptions and attitudes about their own health are significantly correlated with child-related health behaviors such as having one's child immunized (e.g. Tyroler, Johnson, & Fulton, 1965).

In addition, some researchers guided by the HBM model have begun investigating the relationship between compliance and parents' perceptions of their child's health. For example, mothers' perceptions of their children's susceptibility to illness in general, or their resusceptibility to a particular illness, are positively related to compliance with a medication regimen (see, e.g., Becker, Drachman, & Kirscht 1972, 1974; Elling, Whittemore, & Green, 1960). A similar positive relationship has also been found between mothers' perceptions of the severity of their childrens' illnesses and their compliance with their children's medication regimens (see, e.g., Becker, Drachman, & Kirscht, 1972; Becker, Radius, Rosenstock, Drachman, Schuberth, & Teets, 1978; Charney et al. 1967).

Locus of Control

Another psychological variable studied as a predictor of compliance behavior is locus of control. Originated by Rotter (1966), locus of control is defined as the extent to which individuals feel that their behavior is connected to situational outcomes or rewards, and is a more specific example of expectancy-value theories. Rotter originally conceptualized locus of control as a continuum ranging from

external causality (the belief that one's actions are uncorrelated with outcomes or rewards) to internal causality (the belief that one's actions determine the outcomes or rewards that one receives). A substantial amount of research on the construct has shown that identifying individuals as high on internal versus external locus of control makes it possible to reliably predict how they will act in certain situations (Lowrey & DuCette, 1976).

The relationship between locus of control and many different kinds of health-related behaviors has been studied extensively. Kasl and Cobb (1966a, 1966b) delineated three different categories of health-related behaviors, based on the particular point in time that the behavior occurs in the progression of an illness. For example, the first category, termed health behavior, is defined as "any activity undertaken by a person believing himself to be healthy, for the purpose of preventing disease or detecting it in an asymptomatic stage" (Kasl & Cobb, 1966a, p. 246). Examples of health behaviors found to be positively related to internal locus of control are preventive health measures such as being inoculated for influenza (Dabbs & Kirscht, 1971) and using birth control (MacDonald, 1972). The second category, illness behavior, is any activity that a person who is feeling ill performs (such as complaining to relatives or using over-the-counter drugs) in order to define his or her state of health and/or resolve the ill

feeling. The relationship of locus of control to this category of behaviors has not been studied, perhaps because at this stage of an illness individuals do not yet seek out health professionals.

The third category, termed sick-role behavior, is any action (including self-medication and seeing a health professional) undertaken by a person who considers him- or herself to be ill, with the purpose of becoming well. Sick-role behavior is distinguished from illness behavior in that sick-role behavior often involves some abandonment of one's normal duties because of their sick-role status (Kasl & Cobb, 1966a). Within Kasl and Cobbs' categorization system, parental compliance with a child's medical regimen is one example of sick-role behavior, because the parent has recognized that his or her child is ill and has taken the child to a health professional to be diagnosed and treated.

Health Locus of Control Expectancy: Self versus Child

In spite of the differences between adult and pediatric compliance suggested previously, only three studies have investigated the relationship of parental control expectancies to pediatric compliance; all of these investigations came from the literature investigating the Health Belief Model, rather than the literature on locus of control and health. The first investigation found that mothers' expectations of control over situations in general were significantly related to their compliance to their

child's medical regimen for asthma (Becker et al., 1978), whereas the second reported no relationship between mothers' expectations and compliance at all (Becker, Drachman, & Kirscht, 1974). The third study, on the other hand, looked at the relationship between mothers' control expectancies toward their own and their children's health and the number of acute illness visits the children had at a pediatric clinic over a year's time. As the authors predicted, expectations of control over one's health and the health of one's children were both negatively related to the number of acute illness visits made (Becker, Nathanson, Drachman, & Kirscht, 1977).

There are several possible explanations why the findings of these preliminary investigations are somewhat inconsistent. First, these studies all used unstandardized interviews to measure locus of control instead of the standardized questionnaires commonly utilized in research with adults. Second, all of these investigations were conducted with black families, and although significant relationships between locus of control and pediatric compliance were found in two of them (Becker et al., 1977; Becker et al., 1978), results from at least one other investigation suggest that in nonwhite populations, a positive relationship between adults' performance of health behaviors for themselves and their performance of health behaviors for their children is not always found (Tyroler,

Johnson, & Fulton, 1965). Inconsistent results such as these do not preclude the possibility that race is a moderating factor in the locus of control-pediatric compliance relationship.

A final factor which may have contributed to the inconsistent findings is the different levels of specificity of the control expectancy measures used in these studies. Some proponents of control expectancy theory (e.g., Rotter, 1966) suggest that prediction of specific behavioral events (such as compliance with a child's medical regimen) will be enhanced as the specificity of the control expectancy increases. In this particular group, one study measured mothers' control expectancies over situations in general (Becker et al., 1978), whereas the other two measured mothers' specific control expectancies of both their own and their children's health (Becker et al., 1974; Becker et al., 1977). Unfortunately, results of these investigations have hardly confirmed the specificity hypothesis, as only one of the studies measuring the more specific health locus of control construct obtained a significant relationship with compliance (Becker et al., 1977). The other significant relationship was obtained with the general locus of control measure (Becker et al., 1978).

A closer look at the three studies, however, suggests that the specificity hypothesis has not been adequately tested. First, as was mentioned previously, these studies

used an interview to assess locus of control, rather than using the questionnaire format utilized in the locus of control research with adult patients. This factor may account for some of the variation, but is most certainly not the only reason for the inconsistent results. A second and more serious reason why the specificity hypothesis may not have been adequately tested is that the interview measures used in the studies appear to be totally unstandardized. Although the constructs measured by the interviews (e.g., mothers' general concern about their children's health, and the extent to which they feel that they exert control over their lives and do things as planned) are generally described in all three studies (Becker et al., 1974; Becker et al., 1977; Becker, et al., 1978), no description of the interviews' development, validity, or rater reliability (when applicable) is given. Without some sense of the reliability and validity of these interviews, it is difficult to ascertain whether the hypotheses in question have actually been tested. Finally, it is important to note that none of these investigations were specifically designed to measure the specificity hypothesis of the locus of control-pediatric compliance relationship. As mentioned previously, health control expectancies in these studies were conceptualized by the authors as being only one aspect of a larger interest in the impact of health beliefs on compliance behavior (see, e.g., Becker et al., 1978).

Therefore, it is likely that the measurement of this one construct was not pursued as vigorously as it would have been if the studies had been testing the locus of control-pediatric compliance relationship in isolation.

To summarize, it appears that although results from these few studies investigating mothers' expectations of control over their children's health seem to be inconsistent, there is considerable evidence to suggest that the specificity hypothesis has not been adequately tested. Thus, more research on this question is indicated. One way in which to accomplish this goal is to adapt locus of control questionnaires used in the compliance research with adults. Several questionnaires in various stages of development presently exist; all show at least some evidence of reliability and validity, and all vary in their degree of specificity. For example, the well-standardized Internal-External Locus of Control Scale (Rotter, 1966) asks about one's control expectancies over life in general, whereas the Multidimensional Health Locus of Control Scales (MHLC) (Wallston, Wallston, & DeVellis, 1978) asks about adult's control expectancies over their own health. As the specificity hypothesis suggests, a specific questionnaire asking about parental perceptions of control over their <u>child's</u> health may be a superior predictor of pediatric compliance than parental perceptions of control over their <u>own</u> health. For this investigation, the MHLC measure

developed by Wallston, Wallston and DeVellis (1978) was rewritten to reflect a parent's expectations of control over their child's health rather than their expectations concerning their own health. This revised measure, the Multidimensional Health Locus of Control--Child's Health (MHLC-CH), will be developed in the first phase of this investigation, and then will be utilized in a second phase to test the path model hypothesizing that parents' control expectancies and intentions to comply will be significant predictors of their compliance with their children's medical regimens.

Unidimensional Health Locus of Control

One group of researchers asserted that most medical interventions striving to increase compliance in chronically-ill patients were veiled attempts to increase the patients' personal sense of control over the illness. Since Rotter (1966) himself hypothesized that different tasks and/or situations would generate different control expectancies in individuals, this group of researchers wondered if increasing the specificity of Rotter's original I-E instrument would also increase its utility as a predictor of health-related behaviors. Therefore, Wallston, Wallston, Kaplan, and Maides (1976) developed the Health Locus of Control (HLC) Scales, an 11-item instrument designed to measure an individual's expectancies for control (internal and external) over their own health.

In the article describing the scale's development, Wallston and Wallston (1981) reported a significant, yet low correlation with Rotter's I-E scale, indicating that the HLC was measuring a related but distinct domain. One of the first investigations using the HLC measure (Wallston, Wallston, Kaplan, & Maides, 1976) demonstrated the measure's descriminative validity, as the I-E classification using the HLC predicted health-related information-seeking in a sample of college students. Internal-external classifications based on Rotter's more general I-E scale did not predict health behavior in this sample. In addition, normative data from samples of individuals with and without chronic conditions such as hypertension (see, e.g., Wallston & McLeod, 1979) indicate that individuals with chronic problems tend to score in the external direction on the HLC when compared to individuals without such problems (Wallston & Wallston, 1981).

In spite of the increase in the specificity of the HLC measure and the preliminary evidence of its validity, the few studies which investigated its association with compliance were not any more consistent than the previous findings using a more generalized locus of control scale such as Rotter's I-E scale. For example, Key (1975) found that externality was positively associated with compliance to a medication and diet regimen in a small sample of elderly, low-income black hypertension patients. Compliance

in this sample was measured by urine assay and blood sodium levels (an indirect measure of dietary compliance). In contrast, Wallston and McLeod (1979) looked at the relationship between HLC and blood pressure adherence and its control at a VA hospital. No relationships were found between a belief in internal or external (chance) control of one's health and the patients' blood pressure readings, clinic appointment-keeping, or their self-reported medication compliance. The authors did find, however, that internality was positively associated with the staff's assessment of the patients's compliance with their dietary regimen (Wallston & McLeod, 1979). In a similar sample of hypertensives Lewis, Morisky, and Flynn (1978) found that internal patients who felt they had a lot of assistance at home with their medical regimen reported greater medication-taking behavior than internals who did not feel that they had such assistance.

It can be discerned from these studies that one important methodological issue is the way that compliance behavior was measured. As was mentioned previously, there are several different ways that compliance can be assessed: patient self-report through interview or questionnaire, pill count at the doctor's office or at the patient's home, and announced or unannounced urine assay. All of these measures have benefits and problems associated with them, and all yield somewhat different estimates of compliance behavior.

For example, patient self-report by interview or questionnaire tends to yield higher estimates of medication compliance than pill counts or urine assays, yet may reflect the effects of social desirability and/or other distortions associated with retrospective reports of behavior (Haynes, 1979; Marston, 1970). More "objective" measures such as pill counts and chemical assays are not as subject to social desirability if not announced beforehand, but they only measure compliance at a single point in time, rather than documenting a patient's behavior over weeks, months, or years like self-report instruments.

While all three of these studies investigated the health control beliefs of hypertensive patients, they used different ways to measure compliance (urine assay, physiological treatment measures such as blood pressure, self-reported medication compliance) and reported contradictory results. The most surprising inconsistency is the finding that externality is positively associated with compliance assessed by urine assay (Key, 1975). The use of this measure (the other two studies used self-report data) may contribute to the inconsistency of this finding, but it does not seem likely that it is the cause of it. Along these same lines, differences in demographic characteristics such as age, race, and socioeconomic status of the patient do not appear to be a cause for Key's (1975) inconsistent findings, because Lewis, Morisky and Flynn's (1978) sample

also consisted of elderly, low-income black hypertensives.

The hypothesis that methodology contributes but is not the only cause for inconsistency is supported by the other two investigations. For example, Wallston and McLeod (1979) found no relationship between health locus of control and self-reported medication compliance, whereas Lewis, Morisky, and Flynn (1978) found that self-reported compliance with a medication regimen was positively related to internality--provided that those individuals felt that they had a lot of family assistance with their medical regimens. Differences in results between these two studies may be due to the fact that Wallston and McLeod (1979) did not measure perceived home assistance. In addition, differences in the sexual composition of the two samples may be another explanation for the inconsistent results; the sample in the Wallston and McLeod (1979) study was all male, whereas 70% of the sample in Lewis, Morisky and Flynn (1978) was female. Yet another source of problems may be the time since the diagnosis of the hypertension and/or the complexity of the treatment regimens the patients were following. Unfortunately neither of these last two hypotheses can be investigated, as these variables were not measured in these studies.

Multidimensional Health Locus of Control

Another reason for the inconsistent findings may be that the general and health locus of control constructs are

multidimensional rather than unidimensional. For example, Levenson (1973) felt that the concept of externality consisted of two different expectations. The first is the expectation that outcomes are the result of fate, chance, or luck, and the second is the expectation that outcomes are controlled by powerful others in one's environment. Levenson hypothesized that both of these external expectations are orthogonal to internal expectations from outcomes or rewards, and that measuring the two dimensions separately would increase the understanding and prediction of behavior using the locus of control construct. Thus Levenson developed her own scale with questions designed to measure these two different but related aspects of external expectancies for control. Factor analysis of this multidimensional instrument with a psychiatric population yielded the expected results: one scale reflected a belief in fate, chance and luck (C subscale), another a belief in powerful others (P subscale), and the third measured a belief that the self has control over outcomes or rewards (I subscale) (Levenson, 1973).

The authors of the HLC followed Levenson's example and added items to their original measure which reflected a belief in the control of powerful others (i.e., doctors, friends, and family members) over one's health. The authors constructed two parallel forms of the Multidimensional Health Locus of Control (MHLC) Scales. Alpha reliabilities

for each alternate form of the MHLC were marginally adequate, whereas alpha reliabilities for the two forms combined as a 36-item measure ranged from .830 to .859 for the Chance (CHLC), Powerful Others (PHLC), and Internal (IHLC) scales (Wallston, Wallston, & DeVellis, 1978).

The few studies which have investigated the validity of the MHLC suggest that it is a valid instrument. For example, one factor analysis found that scale intercorrelations on the MHLC were consistent with Levenson's original conceptualization of the multidimensional locus of control construct. That is, a belief in control over one's own health (IHLC) was not significantly correlated with a belief in powerful others' control over one's health (PHLC), and was negatively correlated with a belief in the role of chance (CHLC) in one's health. Beliefs in powerful others and in chance control, on the other hand, were positively related in this study (Wallston, Wallston, & DeVellis, 1978). In addition, two other investigations conducted with the MHLC obtained factor structures which corresponded to a priori groupings of test items (Nagelberg, 1979; Wallston, Wallston, & DeVellis, 1978).

In addition to investigations of the internal validity of the scale, preliminary concurrent validity of the MHLC has also been demonstrated. In the study mentioned previously, Wallston, Wallston, and DeVellis (1978) found

that the IHLC, PHLC, and CHLC scales were significantly and positively correlated with the Internal (I), Powerful Others (P), and Chance (C) scales of Levenson's measure, respectively. These were the results that the authors had anticipated from Levenson's (1973) findings.

There is also some evidence of the MHLC's discriminative validity. For instance, a review by Wallston and Wallston (1981) indicated that adults with a chronic illness report consistently lower internal beliefs and higher beliefs in control by powerful others and chance than healthy adults. Along these same lines, mothers of chronically-ill children also report lower internal beliefs about their own health on the MHLC than mothers of healthy children (Perrin & Shapiro, 1985).

Locus of Control and Compliance Behavior

Unlike the literature investigating the validity of the Health Belief Model, studies investigating the relevance of locus of control to patient compliance with a prescribed medical regimen have only studied this relationship among adult patients. Although conclusions drawn from this literature may not generalize to the compliance behavior of a pediatric population, the lack of pediatric research in this area requires that one consider the locus of control research with adults. What follows is a review of those investigations. While reading these pages, it is important to keep in mind that any conclusions reached are quite

tentative in nature.

Studies investigating the relevance of locus of control to patient compliance with a prescribed medical regimen have been contradictory. Some suggest that patients with a predominantly internal orientation have more difficulty complying with long-term medical regimens for chronic conditions (such as those associated with tuberculosis and diabetes) than those patients with a predominantly external orientation (DuCette, 1974; Lowery & DuCette, 1976). On the other hand, results from other studies suggest that having an internal orientation to such tasks is related to a higher degree of patient compliance (Becker et al., 1978; Weaver, 1972; Wenerowicz, 1978) and the intention to comply to a medical regimen (Cromwell et al., 1977). However, one study did not find a relationship between locus of control beliefs and compliance at all (Marston, 1969), and another actually noted a trend suggesting that an external orientation was related to <u>noncompliance</u> in a group of hypertensive patients (Kirscht & Rosenstock, 1977).

