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Applying the Information-Motivation-Behavioral Skills Model in Medication Adherence Among Thai Youth Living with HIV: A Qualitative Study

Chokechai Rongkavilit, M.D.,[1] Sylvie Naar-King, Ph.D.,[2] Linda M. Kaljee, Ph.D.,[2] Apirudee Panthong, M.A.,[3] Juline A. Koken, Ph.D.,[4] Torsak Bunupuradah, M.D.,[3] and Jeffrey T. Parsons, Ph.D.[5]

Abstract

With disproportionately higher rates of HIV/AIDS among youth and increasing access to antiretroviral therapy (ART) in Thailand, there is a growing urgency in understanding the challenges to medication adherence confronting this population and in developing theory-based interventions to address these challenges. One potentially relevant model, the information-motivation-behavioral skills (IMB) model of adherence, was developed in Western settings characterized by a more individualistic culture in contrast to the more collectivistic culture of Thailand. We explored the application and adaptability of IMB on ART adherence among HIV-positive Thai youth through the analysis of qualitative data from a pilot motivational interviewing study. Twenty-two interview sessions from 10 HIV-positive Thai youth (17–24 years) were analyzed; 6 youth were on ART. Data support the utility of IMB as a potential framework for understanding ART adherence in this population. However, data indicate a consideration to expand the motivation construct of IMB to incorporate youths' perceived familial and social responsibilities and the need to adhere to medications for short- and long-term well-being of self, family, and society in a context of Buddhist values. These modifications to IMB could be relevant in other cultural settings with more collectivistic worldviews.

Introduction

Access to antiretroviral therapy (ART) has been increasing worldwide. With the rising prevalence of HIV infection in youth globally, information regarding ART adherence among youth living with HIV/AIDS (YLWHA) and strategies to address nonadherence are urgently needed in middle- and low-income countries.[1] To date, there are very little data on adherence in YLWHA in such settings. Three published studies have suggested that suboptimal adherence is common among YLWHA in resource-limited settings,[2–4] and further research is needed to increase our understanding of ART adherence in this rapidly growing population.

Successful research and interventions incorporate a theory-based approach for understanding HIV-related behaviors.[5,6] However, a majority of existing behavioral theories and associated scales and measurements have been developed and tested mainly with Western populations.[7] The Western culture is prototypically individualistic with an emphasis on the unique aspects of self, personal attributes and personal goals. This is in sharp contrast to Asian cultures such as Thailand, which is considered collectivistic with an emphasis on harmonious interdependence, awareness of one's standing as a group member, and in-group goals.[8] Because of the significant cultural difference, the analysis of qualitative data can provide a conduit for exploration and cultural adaptation of Western-based behavioral theories and is an essential first step toward utilization of these theories in non-Western contexts.[9,10] The present study was designed to begin this exploration of the potential cross-culture adaptation of an

[1]Division of Infectious Diseases, the Carman and Ann Adams Department of Pediatrics, Wayne State University School of Medicine, Detroit, Michigan.
[2]Pediatric Prevention Research Center, the Carman and Ann Adams Department of Pediatrics, Wayne State University School of Medicine, Detroit, Michigan.
[3]HIV Netherlands-Australia-Thailand Research Collaboration (HIV-NAT), Thai Red Cross AID Research Centre, Bangkok, Thailand.
[4]National Development and Research Institutes (NDRI) and Public Health Solutions, New York, New York.
[5]Center for HIV Educational Studies and Training (CHEST), Hunter College and the Graduate Center of the City University of New York, New York, New York.

established model of health behaviors, the information-motivation-behavioral skills (IMB) model in a Thai setting.