Again, the real source of variation in the findings may be because of the divergent ways these investigations measured compliance behavior; in fact, some of the studies did not measure compliance at all. For example, treatment outcome tends to be a poor indication of compliance because there is no simple correspondence between following the treatment regimen and remittance of an illness (Marston,

1970). In spite of this, one investigation used weight gain and other aspects of treatment outcome as its compliance measure in a sample of adult diabetics (Lowery & DuCette, 1976). Although compliance with the complex medical regimen of the diabetic is considered to be a key factor in the control of the disease (Gross, 1987), physical health outcome is still far removed from compliance behavior.

Along the same lines, another investigation measured hospitalized heart patients' intent to comply with medical recommendations in the future after being discharged (Cromwell et al., 1977). This investigation also discovered that patients with an internal orientation were more likely to respond that they intended to comply than those with an external orientation. Although these findings are consistent with other investigations using a direct measure of compliance, it is important to note that the findings were only at the .06 level of significance, and that internality has been found to be positively associated with a tendency to respond in a socially desirable manner (Strickland, 1978). Both of these factors cast some doubt on the findings in this investigation.

Another methodological problem which may explain the inconsistency of this research is the variety of treatment regimens on which this literature is based. While compliance cannot be predicted by merely knowing the patient's diagnosis and/or his treatment regimen, some

features of medical regimens have been found to be associated with patient compliance (Haynes, 1976), and these may influence or change patients' beliefs in their ability to affect their health outcomes. For instance, several investigations have found that the amount of behavioral change necessary to comply with doctor's recommendations is negatively correlated with compliance behavior (Haynes, 1976). Thus, following a diet which necessitates a great change in one's eating habits and lifestyle would be more difficult to comply with than taking a pill every day. A similar negative relationship has also been observed between compliance and the complexity of the regimen (Haynes, 1976), as well as compliance and the total number of medical recommendations the patient is asked to follow (Haynes, 1979). To date there have been no direct inquiries into whether or not locus of control beliefs vary as a function of differences in treatment regimens. However, one may speculate that regimen complexity, amount of behavioral change required, and number of recommendations to follow may influence a patient's perception of control over his illness so that as the treatment demands increase, the patient feels less and less able to exercise control over his or her health. Again, these issues have not been addressed in these studies in any substantive manner.

To summarize, research investigating the relationship between Rotter's unidimensional locus of control construct

and compliance behavior is inconsistent and inconclusive, given the methodological flaws found in the literature. In order to further our knowledge in this field, more attention should be paid to how these methodological issues (i.e, measurement of compliance, quantitative and qualitative aspects of treatment regimens followed, whether the parent reports for him or herself or for the child's health) may affect the relationship between locus of control beliefs and pediatric compliance. This investigation shall attempt to address some, if not all, of these issues.

Relationship Between Compliance Intent and Behavior

Similar to Rotter's (1966) specificity hypothesis regarding locus of control expectancies, Fishbein and Ajzen (1975) have postulated that one of the reasons attitude-behavior correlations are low is because behavior and attitudes typically are not measured at the same level of specificity. In addition, they hypothesize that groups of beliefs or attitudes are determinants of general intentions, but that as the specificity of an intention increases, the ability of a set of beliefs or attitudes to predict that intention decreases. Finally, they assert that intentions can vary in specificity with regard to the behavior intended, the target object at which the behavior is directed, the situation in which the behavior is performed, and the time at which it will be performed.

Few studies in the compliance literature have measured

whether or not patients intend to comply with their doctor's recommendations, preferring instead to measure only treatment outcome or actual compliance behavior. While investigating the relationship between different beliefs or expectancies and compliance behavior is undoubtedly important, discovery of an assessment tool (such as intention to comply) which could diagnose a parent's willingness to carry out a medical regimen would also be useful. In fact, asking parents whether or not they will comply with the doctor's instructions may increase their subsequent compliance behavior.

A few researchers have thought of this; however, none of the studies investigating compliance intent have been methodologically sound enough to draw any real conclusions. For example, one study asked clinic patients to return a card reporting their symptoms after having a flu vaccination. One group was asked to make a verbal commitment as to whether or not they would return the card; another was not asked. Results showed that the verbal commitment group had a significantly higher return of the symptom cards than the control group. The authors' explanation for this difference was that those individuals who made a commitment to comply actually performed the behavior in order to reduce or prevent the dissonance that they may have felt if they had not complied (Levy, Yamashita, & Pow, 1979).

Another explanation of these results is that the salience of patients' intention to comply (or not to comply) was increased by the intervention--once they were aware of the intention, they made a conscious decision whether or not they would act. Unfortunately, this finding could also be explained by clinic differences, as the verbal "commitment" and "no commitment" treatments were assigned by clinic (two clinics per treatment) rather than randomizing the administration of the treatments across all clinics involved in the study. In addition, returning one self-addressed, stamped card is far different than administering medication to a child for several days. Thus, although this finding is interesting, any conclusions drawn from it must be viewed as being quite tentative.

A second study (Davis, 1968) set out to document the relationship between compliance intention and actual compliance behavior. Results from this study showed a fairly high correspondence between compliance intent and actual behavior--63% of those who expressed a desire to comply did actually do so. The problem with this study, however, is that intent was measured retrospectively, at the same time that the patients were asked about their compliance behavior. Attitude research has shown that the outcome of a behavior may color or actually change one's attitude about that behavior (Fishbein & Ajzen, 1975). Therefore, it is difficult to judge whether the congruence

between patients' intentions and behaviors in this investigation actually existed before the behavior was performed.

Demographic Factors

Mother's Education

Many different demographic variables have been investigated as potential predictors or determinants of compliance behavior in pediatric populations, in an effort to identify concrete factors which put children "at risk" for noncompliance. Research suggests that the sex and age of the child, the marital status of the mother, and the racial and economic status of the child's family may affect compliance, although these findings are not consistent from one study to the next (Becker, 1979; Becker, Maiman, Kirscht, Haefner, & Drachman, 1979; Becker et al., 1974; Davis, 1966, 1968; Elling et al., 1960; Gordis, Markowitz, & Lilienfeld, 1969). Becker points out that these characteristics are not subject to change, and therefore should be a low priority in the future of research on compliance because they do not lead to interventions to rectify the problem (Becker, 1979). However, this does not diminish the importance of identifying, and when necessary, controlling for demographic correlates when assessing more psychological predictors of compliance.

An a priori specification of the relationship between these demographic variables and compliance is also difficult

because these investigations have been conducted with many different illnesses, treatment regimens, study populations, and medical settings. Thus, consistent results across studies may not be forthcoming because of the wide variation within this literature (Becker, 1979). In addition, most of these studies have been conducted with adult rather than pediatric patients, a factor which also prevents confident prediction in a pediatric population.

One important demographic variable which illustrates the problems inherent in this literature is educational status. Numerous investigations conducted with various illnesses, regimens, and study populations have been inconclusive; some studies find a positive association between compliance and the patient's educational status, but many more show no relationship with compliance at all (Haynes, 1976). In contrast, the literature on health control beliefs suggests that educational status may be related to an individual's sense of control over their health (Wallston & Wallston, 1981). For example, one study utilizing the HLC found that patients with more formal education had a greater sense of control over their health (i.e., were more internal) than patients with lower education (Brown, 1980; cf. Wallston & Wallston, 1981). A similar result was also noted between education and a generalized expectancy for control over one's life (Walls & Miller, 1970).

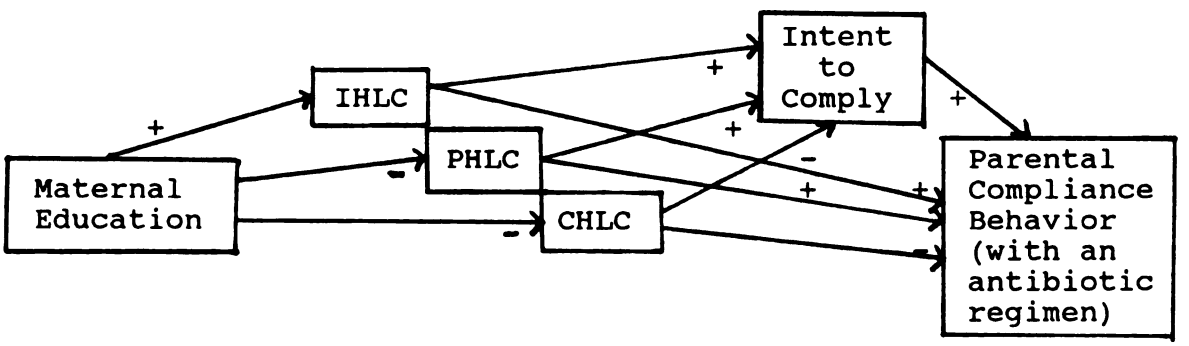
Investigations using the MHLC partially support the findings detailed above. For example, one sample of low SES Spanish women had significantly higher beliefs in chance control on the MHLC than other normative samples such as college students or healthy adult females. However, no significant differences were noted between the groups for internality as measured by the IHLC (Rosenblum, 1979; cf. Wallston & Wallston, 1981). While it is not known if this finding is attributable to the income, education, or race of the participants, a second study utilizing a sample of epileptics found low negative relationships between education and chance and powerful others' control beliefs (Wallston & Wallston, 1981). This suggests that the previous finding may be due to the educational status of the Spanish women, although a negative relationship to family income or race cannot be totally dismissed.

A second reason for the inconsistent findings between education and compliance may be that education only affects compliance <u>indirectly</u> via parents' health control beliefs concerning their children. For example, studies have found that mother's educational status is positively associated with her knowledge of her child's medication regimen (Becker et al., 1972) as well as the cause of her child's illness (Elling et al., 1972). At least one group of researchers has suggested that the reason for this association is that higher education may increase awareness of or accessibility

to health-related information (Becker et al., 1972). This increased knowledge, in turn, may directly affect the mother's sense of control over her child's health; she may be more aware of the steps necessary for control, and thus may feel more confident in her ability to control. This last hypothesis is a tentative one, however, as one investigation found that graduate and professional women were one of the least internal of groups surveyed about their health beliefs (Wallston & Wallston, 1981). The reviewers of this study suggested that this group may have been aware of "negative experiences in health settings" which had reduced their sense of control over their health (Wallston & Wallston, 1981, p. 216). Thus, it appears that education may decrease one's health control beliefs in certain situations.

In the second phase of this investigation the relationships between maternal educational status, health control beliefs, and compliance will be investigated in order to define these associations more clearly (see Figure 3). Mother's knowledge of the child's illness and/or medication regimen will not be measured directly in this investigation. Given the lack of published research on this topic, the only hypotheses tentatively offered are that education will be (1) positively related to a belief that one can control the health of one's child, and (2) negatively related to the beliefs that chance and powerful

Figure 3. Path Model of Compliance



Key:

+ = a positive relationship between two variables

- = a negative relationship between two variables

others' control the health of one's child. These health control beliefs, in turn, will directly affect compliance intent and behavior. No direct effects to compliance are postulated for maternal education.

Possible Confounding Variables

As mentioned previously, research suggests no consistent relationships between compliance behavior and demographic characteristics such as age and sex of the child, marital status of the mother, or the racial and economic status of the child's family. In addition, conclusions from the research between these variables and health control beliefs are sketchy; a handful of studies suggest that the demographic characteristics mentioned above may be related to health control beliefs (Wallston & Wallston, 1981), but no firm conclusions can be reached thus far. The same can also be said about the research on social desirability; there is some evidence to indicate that the tendency to respond in a socially desirable manner is positively associated with a generalized expectancy that one can control the events in one's life (Strickland, 1978) as well as the outcome(s) of one's health (Wallston & Wallston, 1981); however, no research has been conducted to explore whether or not social desirability is related to self-reported compliance behavior. Given the paucity of research in this area, specific associations between these demographic variables, mother's health beliefs, and

compliance cannot be postulated, and are not anticipated. Nevertheless, all of these variables will be measured. If associations are found to exist for these factors for both the independent and dependent variables (health control beliefs and compliance, respectively), then the confounding factors will be controlled for in the subsequent path analyses.

Another variable, illness chronicity, may also affect both maternal health control beliefs and compliance behavior. Cross-sectional research with the locus of control construct indicates that adults with a chronic illness report lower internal control expectancies than healthy adults (Wallston & Wallston, 1981). The same results also have been found for mothers of children with a chronic illness, as well as the children themselves (Perrin & Shapiro, 1985). In addition, internal control expectancies are not the only variables which may decrease over the course of an illness. A review of the compliance literature (Marston, 1970) indicated that compliance tends to decrease as time since diagnosis (and length of time in treatment) increases. This decrease may be due to a shift of patients' control expectancies to an external direction, or may be the result of some other psychological or cognitive process. However, time since diagnosis seems to be an important variable to consider when doing compliance research with locus of control beliefs. Thus, regardless of

the antecedent causes for the decrease, it is possible that chronicity will be negatively related to compliance behavior. Should this be true and should chronicity also be related to maternal health control beliefs, then it will be controlled for in subsequent path analyses.

Situational/Family Variables

A few situational or family variables have also been investigated as potential "risk factors" or predictors of compliance behavior, with mixed results. For instance, marital status and number of siblings in the family have been found to be related to compliance in some investigations, but not others (see, e.g., Becker et al, 1974; Becker et al., 1979; Cohen, 1979; Gordis et al., 1969). Inconsistent results have also been noted for relatively more complex phenomena such as the frequency of family conflict or problems (Elling et al., 1960; Becker et al., 1974; Becker et al., 1979). Researchers investigating these family variables and their relationship to compliance behavior have hypothesized that family conflict functions as a "barrier" to effective compliance behavior (Becker et al., 1979), whereas other researchers have suggested that families may influence compliance positively by offering reminders, encouragement, actual assistance, and/or reinforcement to the parent and child for their compliance (Dunbar & Agras, 1980).

Further research investigating how family structure and

interaction may facilitate and/or prevent effective parental compliance is definitely indicated. However, it is equally important to realize that a family system is composed of one or two parents who bring their own health attitudes and beliefs to the family's health decisions. It would be most helpful to study how these individual variables--parental health perceptions--affect and are affected by the family system, as well as how both of these classes of variables--individual and family--affect parental compliance behavior. A project of this scope, however, is beyond the resources of this investigation. Therefore, this study will only investigate the health and illness beliefs of one family member--the child's mother--in an effort to delineate more clearly the contribution of this intra-individual factor to compliance behavior in a pediatric population.

MHLC and Compliance Behavior

Internality and Compliance Behavior

This study will investigate compliance with a medication regimen for two common childhood illnesses, otitis media and streptococcal pharyngitis. These illnesses have been chosen because of their high incidence in children. For example, various research reports have estimated that two-thirds of all children have had at least one episode of acute otitis media by three years of age (Bluestone et al., 1983; Finney, Friman, Rapoff, & Christophersen, 1985). From the literature with adults

reviewed above, it is hypothesized that mother's internal sense of control over her child's health (as measured by the IHLC) will be positively related to her compliance behavior for her child's otitis media or strept pharyngitis.

Powerful Others and Compliance

Because a belief in one's ability to control one's health (IHLC) has been found to be unrelated to a belief that powerful others (PHLC) control one's health (Wallston, Wallston & DeVellis, 1978), one would suspect that parents' beliefs in powerful others' control over their children's health would be either unrelated or negatively related to their medication compliance for their children. Unfortunately, the findings with the PHLC scale of the MHLC are somewhat contradictory, and therefore neither hypothesis can be readily accepted. For example, one study with dialysis patients found no relationship between the Powerful Others' scale (PHLC) and patient compliance to diet or restricted weight gain (Lewis et al., 1978), whereas a second found that belief in powerful others' control over one's health was negatively correlated with weight gain between dialytic treatments--weight gain being considered a proxy measure of noncompliance to dietary restrictions (Hatz, 1978).

On the other hand, other investigations measuring similar concepts report results indicating that a belief in the control over one's health by powerful others is

positively related to pediatric compliance. In several investigations, belief in the efficacy of medical care and faith in one's doctor was found to be positively related to medication administration to children by their parents for acute illnesses (Becker et al., 1974; Kirscht, Becker and Eveland, 1976). For example, in one study, a favorable attitude toward medical authority was positively related to the parents' subsequent administration of medication to their children for acute ear infections and their overall appointment-keeping ratio (Becker et al., 1974).

Only one investigation contradicts this positive relationship. Kirscht and Rosenstock (1977) found that a feeling of greater dependence on one's doctor was positively related to patient noncompliance. In contrast to the other studies, this investigation was conducted with a group of chronically-ill adults rather than mothers of children with an acute illness. Both of these facts (using adult versus child patients and studying chronic versus acute illnesses) may account for the different findings. Therefore, available research suggests that this parental belief also may be positively related to their compliance with their child's medication regimen.

Chance and Compliance Behavior

Unlike the MHLC research with internal or powerful others' control beliefs, no studies on compliance have documented any links between a belief in fate, chance or

luck (as measured by the CHLC) and compliance, either adult or pediatric. However, given that a belief in chance (as measured by the CHLC on the MHLC) is negatively correlated with parents' beliefs in their abilities to control their own health (as measured by the IHLC), then one would expect that parents' beliefs in chance control over their children's health would be negatively correlated with their compliance to their children's medication regimens. However, it is also reasonable to expect that this correlation will be accounted for by the relationship of both variables to IHLC.

MHLC and Compliance Intent

As was mentioned previously, only one investigation relating locus of control beliefs to compliance intent has been performed (Cromwell et al., 1977). Results from this investigation were consistent with the literature relating internality to greater compliance behavior, finding that internal patients were more apt than external patients to state that they would comply with the doctors' recommendations after being discharged from the hospital (findings were marginally significant--$p < .06$). Because the findings from this study suggest that the relationship between internality and compliance intent is similar to the relationship between internality and compliance behavior, it is hypothesized that compliance intent will also be moderately and positively correlated with a belief in

powerful others' control over children's health and negatively correlated with a belief in chance control over children's health (as measured by the PHLC-CH and CHLC-CH scales, respectively). Again, these hypotheses are only exploratory in nature, given the fact that no investigations have attempted to relate parental locus of control beliefs to parental intention to comply with their children's medical regimens.

Path Model: Specific Hypotheses

As was discussed previously, the MHLC-CH was rewritten to reflect parents' control beliefs over their children's health rather than their own health; this was done to increase the specificity of this measure for the express purpose of improving its ability to predict compliance intent and compliance behavior in a pediatric population. However, since I will be asking about intent to comply with the doctor's current orders (a specific medication regimen) the intention is somewhat more specific than the set of beliefs used to predict that intention. Therefore, parental beliefs of control over their children's health should be moderately correlated with parental intention to comply with their children's medication regimens. In addition, it also follows from this (and previous discussion of Fishbein and Ajzen's (1975) model) that the magnitude of the relationship between parental intention to comply with their children's medication regimens and their actual compliance with those

regimens will be greater than the magnitude of the relationship between parental control beliefs and their actual compliance behavior.

Specific hypotheses in this path model are (see Figure 3):

1. Parents with higher expectations that they can control their child's health (higher IHLC) will display greater compliance intent and compliance behavior than parents with lower scores on the IHLC.
2. Parents with higher expectations that powerful others' can control their child's health (higher PHLC) will display greater compliance intent and compliance behavior than parents with lower scores on the PHLC.
3. Parents with higher expectations that chance, fate, or luck can control their child's health (higher CHLC) will display less compliance intent and compliance behavior than parents with lower scores on the CHLC.
4. Parents with higher intentions to comply with their child's medication regimen will display greater compliance behavior than parents with lower intentions to comply.
5. Indirect effects are expected between maternal educational status and parental compliance behavior. In particular, higher educational status is expected to be related to higher parental expectations that they can control their child's health (IHLC), and lower

expectations that powerful others (PHLC) and fate, chance and luck (CHLC) can control the health of their children.

There is a possibility that other non-psychological variables such as child's age, maternal marital status, and illness chronicity may also be related to parental intention to comply and actual compliance. Therefore, correlations between these variables will be examined, but these variables are not expected to explain the variance accounted for in intent and actual compliance behavior by parental control expectancies.

METHOD

Participants

Phase I

This study was conducted in two phases. Potential subject families for Phase I of this project were identified through computer printouts from the Pediatric Clinic of the College of Osteopathic Medicine at Michigan State University. These subjects were asked to participate in a longitudinal study investigating the interrelationships between family systems variables and the incidence, course, and resolution of recurrent otitis media. Sixty-eight percent of families eligible for inclusion in the study agreed to participate. Fifty-two mothers of children 3-4 years of age (M= 42 months) completed the MHLC-CH in Phase I. Mothers in this predominantly middle-class sample were all currently married and living with their spouses, and had at least a high school education.

Phase II

Potential subjects for this phase of the project were 294 mothers of children (0-7 years of age) who came to the pediatric clinic because they suspected that their child was ill. Mothers completed the MHLC-CH scale before the doctor's visit and completed the compliance intent scale afterwards. If the doctor diagnosed otitis media, strept pharyngitis, tonsillitis or an upper respiratory infection requiring antibiotics, the mother was asked if the investigator could come to her house in a week and interview

her about her child's illness. Seventy-five percent of those mothers asked participated in the interview portion of the study. Of the 61 subjects interviewed, 67% were married or living with the target child's father (or stepfather). Father's average index of social position (Hollingshead, 1957) was 3.7 (*SD* = .34, *n* = 58), and family income was between $20,000 and $25,000, indicating that this was a predominantly lower- to middle-class sample. Mothers' mean educational level indicated that more than half of the sample (*n* = 39) had had some education beyond high school. Mean age of the target child was 29.8 months (*SD* = 20.6). Racial composition of the sample was almost exclusively Caucasian; only two of the mothers were "nonwhite."

Procedures

Phase I

Potential subject families with children 3-4 years of age were identified through computer printouts from the Pediatric Clinic COM. The inclusion criteria for this study were: (1) at least one child between 3-4 years of age who had no other chronic illness besides recurrent otitis media; (2) no more than 4 children living in the home; (3) both parents and/or stepparents living in the home, both having a high school degree, and (4) at least one parent working full time.

Once potential families were identified, trained telephone interviewers contacted the mothers in the families and asked them to complete a short screening interview about

the health and illnesses of their preschool child. Once this interview was completed and if the family met all of the criteria, the family was asked to participate in the larger study on "family factors in children's health". Approximately 30 children who had chronic ear infections (3 within 6 months or 4 within one year) and 30 children who did not meet that criteria were participants in the study. Paid volunteer parents completed an interview conducted in their home about how they cope when their preschool child is ill, and how they (as a team) divide responsibilities when their child must take medication prescribed by a doctor. In addition, the parents completed two questionnaire packets and participated in two direct observations of their interactions with their child. Another home visit was also conducted to assess the cognitive and verbal abilities of the preschool child. Families were paid $75.00 once they completed all aspects of the study mentioned above.

Phase II

Otitis Media and Strept Pharyngitis

Otitis media and strept pharyngitis were chosen because they are both acute illnesses which have a high incidence in children. These illnesses were also chosen because they are generally treated with a short-term antibiotic regimen (Finney et al., 1985). Broadly defined, the term otitis media is an "inflammation of the middle ear without reference to etiology or pathogenesis" (Bluestone et al., 1983, pg. 639). There are several variations of this basic

classification; acute otitis media refers to a rapid onset of symptoms lasting approximately three weeks. Common symptoms of the illness may include: (1) a recent or concurrent upper respiratory infection such as a cold, (2) a low temperature (around 100° degrees), (3) a runny nose, (4) changes in the appearance of the ear, (5) pain in the ear, (6) fluid in the middle ear (upon inspection by the doctor), (7) diarrhea, (8) vomiting, and (9) behavioral changes such as irritability. As was mentioned previously, otitis media is a very common illness in childhood; estimates of its incidence in children 3 years of age and younger is approximately seventy percent (Finney et al., 1985).

Streptococcal pharyngitis is a bacterial infection of the pharynx. Symptoms of this common childhood illness may include: (1) a sore throat often accompanied by difficulty swallowing, (2) a temperature (approximately 100 to 102 degrees), (3) swollen lymph glands, (4) congestion, and (5) a rash. In addition, one of the serious sequela of untreated or inadequately treated strept pharyngitis is acute rheumatic fever (Denny, 1987).

Medical treatment most often prescribed by pediatricians for acute otitis media or strept pharyngitis is an antimicrobial agent such as amoxicillin. Standard dosages for this medication generally are 40-50 mg/kg total per day for ten days. The daily total is divided into three doses, which the parent is instructed to administer approximately every eight hours (Marchant et al., 1986).

Another antimicrobial agent prescribed frequently for strept pharyngitis and used less frequently for otitis media is erythromycin plus sulfisoxazole. The standard daily total of this drug is 50 mg/kg erythromycin and 150 mg/kg sulfisoxazole administered over four daily doses. In addition, two other drugs are often used for otitis media: trimethoprim-sulfamethoxizole and amoxicillin-clavulanate. Standard daily dosages for these drugs are: (1) 8 mg/kg trimethoprim and 40 mg/kg sulfamethoxazole administered over two daily doses, and (2) 40 mg/kg amoxicillin and 5 mg/kg clavulanate administered over three daily doses. Standard length of treatment regimen for all of these antimicrobials is ten days. In addition to antimicrobial agents, the pediatrician may also prescribe a decongestant for the child with otitis media, to control the child's upper respiratory symptoms (such as congestion or coughing) as needed. Because of the young age of this population, the liquid forms of these antibiotics are almost always prescribed.

Phase II Procedures

In this phase, another sample from this clinic (61 mothers whose children were diagnosed with otitis media, strept pharyngitis, tonsillitis or an upper respiratory infection) were asked to complete a short series of questionnaires, and then were interviewed about their compliance with the medication regimen prescribed for their child. In addition to having otitis media or strept pharyngitis, the only other selection criteria for this

phase of the study was that the child was seven years of age or younger. Although this cut-off is somewhat arbitrary, it insured that the children were of an age where the parents have total responsibility for their health care.

When the mother checked in with the receptionist before her child's appointment, she was asked to fill out a questionnaire while she waited for the doctor. After the appointment, the mother then filled out the second questionnaire asking about her intention to comply with the doctor's recommendations. If her child was diagnosed as having otitis media, strept pharyngitis, tonsillitis, or an upper respiratory infection requiring antibiotics, the investigator approached the mother immediately after the visit, and asked her if she would be willing to be interviewed about her child's health in a week's time. No mention of measuring the liquid antibiotic at the home interview was made. If the mother consented to be interviewed, the investigator scheduled an appointment at that time. At the scheduled time the investigator went to the subject's home and interviewed the mother about her child's illness. Afterward, the investigator measured the remaining liquid antibiotic. Although there were many fathers who brought their child to the pediatric clinic, only mothers were asked to complete the MHLC-CH and were interviewed about their compliance behavior because mothers generally have the major responsibility for the health care of their children.

Measures

Phase I

Multidimensional Health Locus of Control--Child Health (MHLC-CH)

The MHLC-CH (Appendix A) is a 36-item instrument rewritten from the original MHLC to measure parents' perceptions of their ability to exert control over the health of their children. The MHLC-CH measures the extent to which parents feel that their child's health is under their own control (Internal dimension), or is controlled by external forces such as doctors (Powerful Others dimension), or by fate, chance, or luck (Chance dimension). In order to rewrite the instrument, all statements which referred to "my health" or "my own health" were changed to "my child's health." Therefore, a statement such as "I am in control of my own health" became "I am in control of my child's health." In addition, statements with the pronoun "I" or the reflexive "myself" (e.g., "When I get sick, I am not the one to blame" and "Even if I take care of myself, I cannot avoid getting sick") became "When my child gets sick, I am not the one to blame" and "Even if I take care of my child, I cannot avoid him/her getting sick."

The original MHLC has two alternate forms. This study used a combination of the two forms because the internal consistency of the scale increases substantially when this is done. For example, while internal consistencies of the scales of the separate Forms A and B only range from .67 to

.77, alpha reliabilities for the combined A-B form of the MHLC are reported to be .86, .84, and .83 for the Internal (IHLC), Powerful Others (PHLC), and Chance (CHLC) scales, respectively (Wallston et al., 1978). No test-retest data on the original MHLC is available.

In addition to combining the two alternate forms and rewriting the items to reflect parental control beliefs over the health of their children, items on Form B of the original MHLC were restated in the negative because all questions were stated positively. This was done in order to control for a positive response set. The resulting three scales (the IHLC, PHLC, and CHLC) of the combined MHLC-CH each have 12 items. Six items on each scale are positively worded, and 6 are negatively worded. Positive and negative items of the three scales are randomly interspersed throughout the measure.

The MHLC-CH uses a 6-point response scale ranging from strongly disagree (scored as 1) to strongly agree (scored as 6). Other points on this scale include moderately disagree (scored as 2), disagree (scored as 3), agree (scored as 4), and moderately agree (scored as 5). Summing each scale (after reversing the negatively-worded items) yielded three scores (one for each control dimension) with higher scores more indicative of that attribute (e.g. "internal causality"). No total score was computed. Because this instrument was developed for this particular study, alpha reliabilities, item-total correlations, and inter-scale

correlations were conducted to investigate the structural properties of the MHLC-CH.

While at the present time there is no reliability or validity data on the MHLC-CH, research suggests that the original MHLC is a valid instrument. For instance, in a sample of 115 individuals recruited from an airport in a large southern town, the three scales on the MHLC were all correlated in a manner consistent with Levenson's original conceptualization of the multidimensional locus of control construct. Thus, the IHLC scale was not significantly correlated with the PHLC scale (r = .12, n.s.), but was significantly negatively correlated with the CHLC scale (r = -.29, $p < .01$). In addition, the PHLC and CHLC scales, both of which purport to measure different but related aspects of external causation, were significantly and positively correlated with one another (r = .20, $p < .05$) (Wallston et al., 1978). Besides these correlations, two separate factor analyses conducted on the instrument indicate a factor structure corresponding to the a priori groupings of test items originally hypothesized by the test authors (Nagelberg, 1979; Wallston et al., 1978).

There also is evidence of the concurrent validity of the original instrument. For example, in the same study mentioned above, the pattern of correlations between Levenson's instrument (the Internal, Powerful Others, and Chance scales) and the scales of the MHLC were also in the hypothesized direction: the IHLC correlated significantly

with the Internal scale (r = .57, p < .001), but not with the Powerful Others or Chance scales (r = -.11 and -.14, n.s.); the PHLC was significantly positively correlated with the Powerful Others and Chance scales (r = .27 and .23, p < .05), but not with the Internal scale (r = -.07, n.s.); and the CHLC scale was negatively correlated with the Internal scale (r = -.30, p < .001), while positively correlated with both the Powerful Others and Chance scales (r= .57 and .80, p < .001) (Wallston et al., 1978).

There also is evidence that the MHLC discriminates between healthy and chronically-ill populations of adults. A review by Wallston and Wallston (1981) indicates that adults with a chronic illness consistently report lower internal beliefs, and higher beliefs in control by powerful others and chance than healthy adults. In addition, a study by Perrin and Shapiro (1985) indicated that mothers of chronically-ill children obtained lower scores on the IHLC and higher scores on the PHLC than did mothers of healthy children. This finding was consistent with the authors' predictions derived from the health locus of control construct.

Phase II

Multidimensional Health Locus of Control--Child Health (MHLC-CH)

A revised version of this 36-item instrument (see Appendix B) was used in the second phase of this investigation. A 6-point response scale was utilized;

responses range from strongly disagree (scored as 1) to strongly agree (scored as 6). The one change were the other points on the scale, which were altered to include: disagree (scored as 2), slightly disagree (scored as 3), slightly agree (scored as 4), and agree (scored as 5). Scoring proceeded in the same way as in the first phase--reversing the negatively-worded items and summing each scale yielded three scores, with the higher scores more indicative of that attribute (e.g. "internal causality"). No total score was computed.

Personal and Family Background Questionnaire

This questionnaire (Appendix C) asked for demographic information such as marital status, race, size of family, occupation, and family income. This information was used to investigate the relationship of these variables to parental control expectancies, intention to comply, and actual compliance behavior.