The IMB model includes three primary constructs that influence behavior changes: Information and knowledge about the behavior; the individual's motivation to perform the behavior; and the behavioral skills necessary to perform the behavior.[11] Fisher et al.[12] have outlined specific details for IMB constructs as applied to medication adherence: (1) "information" includes relevant knowledge on antiretroviral medications such as appropriate administration, side effects, and drug interactions. Information might be correct or incorrect and can both facilitate and impede adherence. Information can also include broader adherence-related heuristics or theories, e.g., regarding ART and physiologic reactions and outcomes; (2) "motivation" includes both personal and social motivations. Personal motivation includes positive or negative attitudes toward taking antiretroviral medications, perceived benefits or side effects of taking medications, and/or perceived negative effects of nonadherence. Social motivation includes the individual's perceptions of social support from significant others for adherence and his/her desire to comply with others; and (3) "behavioral skills" are both the individual's objective ability to perform necessary adherence-related tasks and his/her perceived self-efficacy for these tasks. Adherence-related tasks include cues to dosing, strategies to minimize side effects, and self-reinforcement for adherence over time and across different situations. A number of potential moderating factors have also been identified which affect adherence including psychological health, living situations, access to medical care and services, and substance use.

The IMB has been used to understand HIV-related risk behaviors and inform the development of preventive interventions in youth in resource-rich and resource-limited settings.[13–16] An IMB model of ART adherence was developed and evaluated among persons living with HIV/AIDS in resource-rich settings.[12,17–20] To date, there is only one study that addressed the IMB model for ART adherence in a resource-limited setting; the application of the model was found to be feasible and predictive of ART adherence behaviors in rural South Africa.[21]

Ware et al.[22] outline a heuristic schema for examining the applicability of conceptual models for ART adherence such as the IMB model in different sociocultural settings. The schema consists of four questions to be asked regarding the model being considered for use in a sociocultural context other than the one in which it was developed: (1) Are the model's basic concepts relevant in the new setting?; (2) Are the basic concepts important to the new setting represented in the model?; (3) Are the meanings of the model's basic concepts accurate for the new setting?; and (4) Does the model capture the complexity of adherence in the new setting? Through both deductive and inductive analyses of qualitative interview data, we used these guiding questions to both assess the cross-culture applicability of the IMB model and to determine potential modifications of IMB constructs and/or the model for ART adherence in the setting of YLWHA in Thailand.

Methods

The reported data were collected as part of the qualitative phase of a pilot study testing the feasibility of motivational interviewing (MI) for improving medication adherence and reducing sexual risks and alcohol/drug use in Thai YLWHA. The IMB model and MI were used as the theoretical foundation for the development and implementation of the study. MI is considered an ideal mechanism to implement an IMB model-based intervention because MI is a person-centered, goal-oriented counseling method for promoting health behavior change and as a means to provide information, motivation, and behavioral skills needed to make such change.[23] MI focuses on eliciting the person's point of view in a nonjudgmental spirit utilizing open-ended questions and reflective responses to promote elaboration of themes relevant to the target behavior. MI, initially developed in the Western sociocultural settings, has been successfully used for various health behaviors in African, Central American, and Asian populations.[24–28] For those reasons MI was utilized in the current study.

Population

The participants were a convenience sample of clients attending two Bangkok clinics at the Thai Red Cross AIDS Research Centre and at the adjacent King Chulalongkorn Hospital. Eligible clients were informed by their HIV care providers about the study and those who were interested in participation were referred to the study team. Eligibility criteria were kept at minimum to enroll a more representative sample, and included HIV-positive status, age 16–24 years, and being able to understand written/spoken Thai. Because of the use of convenience sampling, participants were not selected based on either their use of ART or their levels of adherence.

Twelve potential participants were referred to the study team, 11 agreed to participate, and 10 completed the full series of the MI sessions. Six were currently on ART, and they contributed 15 MI session transcripts for the qualitative analysis to assess the applicability of the IMB model on ART adherence. We also included seven MI session transcripts from the remaining 4 participants who were not on ART to provide additional general information on social and cultural contexts of Thai YLWHA.

The study was approved by the Human Investigation Committee of Wayne State University, the Institutional Review Board of the City University of New York, and the Institutional Review Board of the Faculty of Medicine at Chulalongkorn University in Thailand. Informed consent was obtained from all participants, and a waiver of parental consent was permitted for all participants under 18 years.