Intention to Comply

Intention of the parent to comply with the doctor's recommendations was measured by the Adherence Intent scale of the Parent Medical Interview Satisfaction Scale (P-MISS) (see Appendix D). Because one study investigating the impact of compliance intent on actual behavior found that asking whether or not patients intended to mail in a symptom card after a flu vaccination increased the actual rate of return (Levy et al., 1979), the Adherence Intent scale was imbedded in another scale of the P-MISS to reduce the

salience of the intent items. The 6-item scale chosen for this purpose measures parents' perceptions of the physician's communication with the parent during the child's office visit.

The P-MISS (including the 4-item Adherence Intent scale) was developed from a pool of statements generated by over 100 interviews with parents of pediatric patients about their satisfaction with their child's medical care. Scales of the P-MISS include Physician Communication with the Parent, Physician Communication with the Child, and the Adherence Intent scale. A 7-point response scale is generally used with the instrument; however, a 6-point response scale ranging from strongly disagree (scored as 1) to strongly agree (scored as 6) was used in this study, as it was felt that omitting "neither agree nor disagree" would avoid tendencies to answer in this non-committal way. The scale Adherence Intent is summed, a higher score indicating a greater willingness to comply with the doctor's recommendations (Lewis, Scott, Pantell and Wolf, 1986).

The alpha reliability coefficients of two different administrations of the P-MISS was reported as .86. Intercorrelations of this scale with the other scales on the P-MISS (Communication with the Parent and Communication with the Child) were moderate ($\underline{r}$ = .36 and .27, respectively). Reliability of difference scores between the P-MISS scales were computed, and Adherence Intent was found to measure a domain distinct from the Parent and Child Communication

scales (reliability of difference score r = .85, a higher score indicating a higher degree of scale differentiation), in spite of its moderate intercorrelations with the other scales. In addition, Adherence Intent was significantly correlated (r = .39) with objective ratings of physicians' interpersonal skills during pediatric medical interviews (Lewis et al., 1986). Because the P-MISS is a relatively new instrument, item-total correlations, alpha reliabilities of the scales, and inter-scale correlations of the instrument were conducted to see if the structural findings of the instrument (particularly for the Adherence Intent scale) were replicated.

Social Desirability Subscale of the Personality Research Form

This 14-item social desirability scale (Appendix E) is taken from Jackson's Personality Research Form (PRF) (Jackson, 1967). Designed to reflect relatively healthy attributes, respondents answer true or false to a series of statements about themselves. Each response of "true" is summed; a higher score indicates greater social desirability.

With the general locus of control measures, several researchers have noted a relationship between social desirability and internality (Strickland, 1978). Therefore, because social desirability may be related to health locus of control, parental intention to comply, and parental compliance with their child's medical regimen, this measure

was included in the second phase of the study to investigate the relationships between these variables.

Medical Regimen Report Form

This short information sheet (Appendix F) was filled out by the investigator from the child's medical chart after the mother did the interview. In particular, the number of otitis media episodes, the name of any medication(s) prescribed, their schedule of administration, and whether or not there were any additional instructions that the doctor or pediatric nurse recommended were recorded. Because the number of episodes of otitis media and/or strept pharyngitis that a child has experienced may be related to parental control expectancies, the number of episodes of these illnesses were obtained in order to investigate this hypothesis. In addition, the number of medications (and other medical regimens) prescribed were also recorded as an index of regimen complexity. Associations between regimen complexity, parental intention to comply, and compliance behavior were then investigated in the preliminary analyses.

Compliance Behavior

Compliance behavior for the second phase of the study was measured by interview (self-report), and by the amount of liquid antibiotic remaining at the home visit (medication measurement).

Interview. A compliance interview adapted from a protocol currently utilized in another investigation of children's health was administered in the second phase of

this study (Appendix G). This protocol primarily has an open-ended format, asking questions about (1) the mother's recollection of what the doctor told her about her child's medication dosage and its purpose, (2) the difficulties that the mother encountered while giving her child the medication, and (3) her estimate of how many scheduled doses she missed since starting the regimen. Two forms of the interview were administered (Forms A and B). Questions regarding the mothers' recall of the doctors' recommendations were counterbalanced with her recall of her own compliance behavior, in order to minimize the effect that stimulating the subject's memory of the doctors' recommendations may have had on her self-reported compliance behavior. Self-reported compliance was assessed by asking the parent how many doses her child missed.

Medication Measurement. At the home visit the interviewer measured the remaining liquid antibiotic in the prescription bottle using a flask with 2ml gradations. The formula cited in Finney, Friman, Rapoff and Christophersen (1985) $\left(\frac{(DISP - REM)/DOSE}{(DAY \times NUM) - (MISS + LATE)}\right)$ was used to calculate the compliance score (see Appendix G). DISP is the amount of medication dispensed; REM is the remaining medicine measured at the home visit; DOSE is the amount per dose; DAY is the day of the regimen on which the home visit was made; NUM is the number of doses per day; MISS is the number of doses missed on the first day of the regimen, and LATE is the number of doses to be given later in the day of the home visit.

Preliminary Analyses

Measure Construction: Phase I

Alpha reliabilities and item-total correlations were computed for the IHLC, PHLC, and CHLC scales utilizing 52 questionnaires from mothers who had completed the MHLC-CH in Phase I of this project. In spite of excluding items which correlated .15 or below with their respective scales, alpha reliabilities were barely adequate (IHLC= .75, 8 items; PHLC= .62, 5 items; and CHLC= .58, 8 items).

It was determined from these results that new items should be written for Phase II. Therefore, the remaining as well as the rejected items were scrutinized in order to determine what beliefs they were measuring (see Appendix A for item-total correlations of the items). Items were rewritten with the theoretical constructs of the scales in mind; however, those which had not translated well from an individual- to a child-focus in Phase I were dropped. For example, on the IHLC (which purportedly measures the sense of control that the mother feels over her child's health), rejected items seemed to blame parents for their children's illnesses: "Whatever goes wrong with my child's health is not my fault." These types of items were dropped, and new ones generated to take their place: "When my child gets sick, I don't see much use in trying to figure out how I could have prevented it from happening."

In addition, on the PHLC the focus of the scale was changed to reflect the belief that only health professionals

can control a child's health, rather than the idea that others in the child's environment (i.e., family and friends) also have a role in its control. This was done because items with the strongest item-total correlations appeared to reflect this belief in the control of health professionals.

Measure Construction: Phase II

MHLC-CH

Several items from each scale were rewritten and/or added to create a revised MHLC-CH using the process detailed above. Each revised scale consisted of 12 items (6 positively- and 6 negatively-worded) rated on a 6-point response scale ranging from strongly disagree (coded as 1) to strongly agree (coded as 6). Questionnaires were administered to 294 mothers of children who were seen at the pediatric clinic for health maintenance and illness visits. Of these, 207 were complete enough to compute item-total correlations and alpha reliabilities for the MHLC-CH scales. All items with item-total correlations of .20 and below were deleted from the analyses, resulting in a 12-item IHLC scale (no items deleted), an 8-item PHLC, and a 9-item CHLC (see Appendix B for a list of the items and item-total correlations). Means and standard deviations for the three scales are reported in Table 1. As can be seen from this table, alpha reliabilities for the scales were adequate.

Pearson product-moment correlations between the revised MHLC-CH and the social desirability scale of the Personality Research Form (Jackson, 1967) were conducted because several

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Table 1.

MHLC-CH Scales: Phase II

	No. of items	M	SD	Alpha Reliability	N
IHLC	12	52.1	7.5	.77	207
PHLC	8	32.3	5.5	.72	207
CHLC	9	27.1	5.6	.68	207

Key: IHLC = Internal Health Locus of Control

PHLC = Powerful Others Health Locus of Control

CHLC = Chance Health Locus of Control

investigations have noted positive relationships between internal locus of control and social desirability (Strickland, 1978). No significant relationships between the scales and social desirability were found in this sample. These findings suggest that the MHLC-CH scales are not affected by a tendency to respond in a socially desirable manner.

On the other hand, inter-scale correlations of the revised MHLC-CH scales were not entirely consistent with predicted relationships (see Table 2). As was suggested from previous literature (Levenson, 1973; Wallston et al., 1978), mothers' perceptions that they control their children's health (IHLC) were negatively correlated with their perceptions that chance, fate or luck (CHLC) control the health of their children. However, in spite of the fact that the PHLC purportedly reflects a belief in external control similar to that of the CHLC (i.e, the PHLC reflects mothers' perceptions that health professionals control their children's health), the PHLC was positively correlated with the IHLC--a finding which is opposite of the anticipated relationship. In addition, the PHLC was not positively related to the CHLC as suggested by previous research, but actually showed a trend in the opposite direction.

Adherence Intent of the P-MISS

Statistical analyses conducted with this sample reveal that the Adherence Intent (M = 5.4; SD = .68) and Physician Communication (M = 5.3; SD = .02) scales of the P-MISS have

Table 2.

MHLC-CH: Inter-scale Correlations

	IHLC	PHLC	CHLC
IHLC	--	.32*** (253)	-.52*** (250)
PHLC		--	-.09 (250)

Key: IHLC = Internal Health Locus of Control

PHLC = Powerful Others Health Locus of Control

CHLC = Chance Health Locus of Control

Sample sizes in ( ).

***p < .001

similar structural properties to the original instrument. (Item-total correlations for the two scales are reported in Table 3.) For example, analyses conducted on the two scales suggest that each is internally reliable; alpha reliabilities for the Adherence Intent and Physician Communication scales were .73 and .86, respectively. In addition, a Pearson correlation conducted between the two scales (r = .52, p < .001) indicated that mother's intention to comply with the doctor's recommendations (Adherence Intent) was positively correlated with her satisfaction with the doctor's ability to communicate with her (Physician Communication with the Parent). While this correlation is substantial, its magnitude indicates that the Adherence Intent scale is measuring an attitude which is distinct from the satisfaction expressed by the mother toward her physician.

Defining Compliance

As was mentioned previously, compliance can be measured in many different ways; in this study, it was measured by self-report and medication measurement. For the self-report data, mothers were asked to complete a chart indicating what time each medication dose was given, and were also instructed to indicate when doses were missed during the course of antibiotic therapy. Self-reported compliance (Self-Report) was computed from the chart data by using the formula [1 - (# doses missed/# times medication given)] X 100. Scores for this variable ranged from 0 to 100, with a

Table 3.

P-MISS: Adherence Intent and Physician Communication

	Item-Total Correlations
Adherence Intent	
1. It may be too difficult for me to do exactly what the doctor told me.	.69
2. I expect that it will be easy for me to follow the doctor's advice.	.54
3. It will be too much trouble to follow the doctor's advice.	.45
4. I intend to follow the doctor's instructions.	.48
Physician Communication	
1. The doctor listened carefully to what I said.	.59
2. I really felt understood by my child's doctor.	.80
3. The doctor gave me an explanation of my child's illness that I could understand.	.64
4. The doctor did not really give me a chance to say what was on my mind.	.83
5. The doctor seemed to have other things on his mind.	.74
6. The doctor failed to understand my main reason for coming.	.37

mean of 93.7 and a standard deviation of 14.7 (N = 61). Thirty-one mothers reported that they had missed at least one dose (or more) of the medication during their child's illness. The more compliant the subject reported herself to be, the higher the score.

The second compliance score, medication measurement, is the amount of medication actually given the child, divided by the amount that was supposed to have been administered to the child by the home visit (see p. 60 for actual formula and full explanation). Scores on this variable ranged from 0 to 129 with a mean of 82 and a standard deviation of 7 (n = 50). The higher the score on this variable, the more compliant the subject. In this sample, as in other studies utilizing medication measurement to assess compliance, it appears that noncompliance is more normative, as 36 of 50 subjects had scores on this variable which were less than 100. Four subjects attained scores of 100, indicating perfect compliance. Surprisingly, 10 other subjects attained scores greater than 100, indicating that there was less medication left in the bottle than expected.

It is important to investigate the reasons why these ten subjects attained such high scores on the medication measurement compliance score. One hypothesis is that these individuals differ in some significant way from subjects who attained less than perfect compliance (medication measurement less than 100, n = 36), as well as those who attained perfect compliance (medication measurement = 100, n

= 4). In order to test this hypothesis, one-way analysis of variance tests were performed to find out whether the three groups differed demographically (Table 4). Tests were also performed to find out whether the groups differed in their health beliefs (MHLC-CH), intention to comply with their doctor's recommendations (Intent), and their self-reported compliance (Self-Report).

As Table 4 indicates, the three groups were not found to differ significantly from one another on education or marital status. Noncompliers and Overcompliers (medication measurement < 100 and > 100, respectively) did differ in terms of their income and the age of the target child; Overcompliers tended to have higher incomes and target children who were significantly younger than those of the Noncompliers. Thus, one explanation for the missing medication is that the overcompliant mothers, having children who were significantly younger, gave their children extra medication because they were more concerned about them; these mothers may have also been less concerned about medication costs because of their higher incomes. Perfect compliers (called Compliers) did not differ significantly from either of the other two groups on income or age of target child. However, the small size of this group (n = 4) is a factor in the lack of significant differences observed between Compliers and Overcompliers; comparison of their respective means indicates that Compliers appear to be more similar to Noncompliers than

Table 4.

Mean Scores for Noncompliers, Compliers, and Overcompliers

Group	Income		Child Age		IHLC	
	M	SD	M	SD	M	SD
Noncompliers N=36	4.3[a]	2.9	32.7[a]	23.2	4.7[a]	.54
Compliers N=4	4.3[ab]	4.3	42.0[ab]	25.0	3.9[b]	.25
Overcompliers N=10	6.6[b]	3.7	17.3[b]	7.1	4.0[b]	.60

Note: Noncompliers had medication measurement scores < 100.

Compliers had medication scores = 100.

Overcompliers had medication scores > 100.

Column means with the same superscript do not differ significantly (i.e. $p > .05$).

Overcompliers on either income or age of target child.

Table 4 also indicates that the Noncompliers reported significantly greater belief in their own sense of control over their children's health than the other two groups. No significant differences were found among the groups in their beliefs that powerful others (PHLC) or fate, chance, or luck (CHLC) control their children's health; there were also no differences between the Compliers and Overcompliers in their intention to comply or their self-reported compliance. Thus, while Compliers may have lower average incomes and older target children than Overcompliers, they seem to be most similar to Overcompliers in terms of internal health locus of control. Because this investigation is most interested in the psychological predictors of compliance, and will control for potentially confounding variables such as family income and age of the target child if necessary, it was decided that the ten medication scores of the Overcompliers would be recoded to equal 100. Scores on this transformed medication measurement score range from 0 to 100 with a mean of 78.6 and a standard deviation of 23.2.

Another possible reason for the missing medication is not that the mothers were overly-compliant, but that the medication was spilled before it was given to the children. During the course of completing the compliance chart, subjects were asked to report how many times spills occurred in the process of giving their child the medication. Of the 61 subjects, 8 reported having spilled the medication once,

and 2 subjects reported spilling it more than once. Because of the small number of subjects reporting spillage, and the restricted range of spills reported per subject, subjects were sorted into two categories: those who had not reported any medication spillage, and those who had reported one or more episodes.

It is important to investigate the contribution (and possible confounding effects) that spills may have made to the medication measurement. In order to do so, subjects' medication measurement scores were recoded into a categorical format--compliant or noncompliant. The medication measurement data was recoded so that scores less than 100 were categorized as noncompliant, and those equal to 100 were categorized as compliant. The spillage variable was then crosstabulated with this categorical medication data, and chi-square tests were performed. As Table 5 indicates, spills do not appear to be associated with those subjects judged to be "compliant" on the medication measurement score. In fact, of the 10 subjects reporting that they spilled the medication, 7 were categorized as being <u>noncompliant</u> according to their medication scores. A second crosstabulation between the spillage variable and the compliance groups (Noncompliers, Compliers, and Overcompliers) indicated that the three remaining subjects all fell into the category of overcompliance. Thus, from these analyses it appears that reported spillage did not confound the medication scores of the overly-compliant group

Table 5.

Relationship Between Reports of Spills and Compliance

A.		No Spillage	Spillage	Row Total
Noncomplaint		29	7	36
(Medication score <100)	Col %	72.5	70.0	
Compliant		11	3	14
(Medication score=100)	Col %	27.5	30.0	
				n=50 100.0%

Chi-square = 0.00; p, n.s.

B.		No Spillage	Spillage	Row Total
Noncompliers		29	7	36
(Medication score <100)	Col %	72.5	70.0	
Compliers		4	0	4
(Medication score=100)	Col %	10.0	0.0	
Overcompliers		11	3	10
(Medication score >100)	Col %	27.5	30.0	
				n=50 100.0%

Chi-Square = 1.63; p, n.s.

to a great degree, but, in fact, was associated with the group judged noncompliant by the medication measurement score.

It is evident from the above discussion that medication measurement has its own specific sources of measurement error. Probable sources of inaccuracy are unreported spills, pharmacist error, and variations in the amount dispensed per dose by parents. Self-reported compliance, on the other hand, also appears to be subject to systematic error, although this error stems from different sources. For instance, in this sample, subjects' own reports that they were compliant were positively correlated with a tendency to respond in a socially desirable manner (r = .24, $p < .05$, N=61).

In spite of the measurement difficulties inherent in each method of estimating compliance, it appears that both are measuring some distinct aspects of compliance. The correlation between the two compliance scores was .65, indicating that each is measuring some distinct facet of the same phenomenon. However, given substantial sources of error associated with both scores, it is conceivably more valid to treat each as a categorical rather than an interval variable (r for these two categorical scores was .42, $p < .001$).

Table 6 displays the univariate correlations obtained between the MHLC-CH scales and the four compliance scores. It is clear from looking at the table that the correlations

Table 6.

Relationships between the MHLC-CH and Compliance Scores

	Compliance Measure			
	Self-Report		Medication	
	Interval	Categorical	Interval	Categorical
IHLC	-.05	-.22*	-.17	-.51***
PHLC	-.12	-.21*	-.25*	-.30**
CHLC	-.01	.07	.00	.30*

*p < .05

**p < .01

***p < .001

with the MHLC-CH scales are stronger with the two categorical compliance scores than with the interval ones. For example, while no significant correlations were found between the interval self-report variable and the MHLC-CH scales, both the IHLC and the PHLC were negatively correlated with the categorical self-report variable. A similar pattern was observed with the interval and categorical medication measurement variables; only a belief in health professionals' control over children's health (PHLC) was significantly correlated with the interval medication score, whereas all three scales (the IHLC, PHLC, and CHLC) were correlated with the categorical medication measurement score. Given these results, and the fact that the interval compliance scores increase the likelihood of measurement error, the path analyses were performed with the categorical compliance variables only. In a further effort to simplify the presentation of these findings, the models discussed in the section on path analysis will only include those demographic and illness-related variables which contributed significantly to those analyses.

RESULTS

Pearson product-moment correlations were used to rule out possible confounds associated with demographic characteristics of the sample or with social desirability, complexity of the medical regimen, or illness chronicity. It is important to note that race was dropped from the planned correlations because of the very low percentage (3%)

of nonwhites in this sample. As Table 7 shows, the only variable which emerged as being related to both the dependent and independent variables in the path model was mother's education, which was found to be negatively correlated with mothers' beliefs that health professionals control their children's health (PHLC), and positively correlated with their observed compliance (medication measurement) score.

Family income, however, was also included in the initial path analyses because it was felt that the combination of education and income together may contribute to predict mother's health control beliefs.

There are a few other significant correlations in Table 7 which deserve comment, although they were not included in the final path analyses. For example, family income was found to be positively related to mothers' perceptions that fate, chance, or luck control their children's health (CHLC). In addition, a negative relationship was evidenced between mother's marital status and her perception that her own behavior controls her child's health (IHLC). Thus, those mothers who are married feel that they have less ability to affect or control the health of their children than those women who are not married. While the direction of these correlations were not predicted, these results suggest that situational variables do have an effect on mothers' perceptions of who (or what) has control over the health of their children.

Table 7: Univariate Correlations[a]

Predictor Variables				Compliance Variables		
	IHLC	PHLC	CHLC	Intent	Self-Report	Medication (n=50)
Mother's Education	-.19	-.24*	.05	.21	-.04	.24*
Income	-.15	-.16	.21*	.15	-.02	.23
Age of Child	.04	-.32**	.04	-.15	-.04	-.17
Sex of Child	-.03	-.18[t]	-.04	.13	.25*	.15
Marital Status	-.34**	-.16	.14	.06	.13	.14
Social Desirability	.16	.01	.02	-.04	.24*	-.11
Regimen Complexity	.12	-.06	-.18[t]	.07	-.14	-.14
Illness Chronicity	-.28 (n=19)	-.00 (n=19)	.13[t] (n=19)		.19 (n=19)	.13 (n=16)
Order of Interview Questions	-.09	-.06	-.09	-.12	-.01	-.02

Key: IHLC = Internal Health Locus of Control
PHLC = Powerful Others' Health Locus of Control
CHLC = Chance Health Locus of Control
Intent = Intention to Comply
Medication = Medication Measurement Score

[a] N=61 for all correlations except those noted in ( ).

[t] $p < .10$

*$p < .05$

**$p < .01$

One variable in Table 7 which was anticipated to be related solely to the dependent variables in this study was regimen complexity. For this investigation, regimen complexity was measured by the number of medications prescribed by the doctor during the illness visit. The child's medical records were used to obtain this information, and only medications prescribed on a set schedule (i.e., antibiotics and cough medicines or decongestants which were to be given a certain number of times every day) were included in this score. Of 61 subjects, 12 had two medications prescribed by the doctor; regimen complexity had a mean of 1.2 and a standard deviation of .44. Results for this variable indicated that regimen complexity was negatively related to the self-report interval compliance score ($n(61) = -.32$, $p < .01$), suggesting that the complexity of the medication regimen negatively affects the mother's perception of whether or not she complied, but does not affect her observed behavior. Because regimen complexity was not significantly related to either the independent or categorical variables in the path model, it was not included in the path analyses reported below.

One final variable potentially correlated with the MHLC-CH, compliance intent, and/or compliance behavior is illness chronicity. Cross-sectional research with the original MHLC scale (Wallston & Wallston, 1981) indicated that a belief in chance control over one's health was

negatively associated with illness chronicity. In addition, chronicity may be negatively correlated with self-reported compliance, as well as with observed compliance (medication measurement). Because all children with chronic problems were excluded from this study, "illness chronicity" was the frequency of three common illnesses (which require antibiotics) that the child had had over his or her lifespan. The three illnesses were otitis media, strept pharyngitis, and upper respiratory infections. The formula for this variable was the total of these three illnesses divided by the age of the child.

In order for this variable to be useful, complete medical records were needed from all subjects. In the course of working with the records, it became apparent that only a small subsample (n=19) were complete. Correlations between chronicity and the independent and dependent variables were conducted to see whether or not chronicity was correlated with the MHLC-CH and compliance for the 19 subjects (see Table 8). None of the correlations were significant. Thus, while illness chronicity will not be included in the path analyses for this investigation, previous research as well as the magnitude of these correlations suggest that this is an interesting and potentially important variable for future compliance research.

Table 8.

Correlations between Illness Chronicity and the Predictor and Outcome Variables

IHLC	PHLC	CHLC	INTENT
		t	
-.28 (N=19)	.00 (N=19)	.31 (N=19)	-.22 (N=19)

Interval		Categorical	
Self-Report	Medication	Self-Report	Medication
.26 (N=19)	-.17 (N=19)	.19 (N=16)	.13 (N=16)

Key: IHLC = Internal Health Locus of Control
PHLC = Powerful Others' Health Locus of Control
CHLC = Chance Health Locus of Control
INTENT = Intention to comply with the doctor's recommendations

t
p < .10

Path Analysis

Several variables were dropped from the path analyses shown in Figures 4 and 5. Family income was dropped because it did not contribute significantly to the prediction of the MHLC-CH scales. Mothers' education and income are significantly positively correlated with one another (r = .36, p < .01), but are both negatively related to mothers' beliefs that they control their children's health (beta = -.09 and -.15, n.s.). Once income was dropped from the path, the negative correlation between mothers' education and their IHLC increased, but still was nonsignificant (beta = -.19). The PHLC and CHLC variables (which measured the beliefs that health professionals and fate, chance, or luck control children's health, respectively) were also dropped from the final path models because of their nonsignificant contributions to mothers' intentions to comply (beta = .10 and -.19), as well as their self-reported (beta = -.18 and .01) and observed compliance (beta = -.08 and .10). Removal of the PHLC and CHLC scales from the equation saw little practical decrease in the predictive power of the path, and actually increased the strength of the relationship between mothers' sense of control over their children's health (IHLC) and compliance intent. A similar pattern was also seen with the observed compliance (medication measurement). The more complete models are in Appendices H and I.

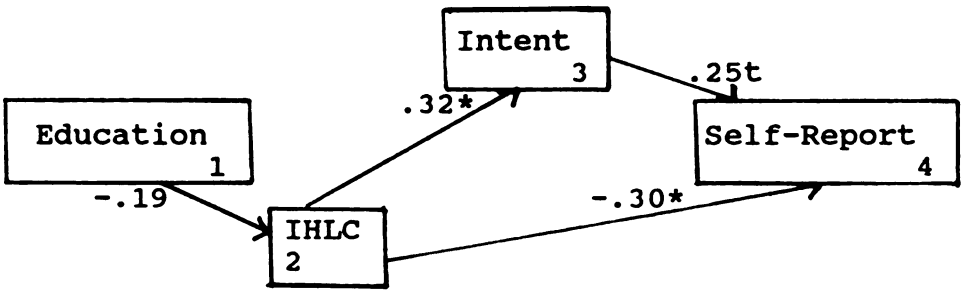
Self-Reported Compliance

The revised predicted and full models for self-reported and observed compliance (medication measurement) are shown in Figures 4 and 5. Figure 4 shows the revised predicted and full path models for self-reported compliance. The path coefficients (beta weights for regressions) in the diagrams indicate the strength of direct influences among the variables. As can be seen in the diagram of the predicted model, mothers' sense of control over their children's health (IHLC) has a direct, positive influence on their intention to comply (INTENT) as expected. Thus, the greater the sense of control that the mother has over her child's health, the stronger are her intentions to comply with the doctor's recommendations. In addition, intention did influence mothers' self-reports of their compliance behavior as predicted, although the association was only a trend. A direct effect between mothers' sense of control over their children's health (IHLC) and their self-reported compliance was also obtained, although it was in the opposite direction than expected. The path coefficient was negative, indicating that the greater the mother's sense of control over her child's health, the less likely she was to report that she had complied with the doctor's recommendations.

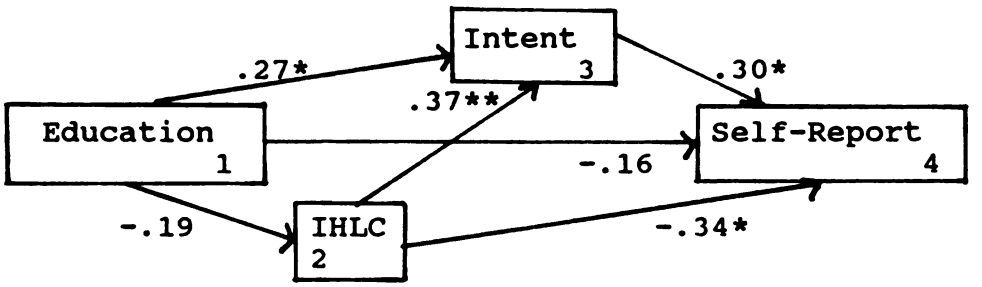
In addition to the surprising association noted above, the hypothesis that mothers' internal health control beliefs would indirectly affect their self-reported compliance via

Figure 4. Revised Path Model: Self-Report Measure

Predicted



Full



	Predicted		Full	
	Vars	R2 Change	Vars	R2 Change
Education	--	--	--	--
IHLC	1	.03	1	.03
Intent	2	.10*	1,2	.17**
Self-Report	2,3	.10*	1,2,3	.13*

Key: IHLC = Internal Health Locus of Control

Intent = Intention to Comply

*p < .05

**p < .01

***p < .001

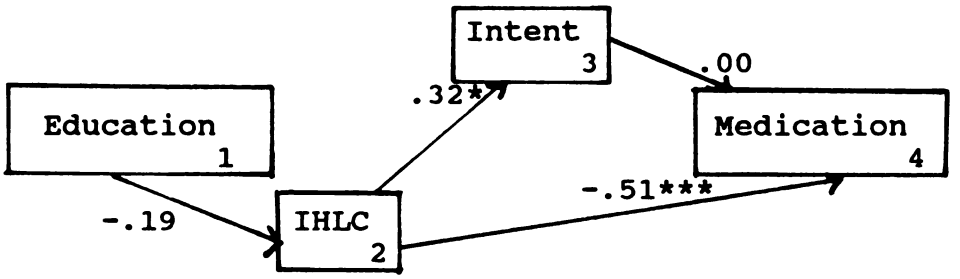
their compliance intentions was not conclusive from the predicted model (i.e., the relationship between intent and compliance was only significant at $p < .10$). However, comparison of the predicted with the full model for self-reported compliance indicates that mother's education directly influences her intention to comply in a positive direction--as her education increases, so does her conviction that she will comply. The full model also indicates that mother's education is weakly related to self-reported compliance in a negative direction. Moreover, while the addition of this variable appears to have no appreciable effect on the prediction of self-reported compliance overall, it does strengthen the direct effect that mothers' internal health control beliefs have on compliance intent and self-report. The direct influence of compliance intent (Intent) on self-reported compliance also increases in magnitude and becomes statistically significant with the addition of education. Thus, it appears that the full model offers a more complete picture of the prediction of mothers' self-reported compliance from education, internal health control beliefs, and compliance intent.

Observed Compliance

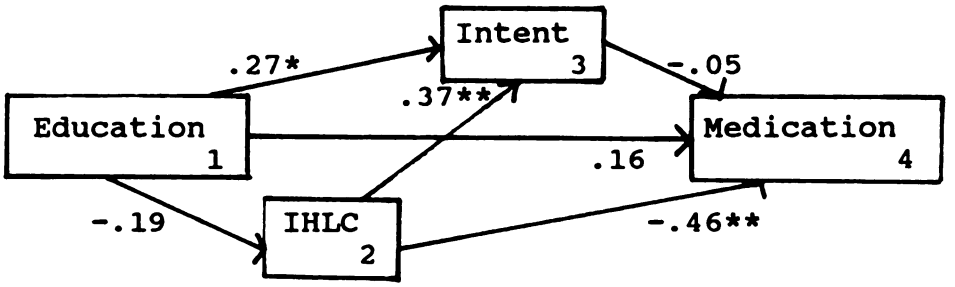
Figure 5 shows the revised predicted and full models for observed compliance (the medication measurement score). Of course, many of the paths in this predicted model are the same as those for self-reported compliance. However, as can be seen in this diagram for the predicted model of observed

Figure 5. Revised Path Model: Medication Measure

Predicted



Full



	Predicted		Full	
	Vars	R2 Change	Vars	R2 Change
Education	--	--	--	--
IHLC	1	.03	1	.03
Intent	2	.10*	1,2	.17**
Medication	2,3	.26***	1,2,3	.29**

Key: IHLC = Internal Health Locus of Control

Intent = Intention to Comply

Medication = Medication Measurement Score

*p < .05

**p < .01

***p < .001

compliance, mothers' intentions to comply with the doctor's recommendations are unrelated to their observed compliance behavior (medication measurement). In addition, mothers' internal health control beliefs (IHLC) were found to strongly influence their observed compliance behavior in a negative direction; again, this relationship was opposite of the one predicted originally. This pattern of findings contradicts the specificity model proposed earlier, which hypothesized that compliance intent would be more highly related to observed compliance than mothers' health control beliefs. It contradicts this model because the intention to administer a child his or her medication on schedule is a more specific belief than the belief that one can control the health of one's child; therefore, one would expect that compliance intention would be more strongly associated with the actual behavior than the less specific health beliefs.

Comparison of the predicted and full models for observed compliance indicates that the addition of direct effects from mothers' education to observed compliance (medication measurement) yielded a weak positive association which did not appreciably affect the prediction of observed compliance. Thus, it appears that little predictive power is lost using the predicted path model to predict observed compliance.

Additional Analyses

Because the correlation between self-reported and observed compliance was significant ($r = .42$, $p < .001$),

additional analyses were completed in order to verify that the relationship between IHLC and self-reported and observed compliance was not due to the variance shared with the other compliance score. To assess this possibility, hierarchical regression analyses were used to (a) predict observed compliance from IHLC controlling for the self-report score, and (b) predict self-reported compliance from IHLC controlling for observed compliance.

Controlling for observed compliance decreased the path coefficient between mothers' self-reported compliance and internal health control beliefs (IHLC) from -.35 ($p < .05$) to -.13 (p n.s.), essentially negating the direct effect that mothers' IHLC appeared to have on self-reported compliance. In contrast, while controlling for self-report decreased the magnitude of the direct effect that mothers' IHLC had on observed compliance (beta went from -.46, $p < .01$, to -.33, $p < .05$), it did not negate this effect. Finally, these analyses did not significantly change the pattern of direct and indirect influences found between education, compliance intent, and self-reported and observed compliance.

DISCUSSION

There were two major goals in this investigation. The first was to develop a reliable and valid questionnaire to measure the health beliefs of parents regarding their children's health and illnesses. The second and most important goal was to model the process of how parental

health beliefs may predict parental compliance behavior with their children.

MHLC-CH

With regard to the first goal, it appears from the above discussion that the revised version of the MHLC-CH is a reliable instrument, having adequate internal consistencies for each of the three scales, and displaying no systematic bias because of a tendency to respond in a socially desirable manner.

The validity of the MHLC-CH seems to be somewhat more tentative, if one evaluates the findings from this investigation against the research conducted with the original MHLC. However, as previously indicated, it appears that a mother's sense of control over her child's health may be different from her sense of control over her own health. For example, blaming oneself for one's own illness is probably less anxiety-provoking than blaming oneself for the illness of one's child, particularly when that child is too young to take responsibility for his or her own health care. Items emphasizing self-blame were replaced in the revised MHLC-CH because of the low internal consistency of the internal scale of which they were a part. Therefore, the internal scale (IHLC) of the MHLC-CH focuses on mothers' perceptions that their actions make a difference in their children's health status, rather than on their global attributions of who (or what) is to blame for their children's illnesses.

Along these same lines, mother's perceptions of powerful others' control over their children's health also appear to be somewhat different than when contemplating their own health. Items which considered the role of family and friends in children's health were replaced with items asking only about the role of health professionals. It may be that mothers regarded "family" as being extensions of themselves, particularly since many of the mothers interviewed in Phase II of this project indicated that they regarded themselves as the parent solely responsible for their children's health. Therefore, the revised PHLC scale appears to measure mothers' perceptions of control that health professionals have over their children's health.

In addition to measuring different perceptions than their original counterparts, inter-scale correlations between the child versions of the IHLC and PHLC scales were opposite of those anticipated from previous research on adults. One explanation for these findings is that the more mothers feel that they are "in control" and responsible for their children's health, the more that they perceive that a working partnership with a physician is important for keeping and/or enhancing their control. Thus, the physician's control over the health of children is seen by the mothers as being a logical extension of their own. This would also explain why the revised PHLC was not significantly related to the revised CHLC; conceptually, the PHLC and IHLC scales appear to be measuring the mother's

perception that significant others (herself) and powerful others (health professionals) are working together to control her child's health. In contrast, the CHLC is measuring her perception that an abstract force (such as chance) is controlling her child's health.

Health Beliefs, Compliance Intent, and Compliance Behavior

The most important goal of this study was to explore the processes by which mothers' health control beliefs lead to their compliance with their children's medication regimen for acute illnesses. The work of Fishbein and Ajzen (1975) provided a useful conceptual framework to organize the factors which were hypothesized to predict compliance. The use of path analysis permitted an in-depth look at the complex interrelationships between health beliefs, compliance intent, and compliance behavior; the findings indicated that a somewhat different model from the one originally conceptualized best fit the data.

IHLC and Compliance

In contrast to what was expected, mothers' sense of control over their children's health negatively related to their observed compliance (medication measurement). This unexpected relationship does not appear to be the result of the confounding effects of illness chronicity; although this variable was not controlled for, all the available research suggests that illness chronicity would decrease both mothers' sense of health control and their subsequent compliance, a combination of effects which do not explain

this negative relationship.

Another tentative hypothesis concerns the episodic nature of the acute illnesses studied in this investigation. As was outlined in the introduction, very few studies of health locus of control beliefs and compliance have been conducted, and even fewer still have been performed with acutely- as opposed to chronically-ill populations. Therefore, the hypotheses postulated above were based largely on studies conducted with adult patients who had life-threatening and/or chronic conditions. It may be that substantial differences exist in the control attributions that individuals make concerning acute versus chronic illnesses. For example, in this sample, mothers with a greater sense of control over their children's health may have felt that strict adherence to the doctor's recommendations was not necessary because of their (the mothers') own ability to care for their children. One research study of the Health Beliefs Model supports this interpretation, finding that the maternal belief that "most children's illnesses are preventable" was negatively related to their children's acute illness visits to a pediatrics clinic (Becker et al., 1977).

A second interpretation of these findings is not that mothers with higher health control beliefs feel that they can take care of their children "better" than their doctors, but that these mothers make more "adaptive" compliance decisions concerning their children's medication regimen

than mothers with lower beliefs in health control. In a recent compliance study of children with asthma, for example, it was found that a rating of parents' decision-making "adaptiveness" (i.e., the activeness and clarity of the parents' decision, their knowledge of the medication regimen as well as knowledge of their child, and aspects of the decision-making process itself) was positively related with the child's quality of life, regardless of whether or not the parents said that they complied with the medication regimen. Self-reported compliance, on the other hand, was <u>not</u> related to the child's quality of life (Deaton, 1985). In addition, although adaptiveness was directly associated with compliance, there were some parents in this sample who were adaptive noncompliers.

Scrutiny of the dimensions included in Deaton's adaptiveness rating suggest that the more adaptive compliers may have been greater information-seekers (and, perhaps, information-utilizers) than the nonadaptive compliers. Greater information-seeking and utilization during cognitive tasks in experimental situations has also been associated with greater internality on general locus of control measures, although the variance accounted for by this variable has generally been small (Lefcourt, 1972). Furthermore, "internal" individuals also tend to resist pressures to conform (Odell, 1959), have greater confidence in their abilities to make judgments on certain tasks

(Crowne & Liverant, 1963), and generally seem unimpressed with the opinions of authority figures (Gore, 1963; Ritchie & Phares, 1969; Strickland, 1970). Thus, it may be that mothers with higher internal health control beliefs were less compliant (as assessed by medication measurement) because they preferred to seek out and utilize health-related information more adaptively, rather than follow their children's medication regimens blindly. This unwillingness to accept the doctor's treatment without question may have led them to alter their administration of their children's medication.

Although adaptive decision-making implies that there is a good partnership with one's pediatrician, maternal belief in health professionals' control over children's health (PHLC) did not contribute to the prediction of either compliance score. Furthermore, maternal belief in the role of fate, chance, and luck in the control of children's health (CHLC) also did not contribute significantly to compliance. Both findings were contrary to prediction. One possible explanation for these results is simply that mothers regard themselves as the orchestrator of the forces which affect their children's health; therefore, their belief in their own contribution overrides the significance of the other two forces.

IHLC, Compliance Intent, and Compliance Behavior

As anticipated, mothers' perceptions that their actions do make a difference in their children's health status were

also found to contribute directly to their intention to comply, as well as indirectly to their reports of compliance with the medication regimen. In other words, the belief that one's actions will make a difference in the health status of one's child appears to motivate one to formulate a strong intention to comply with his or her regimen; one's intention to comply, in turn, positively influences one's later reports that one did what one set out to do.

In contrast to the path model for self-reported compliance, mothers' intentions to comply with their children's medical regimens do not predict their observed compliance behavior (Figure 5). This finding contradicts the hypothesis put forth by Fishbein and Ajzen (1975) that behavioral intention always mediates the relationship between belief and actual behavior. No explanation for this finding is offered, other than the observation that beliefs can be very powerful determinants of actual behavior.

Education and IHLC

It was initially hypothesized that mother's education would be positively related to her sense of control over her child's health, and thus would indirectly affect her intention to comply via her internal sense of control (Figure 4). This was not the case. Instead, education insignificantly (and also negatively) related to IHLC. One explanation for these findings is that at least some more educated mothers are more aware of the multitude of factors which may influence the health of their children. This idea

is supported by the finding that a sample of graduate and professional women were among the least internal of groups surveyed about their health beliefs; the researchers hypothesized that increased awareness of negative health experiences may have reduced their sense of control over their health (Wallston & Wallston, 1978; cf. Wallston & Wallston, 1981). In this current investigation, then, education for some mothers may have decreased their sense of control over their children's health; this heightened awareness of their limitations may have also increased their intentions to comply, in order to compensate for their diminished sense of control. Mothers' intentions, in turn, were directly related to their subsequent perceptions that they actually did comply with the medication regimen (self-reported compliance). However, while this process may have been true for some mothers, overall, education was not found to have any direct or indirect effect on mothers' compliance intentions, their self-reported compliance, or their actual compliance behavior.

Compliance: Self-report Versus Medication Measurement

The differences in the decision-making models for self-reported and observed compliance documented in this investigation reinforce findings from previous research suggesting that these two compliance measures are not equivalent (Gordis, 1979). For example, the findings that intention to comply was highly related to self-reported, but not observed compliance, and that health control beliefs did

not affect self-report strongly suggest that these two scores are subject to different kinds of distortions. While medication measurement seems to be subject to inaccuracies such as unreported spills and dosage errors, self-reported compliance appears to be inflated by mothers' tendencies to respond in socially desirable ways, as well as by their need to have their reports of their compliance behavior coincide with their original compliance intentions. These differences suggest that neither score is an adequate reflection of compliance, although results from this study do suggest that observed compliance (medication measurement) is the more "robust" measure when one is investigating the relationship of compliance to mothers' health control beliefs. Nevertheless, it appears to be important in future research to continue to use multiple measures of compliance behavior, in order to gain as much knowledge as possible about the different aspects of compliance decision-making. In her review of pediatric compliance, Dunbar (1983) advocates such a strategy, suggesting that a combination of daily self-monitored pill count, in-depth interview, and biological indices such as urine antibiotic assay will give a more comprehensive assessment of compliance behavior.

Research Limitations and Future Directions

A few aspects of the recruitment phase of the study may have limited the generalizability of the findings in this investigation. First of all, subjects were recruited in the waiting room of a university-based pediatrics clinic;

invitation to participate in the interview phase of the study was contingent on the mother being able to complete the MHLC-CH and compliance intention questionnaires before leaving the clinic. Thus, it is felt that those mothers whose children were sicker during the office visit, or who were otherwise distracted (e.g., by their other children) were not included in the study. Second, because the clinic was only open during office hours five days a week, the mothers who brought their children to the clinic tended to be full-time housewives. Thus, 56% of this sample are unemployed--a relatively unique group by today's standards. Finally, because the clinic was university-based, 20% of the mothers were university students. All of these factors, including the small sample size, suggest that replication with a larger and more diverse sample is necessary to insure greater confidence in the results obtained here.

A second factor which limits generalizability of this investigation's findings is the use of a relatively new measure of health locus of control. While the MHLC-CH showed adequate internal consistency and appears to be measuring constructs theoretically similar to the original adult version of the MHLC, future research with this measure should focus on gathering additional reliability and validity data to investigate the theoretical and structural properties of this instrument. This is particularly important given the restricted nature of this present sample; common sense suggests that working mothers and

fathers may have very different perceptions of their abilities to affect the health and illness of their children.

Another limitation of this research is the fact that illness chronicity was not controlled for in the path analysis. Findings from previous research (Marston, 1970; Perrin & Shapiro, 1985; Wallston & Wallston, 1981), as well as the magnitude of the nonsignificant correlations (n=19) in this investigation indicate that illness chronicity is an interesting and potentially important variable for future health locus of control and compliance research.

A more serious limitation of this research is theoretical; although the model tested in this study was partially derived from one outlined in Fishbein and Ajzen (1975), only a few of the most important variables were measured (see Figure 2). For example, while the authors argued that the attitude toward a behavior (in this case, toward compliance) may add no additional predictive power when beliefs and intentions regarding that behavior were also measured, they did include it in their model; however, no measurement of this construct was undertaken here, primarily because there was no established way to measure this attitude. The same is true of several other variables: evaluation of consequences, normative beliefs, motivation to comply, and subjective norms regarding compliance behavior were virtually ignored in my compliance model. Therefore, while this investigation has established that intention to

comply is not a strong determinant of mother's actual compliance for their child, it can not be concluded from this investigation that the model put forth by Fishbein and Ajzen (1975) has been fully tested and refuted.

Perhaps the most important limitation of this study is the almost complete disregard of the family milieu in which compliance with a child's medication regimen takes place. While investigation of mother's health-related decision-making is important, this process does not take place in isolation. Past research suggests that families can offer positive support that may facilitate compliance in the family with a pediatric patient (Dunbar & Agras, 1980; Gordis et al., 1969). Interviews and observations from this study further suggest that fathers (and auxiliary caretakers such as babysitters and preschool teachers) vary in the amount of emotional support and/or concrete assistance they contribute when their child is ill; anecdotally, this appears to be related to how the parents interact and function as a decision-making team, as well as how the family is structured overall. Future research on this question should investigate how parental interaction, decision-making, and role relationships concerning health-related matters interact with individual parental health control beliefs to affect parental compliance with their child's medication regimen.

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Appendix A

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Appendix B

Revised MHLC-CH Scales

INTERNAL (IHLC)	Item-Total Correlations
Items from OM pilot: 5 positive, 3 negative	
1. If my child gets sick, it is my behavior that determines how soon s/he gets well again. (+)	.28
2. I am in control of my child's health. (+)	.34
3. I am not directly responsible for my child's health. (-)	.39
4. The main thing which affects my child's health is what I do for him or her. (+)	.45
5. My child's physical well-being does not depend on how well I take care of him or her. (-)	.43
6. If I take the right actions, my child can stay healthy. (+)	.43
7. If I take care of my child, s/he can avoid being ill. (+)	.42
8. If my child becomes sick, I do not have the power to make him/her well again. (-)	.40
New items: 1 postive, 3 negative	
9. I have little control over whether or not my child gets sick. (-)	.48
10. When my child gets sick, I don't have much contol over whether or not s/he recovers. (-)	.54
11. When my child gets sick, I don't see much use in trying to think how I could have prevented it from happening. (-)	.34
12. When my child gets sick, I have a lot of influence over how quickly s/he recovers. (+)	.48

Appendix B

Revised MHLC-CH Scales

CHANCE (CHLC)	Item-Total Correlations
Items from OM pilot: 3 positive, 2 negative.	
1. No matter what I do, if my child is going to get sick, s/he will get sick. (+)	.40
2. Luck plays a big part in determining how soon my child will recover from an illness. (+)	.42
3. Even if I take care of my child, I cannot avoid him/her getting sick. (+)	.30
4. When my child stays healthy, it's not just luck. (-)	.32
5. Most things that affect my child's health do not happen to him/her by accident. (-)	.32
New items: 3 positive, 1 negative	
6. How soon my child recovers from an illness is more up to chance than anything else. (+)	.36
7. When my child has not been sick for a long time, I cross my fingers and hope it will last. (+)	.34
8. No matter what I do, my child is likely to get sick. (+)	.41
9. My child's health or illness is not a matter of luck. (-)	.36
POWERFUL OTHERS (PHLC)	
Items from OM pilot: 2 positive, 2 negative.	
1. Health professionals do not keep my child healthy. (-)	.44
2. Following doctor's orders to the letter is not always the best way for my child to stay healthy. (-)	.39

Appendix A

POWERFUL OTHERS (PHLC)	Item-Total Correlations
5. My family doesn't have a lot to do with my child's becoming sick or staying healthy. (-)	.03
6. Regarding my child's health, I can only do what my doctor tells me to do for him/her. (-)	.09
7. If I do not take my child to see a doctor regularly, s/he is more likely to have health problems. (-)	-.23
8. Whenever my child doesn't feel well, I should consult a medically trained professional. (+)	.35
9. Health professionals control my child's health. (+)	.23
10. Other people do not play a big part in whether my child stays healthy or becomes sick. (-)	-.09
11. Consulting health professionals regularly will not help my child maintain his/her health. (-)	.11
12. When my child recovers from an illness, it's usually because other people (for example, doctors, nurses, family, friends) have been taking good care of him or her. (+)	-.05

Appendix B

Revised MHLC-CH Scales

POWERFUL OTHERS (PHLC)	Item-Total Correlations
3. Whenever my child doesn't feel well, I should consult a medically trained professional. (+)	.50
4. Health professionals control my child's health. (+)	.42
New items: 2 positive, 2 negative	
5. It is better to rely on my doctor's suggestions rather than my own thoughts on how to keep my child healthy. (+)	.40
6. When my child is sick, I think it is better to consult a doctor, rather than going with my own judgement about how to make him/her better. (+)	.41
7. Health professionals do not play a big role in whether or not my child stays healthy or gets sick. (-)	.25
8. Following the recommendations of my child's doctor is the best way to keep my child from getting ill. (+)	.50

Appendix B

MICHIGAN STATE UNIVERSITY

COLLEGE OF OSTEOPATHIC MEDICINE • WEST FEE HALL
DEPARTMENT OF PEDIATRICS • (517) 353-9100

EAST LANSING • MICHIGAN • 48824-1316

Dear Parents:

I am writing to you to ask for your help in a research project on "Parental Health Perceptions". The purpose of this study is to learn more about how parents feel about the health of their children, how satisfied they are with their health care, and how they manage when their child is ill. A group of researchers from the Departments of Pediatrics and Psychology at MSU will look at these issues.

Over the years, pediatricians have increasingly recognized that comprehensive health care includes not only treatment of illness with medications, diet, surgery or manipulation, but also evaluation of how parents feel about the health of their children. We already know that parents report that when children are ill their families often experience a good deal of stress. We think that the best way to understand more about these issues is to ask people like yourselves who have young children how you cope with such events.

Cheryl Olmsted, the primary investigator, has already asked you to complete these two questionnaires before you leave the clinic today. Your participation in this phase of the study is greatly appreciated. After this initial phase, Ms. Olmsted will ask a smaller number of parents if she can visit you in your home in a week's time to interview you about how you coped with your child's illness. We hope that you will want to continue if asked. However, we want to stress that your cooperation with this part of the study does not commit you in any way to further participation. Your participation is completely voluntary, and as the following letter details, you may choose not to answer any particular question asked and you may discontinue at any time. Any information you provide will be treated confidentially, and your decision not to participate or to withdraw will in no way jeopardize current or future treatment at the MSU Clinical Center.

On behalf of the research team, I wish to personally thank you for your help in this project. Studies like this give pediatricians more infomation that helps us in providing comprehensive health care to families like yours.

Sincerely yours,

Gerard M. Breitzer, D.O., F.A.A.P.
Associate Professor, Pediatrics
Director, Pediatric Clinic

Appendix B

Informed Consent Letter to Parents

Dear Parent,

We invite you to participate in a study about health and illness. This collaborative study is being carried out by faculty and students in the Departments of Pediatrics and Psychology here at Michigan State University. The purpose of this research is to learn more about how parents feel about the health of their children. In addition, we want to know how satisfied parents are with the health care services they receive for their children.

If you decide to participate, we will ask you to complete two questionnaires concerning your feelings about your child's health and your satisfaction with the health care provided to your child at the MSU Clinical Center. Please note that if you have more than one child, answer the questionnaire pertaining to your children's health in terms of the child who is seeing the physician today for an illness. Answer this questionnaire in terms of this child only, rather than for all of your children together.

You should be able to complete the first questionnaire while you wait to see the doctor. The second questionnaire should be completed after the appointment, because it refers to the visit that your child will have just completed with the doctor. This questionnaire will ask you how satisfied you are with the appointment that your child just had with the doctor. After finishing this second questionnaire, seal both in the envelope provided, and return it to the investigator.

Your participation is of course completely voluntary. You have the right not to answer any item on the questionnaires that you do not wish to answer. However, your participation will be most helpful if you do answer all of the items. In addition, if you decide not to participate, or withdraw from the study at any point in time, the medical care of your children will not be affected by your decision. Completion of the questionnaire packet will indicate your informed consent to take part in this study, so signing your name is not necessary. This will also ensure that your answers are completely anonymous.

If you would like to know the results of the study, you can write to:

Cheryl L. Olmsted
Michigan State University
Department of Psychology
Psychology Research Building
East Lansing, MI 48824-1117

I will be happy to sent you a summary of the findings as soon as these are available. Thank you for your participation. Please feel free to take this letter with you for your future reference.

Appendix C

Appendix C

Personal and Family Background Questionnaire

Your relationship to the child who has an appointment with the doctor today:

mother father stepmother stepfather

other (specify)_____

Are you: never married married divorced and currently single divorced and remarried

If you are married, how many years have you been married?
Number of years_____

How many children do you have (including stepchildren, etc.):_____

How many children are now living in your home? _____

What is the age of the child seen by the doctor today? _____

What is your age? _____ What is your spouse's age? _____

What is your race? Black _____ White _____ Hispanic _____

Asian _____ American Indian _____

Other (specify):_____

What is your spouse's race? Black _____ White _____

Hispanic _____ Asian _____

American Indian _____

Other (specify):_____

What is your religion?

Protestant _____ Please specify denomination_____

Roman Catholic _____ Greek Orthodox _____ Jewish _____

Moslem _____ None _____ Other (specify):_____

What is your spouse's religion?

Protestant _____ Please specify denomination_____

Roman Catholic _____ Greek Orthodox _____ Jewish _____

Moslem _____ None _____ Other (specify):_____

Appendix C

Personal and Family Background Questionnaire

Are you currently employed? no _____ yes _____

How many hours do you spend each week working at your workplace?

1 to 10 hours_____ 11 to 20 hours_____ 21 to 34 hours_____

35 to 40 hours_____ 41 to 50 hours_____ 51 to 60 hours_____

61 to 70 hours_____ more than 70 hours_____

What is your occupation? Describe your specific job responsibilities:

Is your spouse currently employed? no _____ yes _____

How many hours does s/he spend each week working at his/her workplace?

1 to 10 hours_____ 11 to 20 hours_____ 21 to 34 hours_____

35 to 40 hours_____ 41 to 50 hours_____ 51 to 60 hours_____

61 to 70 hours_____ more than 70 hours_____

What is your spouse's occupation? Describe his/her specific job reponsibilities:

What is your total family income?

less than $10,000 _____ $10,000 to 14,999 _____

$15,000 to 19,999 _____ $20,000 to 24,999 _____

$25,000 to 29,999 _____ $30,000 to 34,999 _____

$35,000 to 39,999 _____ $40,000 to 44,999 _____

$45,000 to 49,999 _____ $50,000 to 74,999 _____

$75,000 to 100,000 _____ above 100,000 _____

Appendix D

Appendix D

ADHERENCE INTENT

1. It may be too difficult for me to do exactly what the doctor told me. (-)
2. I expect that it will be easy for me to follow the doctor's advice. (+)
3. It will be too much trouble to follow the doctor's advice. (-)
4. I intend to follow the doctor's instructions. (+)

PHYSICIAN COMMUNICATION WITH THE PARENT

1. The doctor listened carefully to what I said. (+)
2. I really felt understood by my child's doctor. (+)
3. The doctor gave me an explanation of my child's illness that I could understand. (+)
4. The doctor did not really give me a chance to say what was on my mind. (-)
5. The doctor seemed to have other things on his mind. (-)
6. The doctor failed to understand my main reason for coming. (-)

Appendix E

Appendix E

PERSONAL DESCRIPTION QUESTIONNAIRE

INSTRUCTIONS: On the following pages is a series of statements which a person might use to describe him- or herself. Read each one and decide whether or not it describes you. If you decide that it does describe you, circle the word "True." If it does not describe you, circle the word "False." Answer every statement either true or false, even if you are not completely sure of your answer.

EXAMPLE ITEM:

I often wish I were more skilled. TRUE (FALSE)

Please answer the following items in the same way.

---

1. I am quite able to make correct decisions on difficult questions.
   TRUE FALSE

2. There is really no way I can solve some of the problems I have.
   TRUE FALSE

3. I am never able to do things as well as I should.
   TRUE FALSE

4. My life is full of interesting activities.
   TRUE FALSE

5. I believe people tell lies any time it is to their advantage.
   TRUE FALSE

6. I have little control over the things that happen to me.
   TRUE FALSE

7. If someone gave me too much change I would tell him.
   TRUE FALSE

8. I can do just about anything I set my mind to do.
   TRUE FALSE

9. I would be willing to do something a little unfair to get something that was important to me.
   TRUE FALSE

10. I get along with people at parties well.
    TRUE FALSE

11. I often feel helpless in dealing with the problems of life.
    TRUE FALSE

12. I did many very bad things as a child.
    TRUE FALSE

Appendix E

Personal Description Questionnaire

13. I am glad I grew up the way I did.
TRUE FALSE

14. I often question whether life is worthwhile.
TRUE FALSE

15. There is little I can do to change many of the important things in my life.
TRUE FALSE

16. What happens to me in the future mostly depends on me.
TRUE FALSE

17. I am always prepared to do what is expected of me.
TRUE FALSE

18. My daily life includes many activities I dislike.
TRUE FALSE

19. I am one of the lucky people who could talk with my parents about my problems.
TRUE FALSE

20. Many things make me feel uneasy.
TRUE FALSE

21. I am careful to plan for my distant goals.
TRUE FALSE

22. I find it very difficult to concentrate.
TRUE FALSE

23. Sometimes I feel that I'm being pushed around in life.
TRUE FALSE

Appendix F

Appendix F

PURPOSE OF MEDICAL VISIT

Date of visit: _____

1. Purpose of medical visit:

   a) Parent: _____

   b) Dr. (diagnosis): _____

2. Medication prescribed:

   a) Medication: _____

      Times per day: _____

      Dosage Frequency: _____

      Amount per dose: _____

      Total Amount
      Dispensed: _____

   b) Medication: _____

      Times per day: _____

      Dosage Frequency: _____

      Amount per dose: _____

      Total Amount
      Dispensed: _____

   c) Medication: _____

      Times per day: _____

      Dosage Frequency: _____

      Amount per dose: _____

      Total Amount
      Dispensed: _____

   d) Medication: _____

      Times per day: _____

      Dosage Frequency: _____

      Amount per dose: _____

      Total Amount
      Dispensed: _____

Appendix F

Purpose of Medical Visit—page 2

3. Other Doctor recommendations:

a) Recommendation: _____

_____

Reason: _____

b) Recommendation: _____

_____

Reason: _____

c) Recommendation: _____

_____

Reason: _____

d) Recommendation: _____

_____

Reason: _____

4. Otitis Media

	Date(s) of previous visits	Medication(s) prescribed	Follow-up visit
1	_____	_____	_____
2	_____	_____	_____
3	_____	_____	_____
4	_____	_____	_____
5	_____	_____	_____
6	_____	_____	_____
7	_____	_____	_____
8	_____	_____	_____
9	_____	_____	_____
10	_____	_____	_____

Appendix F

Purpose of Medical Visit--page 3

5. Streptococcal Pharyngitis

	Date(s) of previous visits	Medication(s) prescribed	Follow-up visit
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

Appendix G

Appendix G

Date: _____ Code No. _____

Form A

Illness (circle): Otitis Media Strept

(Proceed with the interview after the mother has read and signed the informed consent.)

First I would like to ask you some questions about _____'s visit with the doctor last week.

1. Did your doctor give you a pamphlet about _____ _____ ?

YES NO

2. Did you read the pamphlet? YES NO

(ask a-e if answer to 2 is yes. If answer to 2 is no, ask d only.)

a. Did you find it useful? YES NO

(if yes) In what ways did you find it useful to you?
(if no) Why didn't you find it useful?

b. When did you read it? (In clinic, when you got home, etc.)

c. How could the pamphlet be improved?

d. Did anyone else in your family (spouse, etc.) read it?

e. Did you talk about the pamphlet with someone?

YES NO

(if yes) Who did you talk about it with?

What did you talk about?

Appendix G

3. What was the name of the medication (antibiotic) that the doctor prescribed for your child's illness?

   a. What did the doctor say the medication (antibiotic) was for?

   b. How many times a day did the doctor say you should give your child this medication for his/her _____ ?

   c. What times of the day or evening were you told to give the medication (antibiotic)?

   d. How many days was _____ supposed to take the medication?

   e. Sometimes parents find it difficult to stick to the medication regimen. How many times has your child missed a dose of this medication? (If subject can't remember, tell her to give you her best estimate)

4. Did the doctor prescribe any other medication besides an antibiotic?

   YES NO

   (If yes, ask questions a-c)

   a. What is the name of this medication?

   b. What did the doctor say this medication was for?

   c. How many times a day did the doctor say you should give your child this medication?

   (If subject indicates that the schedule is "as needed", skip to question #5).

   d. What times of the day or evening were you told to give the medication?

   e. How many days was _____ supposed to take the medication?

Appendix G

f. How many times has your child missed a dose of this medication? (If subject can't remember, tell her to give you her best estimate)

5. Did you give _____ any medication or treatment that wasn't prescribed, but that you thought might help him/her? (If yes, ask what medication was given for, and schedule of administration.)

6. What day and time of day did your child see the doctor?

a. What day and time of day did s/he receive her/his first dose of the antibiotic (medication)?

b. So s/he should have had _____ doses by now.
Is that how many s/he has had?
YES NO

c. Who was responsible for giving the medication to your child during this episode?
Why was that?

d. (If answer is only one person) Was/were _____/you always responsible or did someone else occasionally give your child the medication?

(How often did this other person help out?)

e. Do you remember accidentally missing a dose or even intentionally changing the medication schedule? (If yes: Why was that?)

f. Did you have to be reminded about sticking to the medication regimen? (Ask who reminded, how many times, and why needed to be reminded)

g. (If anyone else gave the medication, ask:) Did you have to remind anyone else about sticking to the medication regimen?

Appendix G

Here is a chart for you to look at. I'd like you to use it to help you recall who gave your child the medication every day since you began. Also, please indicate whether or not you encountered any problems giving your child the medication (e.g. spilling it, your child refused to take it, etc.)

(Fill out the chart with the mother)

(ask question #6 a-g if the parent indicates that the doctor prescribed some other medication in addition to the antibiotic for the illness)

7. Now, let's talk about the other medication that the doctor prescribed for your child:

   a. Who was responsible for giving the _____ to your child during this episode? Why was that?

   b. (If answer is only one person) Was/were _____/you always responsible or did someone else occasionally give your child this medication?

      (How often did this other person help out?)

   c. (If anyone else gave the medication, ask:) Did you have to remind anyone else about sticking to the medication regimen?

      (ask d-g if the medication was to be given on a prescribed schedule)

   d. What day and time of day did s/he receive her/his first dose of this medication?

   e. Do you remember accidentally missing a dose or even intentionally changing the medication schedule? (If yes: Why was that?)

   f. Did you have to be reminded about sticking to the medication regimen? (Ask who reminded, how many times, and why needed to be reminded)

Appendix G

g. (If anyone else gave the medication, ask:) Did you have to remind anyone else about sticking to the medication regimen?

(If the medication was to be given on a prescribed schedule, fill out a second medication chart with the subject)

Okay, now let's talk a bit about how the _____ affected your child.

(Only ask #8 if child had an ear infection)

8. Did this middle ear infection affect both ears or only one?

a. Was any hearing loss diagnosed?

b. Did the doctor suggest that _____ be put on antibiotics for an extended period of time (that is, more than the usual ten days?)

c. Did the doctor suggest that your child be put on another medication (such as a decongestant) for an extended period of time?

d. Did the doctor suggest that tubes be put in your child's ears?

e. Was your child hospitalized for this illness? (If yes: Why?)

f. As far as you know, what part of your child's ear was infected?

(Ask #9 only if child had strept pharyngitis)

9. Did the doctor suggest that _____ be put on antibiotics for an extended period of time (that is, more than the usual 10 days?)

Appendix G

a. Was your child hospitalized for this illness?
(If yes: Why?)

(Ask all subjects #10)

10. How is your child feeling now?

11. As far as you know, what are the common consequences of not treating _____ ?

12. As far as you know, what are the possible side effects of the medication your child was given for his/her illness?

a. Has your child had any side effects, for example, diarrhea or a rash?

13. Do you plan to take your child to see the doctor for a follow-up visit? (If not: Why not?)

14. During this illness, did you ever discuss with someone (i.e. your husband, a relative, or a friend) whether or not to skip a dose or change your child's antibiotic schedule?

YES NO

(If yes ask a-d)

a. Who brought up the idea of changing the schedule?

b. What was your (or that person's) reason for suggesting the change?

(If the suggestion was brought up by someone else, ask c)

c. What were your feelings about his/her suggestion?

d. What did you decide to do?

Appendix G

e. How did your decision affect what you actually did?

(Ask #13 if the doctor prescribed another medication in addition to the antibiotic)

13. During this illness, did you ever discuss with someone (i.e. your husband, a relative, or a friend) whether or not to skip a dose or change the medication schedule for the other medication the doctor prescribed?

YES NO

(If yes ask a-d)

a. Who brought up the idea of changing the schedule?

b. What was your (or that person's) reason for suggesting the change?

(If the suggestion was brought up by someone else, ask c)

c. What were your feelings about his/her suggestion?

d. What did you decide to do?

e. How did your decision affect what you actually did?

Appendix G

Date: _____ Code No. _____

Form B

Illness (circle): Otitis Media Strept

(Proceed with the interview after the mother has read and signed the informed consent.)

First I would like to ask you some questions about _____'s visit with the doctor last week.

1. **Did your doctor give you a pamphlet about _____ _____ ?**

YES NO

2. **Did you read the pamphlet?** **YES NO**

(ask a-e if answer to 2 is yes. If answer to 2 is no, ask d only.)

a. Did you find it useful? YES NO

(if yes) In what ways did you find it useful to you?
(if no) Why didn't you find it useful?

b. When did you read it? (In clinic, when you got home, etc.)

c. How could the pamphlet be improved?

d. Did anyone else in your family (spouse, etc.) read it?

e. **Did you talk about the pamphlet with someone?**

YES NO

(if yes) Who did you talk about it with?

Appendix G

What did you talk about?

3. What day and time of day did your child see the doctor?

   a. What day and time of day did s/he receive her/his first dose of the antibiotic (medication)?

   b. Who was responsible for giving the medication to your child during this episode?
   Why was that?

   c. (If answer is only one person) Was/were _____ always responsible or did someone else occasionally give your child the medication?

   (How often did this other person help out?)

   d. Sometimes parents find it difficult to stick to the medication regimen. Do you remember accidentally missing a dose or even intentionally changing the medication schedule? (If yes: Why was that?)

   e. So, how many times has your child missed a dose of this medication? (If subject can't remember, tell her to give you her best estimate)

   f. Did you have to be reminded about sticking to the medication regimen? (Ask who reminded, how many times, and why needed to be reminded)

   g. (If anyone else gave the medication, ask:) Did you have to remind anyone else about sticking to the medication regimen?

4. What was the name of the medication (antibiotic) that the doctor prescribed for your child's ear infection?

Appendix G

a. What did the doctor say the medication (antibiotic) was for?

b. How many times a day did the doctor say you should give your child this medication for his/her illness?

c. What times of the day or evening were you told to give the medication (antibiotic)?

d. How many days was _____ supposed to take the medication?

e. So s/he should have had _____ doses by now. Is that how many s/he has had?

YES NO

Here is a chart for you to look at. I'd like you to use it to help you recall who gave your child the medication every day since you began. Also, please indicate whether or not you encountered any problems giving your child the medication (e.g. spilling it, your child refused to take it, etc.)

(Help mother fill out chart)

5. Did the doctor prescribe any other medication besides an antibiotic?

YES NO

(If yes, ask questions a-c)

a. What is the name of this medication?

b. What did the doctor say this medication was for?

c. How many times a day did the doctor say you should give your child this medication?

(If subject indicates that the schedule is "as needed", skip to question #6)

d. What times of the day or evening were you told to give the medication?

Appendix G

e. How many days was _____ supposed to take the medication?

6. Did you give _____ any medication or treatment that wasn't prescribed, but that you thought might help him/her? (If yes, ask what medication was given for, and schedule of administration.)

(Ask questions #7a-g if subject indicates that child was prescribed another medication in addition to the antibiotic. Do not ask this series of questions if schedule of administration is PRN or "as needed".

7. Now, let's talk about the other medication that the doctor prescribed for your child:

a. Who was responsible for giving this medication to your child during this episode?
Why was that?

b. Was/were _____ always responsible or did someone else occasionally give your child this medication?

(How often did this other person help out?)

c. (If mom was only or primary medication-giver, ask:) Did you have to be reminded by anyone to stick to the medication schedule?

d. (If anyone else gave the medication, ask:) Did you have to remind anyone else about sticking to the medication regimen?

(ask e-g if the medication was to be given on a prescribed schedule)

e. What day and time of day did s/he receive her/his first dose of this medication?

f. Do you remember accidentally missing a dose or even intentionally changing the medication schedule? (If yes: Why was that?)

Appendix G

g. How many times has your child missed a dose of this medication? (If subject can't remember, tell her to give you her best estimate)

(If the medication was to be given on a prescribed schedule, fill out a second medication chart with the subject)

Okay, now let's talk a bit about how the _____ affected your child.

(Only ask #8 if the child had an ear infection)

8. Did this middle ear infection affect both ears or only one?

a. Was any hearing loss diagnosed?

b. Did the doctor suggest that _____ be put on antibiotics for an extended period of time (that is, more than the usual ten days?)

c. Did the doctor suggest that your child be put on another medication (such as a decongestant) for an extended period of time?

d. Did the doctor suggest that tubes be put in your child's ears?

e. Was your child hospitalized for this illness? (If yes: Why?)

f. As far as you know, what part of your child's ear was infected?

(Ask all subjects #9)

9. How is your child feeling now?

(Ask #10 only if child had strept pharyngitis)

10. Did the doctor suggest that _____ be put on antibiotics for an extended period of time (that is, for more than the usual 10 days?)

Appendix G

a. Was your child hospitalized for this illness? (If yes: Why?)

(Ask all subjects #11)

11. As far as you know, what are the common consequences of not treating _____ like this one?

12. As far as you know, what are the possible side effects of the medication your child was given for his/her illness?

a. Has your child had any side effects, for example, diarrhea or a rash?

13. Do you plan to take your child to see the doctor for a follow-up visit? (If not: Why not?)

14. During this illness, did you ever discuss with someone (i.e. your husband, a relative, or a friend) whether or not to skip a dose or change your child's antibiotic schedule?

YES NO

(If yes ask a-d)

a. Who brought up the idea of changing the schedule?

b. What was your (or that person's) reason for suggesting the change?

(If the suggestion was brought up by someone else, ask c)

c. What were your feelings about his/her suggestion?

d. What did you decide to do?

e. How did your decision affect what you actually did?

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(Ask #15 if the doctor prescribed another medication in addition to the antibiotic)

15. During this illness, did you ever discuss with someone (i.e. your husband, a relative, or a friend) whether or not to skip a dose or change the medication schedule for the other medication the doctor prescribed?

YES NO

(If yes ask a-d)

a. Who brought up the idea of changing the schedule?

b. What was your (or that person's) reason for suggesting the change?

(If the suggestion was brought up by someone else, ask c)

c. What were your feelings about his/her suggestion?

d. What did you decide to do?

e. How did your decision affect what you actually did?

Appendix G

Who gave the medication, What times administered,
Were there any problems?
(e.g., such as spillage, child fighting you, etc.)

Name of Medication: _____

Times per day: _____

DAY 1 (day/date_____)

The first dose: _____

The second dose: _____

The third dose: _____

The fourth dose: _____

DAY 2 (day/date_____)

The first dose: _____

The second dose: _____

The third dose: _____

The fourth dose: _____

DAY 3 (day/date_____)

The first dose: _____

The second dose: _____

The third dose: _____

The fourth dose: _____

DAY 4 (day/date_____)

The first dose: _____

The second dose: _____

The third dose: _____

The fourth dose: _____

DAY 5 (day/date_____)

The first dose: _____

The second dose: _____

Appendix G

DAY 5 (continued)

The third dose: _____

The fourth dose: _____

DAY 6 (day/date_____)

The first dose: _____

The second dose: _____

The third dose: _____

The fourth dose: _____

DAY 7 (day/date_____)

The first dose: _____

The second dose: _____

The third dose: _____

The fourth dose: _____

DAY 8 (day/date_____)

The first dose: _____

The second dose: _____

The third dose: _____

The fourth dose: _____

Appendix G

Home Visit Form

Research Asst: _____

Patient code number _____

Illness (please circle): Otitis Media Strept Pharyngitis

Date of Visit _____ Time of Visit _____

Date of Prescription _____

Month/Day/Time of first dose _____

a) NUM: Number of doses prescribed per day _____

b) Number of expected doses on Day 1 _____

c) DOSE: Amount prescribed per dose _____ ml

d) DISP: Child should have had _____ ml by visit (Number of doses given by home visit X DOSE)

e) Amount that should be in medication bottle _____ ml (Amount dispensed by pharmacy - d)

f) REM: There was actually _____ ml in the bottle

g) DAY: Visit was on 7th _____ 8th _____

h) MISS: Number of doses missed _____

1) Excess medication _____ ml (e - f)

2) Number of missed doses (h1/c)

Formula: $\left(\frac{(DISP - REM)/\ DOSE}{(DAY \times NUM) - (MISS + LATE)}\right)$

h) Compliance Score: _____

Computing Compliance Score:

Appendix G

Mother's Perceptions of Their Children's Health: Part II

Informed Consent

I understand that the purpose of this study is to learn more about how mothers cope when their preschool child has a middle ear infection (otitis media) or strept throat (streptococcal pharyngitis). I have been informed that if I agree to participate in this second phase of the study, I will be interviewed once in my home about how my child's illness has affected him/her, as well as how I and my family have coped with the tasks associated with having a sick child.

I have also been informed that I will complete three questionnaires. The first, the Personal and Family Background Questionnaire, provides information about my occupation, ethnic background, religion, and the size of my family. The second, the Personal Description Questionnaire, will ask me to decide whether or not twenty-three statements describes myself as a person. The third, the Health Survey, asks about my child's health history. I understand that this history is currently being given to parents of all new patients coming to the clinic and will be included in my child's medical chart at a later time. I have been informed of the procedures safeguarding the confidentiality of my responses to this health history questionnaire, and I am satisfied with those procedures.

I have been told that the researchers will maintain the confidentiality of the interview conducted at my home. I understand that all material will be labelled with a code number, and all identifying information (names, addresses, etc.) will be removed from the interview and all questionnaires. I also understand that only members of the research team in the Psychology Department will have access to the research material and that none of the physicians or other staff at the Pediatrics Clinic COM of the MSU Clinical Center will have access to my responses, except for my child's Health Survey. I understand that this interview and completing the three questionnaires will take about an hour.

While I have been informed that my participation will be most helpful if I do complete all aspects of the interview, I also know that I have the right to decline to respond to specific questions or to decline to complete specific tasks. I have been informed that my decision not to participate, or to withdraw, will in no way jeopardize current or future treatment at the MSU Clinical Center for myself or my child.

Appendix G

I understand that my participation in this study will help physicians and behavioral scientists to assist other families in dealing with their children's health problems. The researchers have explained to me that they will not be able to provide me with feedback about myself or my family, but that I will receive a summary of the results of the study as they become available.

_____

Subject name Date

If you should have any questions or concerns about the study you can contact:

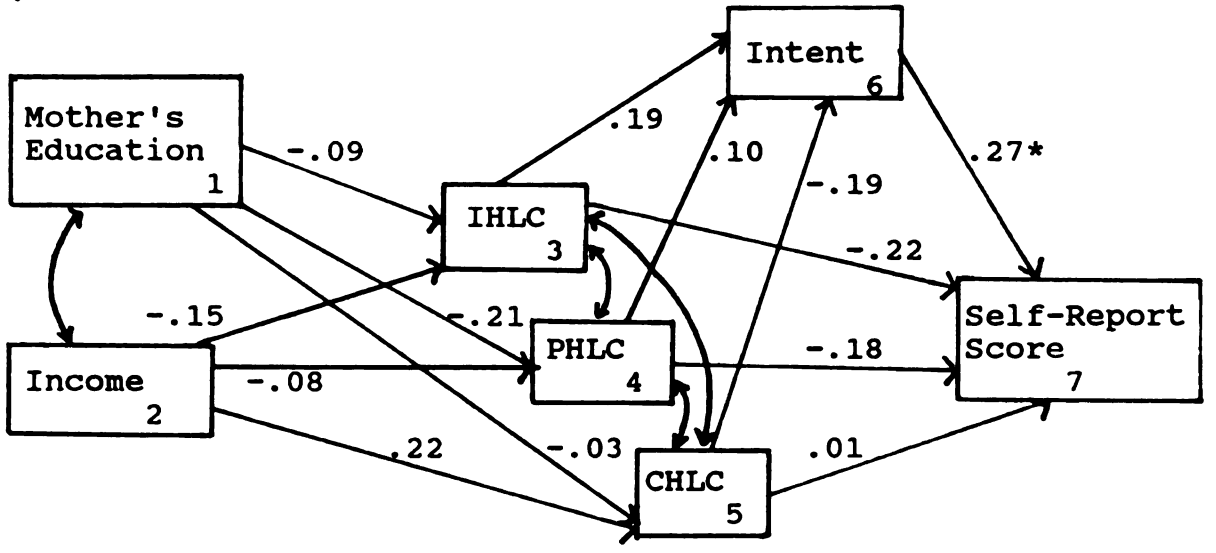
Cheryl L. Olmsted
Graduate Student
Department of Psychology
Psychology Research Building
East Lansing, MI 48824

Home phone: 337-0298
Work phone: 355-9561
(call and leave message)

Appendix H

Appendix H

Appendix H: Complete Path Model, Self-Report Data



r2 3.12 = .04 r2 6.345 = .14* r2 7.1-6 = .17t

r2 4.12 = .06 r2 7.3-6 = .13t

r2 5.12 = .04 r2 6.1-5 = .25**

Key: IHLC = Internal Health Locus of Control

PHLC = Powerful Others Health Locus of Control

CHLC = Chance Health Locus of Control

t= p < .10

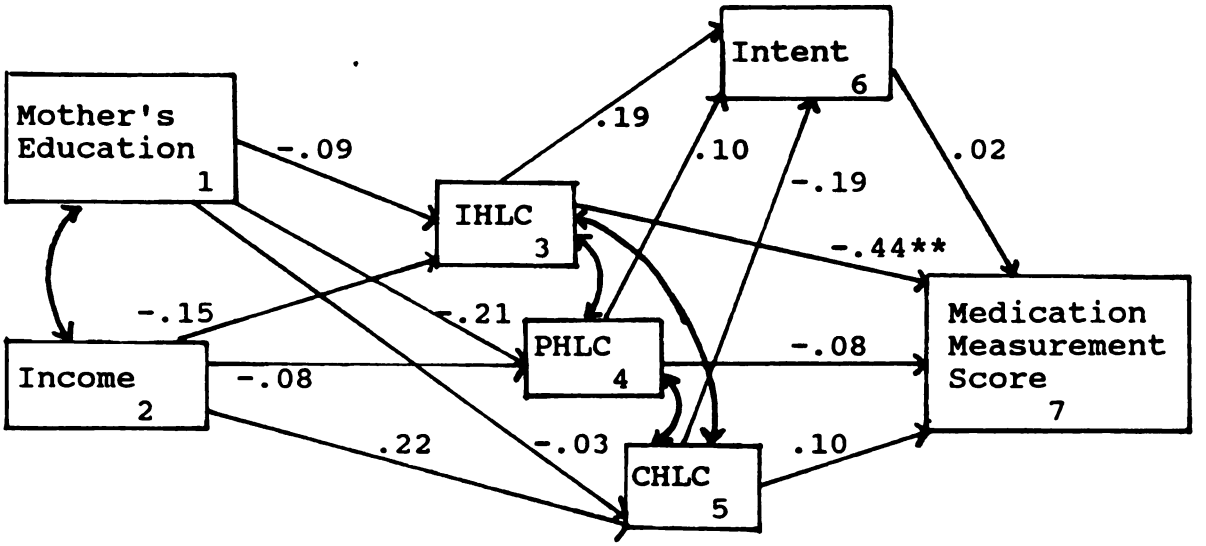
*= p < .05

**= p < .01

Appendix I

Appendix I

Appendix I: Complete Path Model, Observed Data



r2 3.12 = .04 r2 6.345 = .14* r2 7.1-6 = .31*

r2 4.12 = .06 r2 7.3-6 = .28**

r2 5.12 = .04 r2 6.1-5 = .25**

Key: IHLC = Internal Health Locus of Control

PHLC = Powerful Others Health Locus of Control

CHLC = Chance Health Locus of Control

t= p < .10

*= p < .05

**= p < .01