Study design

Each participant attended four MI sessions over the course of 12 weeks. All sessions were conducted between December 2007 and March 2008. A single counselor conducted the sessions with participants one-on-one in a private room. For the participants currently on ART, the sessions focused on medication adherence and sexual risk. For those not on ART, their sessions focused on sexual risk and alcohol/drug use. The participants had the opportunity to choose at which session he/she wanted to talk about each behavior, though issues from previous interview sessions were reviewed throughout the sessions. All sessions were conducted using MI communication techniques that emphasize open-ended discussions

and exploration of ambivalence, barriers, facilitators, and client's viewpoints relevant to the behaviors. While participants on ART were encouraged by the counselor to discuss adherence, it was a topic about which the YLWHA talked less frequently than sexual risk and substance use.

The counselor utilized both general and respondent-specific questions to elicit discussion of each of the three IMB constructs. A general "information" question is, "As you said, when you first took medications it affected your body. Are there other ways medications affect your body?" Motivation questions include, "It seems like something (helps) you to take medication at the same time?" and "How do you feel about (your boyfriend) 'warning' you to take your medications?" Behavioral skills questions include, "What are the obstacles you have in terms of waking up in time to take the medication,?" and "How do you deal with swallowing the bigger pill?" In order to enhance intrinsic motivation for change in the participant, the counselor would also ask broader questions consistent with MI practice, such as "What are your goals for taking your medication?"

Barriers and facilitators for adherence were explored with participants throughout the sessions. Family and social issues as well as the lived experience of Thai YLWHA were discussed. This was followed by the provision of individual feedback based on information about recent adherence behaviors reported by the participant at the study entry, and then development of behavior change plans. Each session took approximately 60 min. The sessions were videotaped in such a way that only the counselor's face and voice and the participant's voice were recorded. Only the participant's nickname or first name was used during the interview.

Data management and analysis

For the purpose of exploring the sociocultural relevance of the IMB model for medication adherence, the MI sessions were analyzed as qualitative data reported in the study. First, the session audiotapes were transcribed into Thai and translated into English. The translation was independently reviewed by a bilingual research team member for accuracy. The English translation was used in the data analysis presented in this study. The data were entered into a qualitative data management program Atlas ti (Scientific Software Development 2002–2009). A coding dictionary was developed that focused on IMB constructs (e.g., information, motivation, behavioral skills), topical areas (e.g., adherence), and emerging issues (e.g., self efficacy, social support). The English transcripts were reviewed and coded by a single researcher. For purposes of the current analysis, searches were conducted on those codes most closely associated with adherence and/or the IMB constructs. The use of these constructs for coding provided the ability to deductively assess the use of the IMB model for adherence among this population. Emergent codes provided the ability to inductively determine broader contextual issues and potential adaptations to the existing constructs and/or the need to develop new constructs.

The searched texts were organized both by patterns and relationships within the text and within the IMB model. The texts were then used to address the four questions in Ware et al.'s heuristic approach to theory adaptation.[22]

Results

Participant characteristics

Participants included five women and five men. Ages ranged from 17 to 24 years with a median age of 21.5 years. Among the five men, four identified themselves as homosexual and one as bisexual. One woman identified herself as bisexual and the remaining four as heterosexual. Two of the women each had one child. Four participants reported contracting HIV through sexual contact; the remaining six reported an unknown route of HIV acquisition, although they were likely infected through sexual contact based on their narratives in MI session transcripts. At study entry, five participants reported alcohol use in the past 30 days, however, none reported illicit drug use in that time period. Two men and two women stated they had disclosed their HIV status to their partners.

At study entry, six participants (four women and two men) were receiving ART. The regimens included efavirenz plus two nucleoside reverse transcriptase inhibitors (NRTI; 2 cases), boosted atazanavir plus two NRTI (1), saquinavir plus two NRTI (1), four NRTI (1), and a fixed dose combination of nevirapine plus two NRTI (1). The median age was 21 years. One woman did not report her estimated level of adherence and one woman self-reported her level of adherence at 50% during the past 30 days. The other four participants self-reported 99%–100% adherence during the past 30 days. Self-reported data by the visual analogue scale were the measure used in regards to the participant's level of adherence.

Applying the IMB model on ART adherence in Thai YLWHA

The schema outlined by Ware et al.[22] for examining the applicability of the IMB model for ART adherence are addressed as follows.

- **Are the IMB model's basic concepts relevant to adherence among Thai YLWHA?**

The IMB model's basic concepts were reflected in the narratives from participants currently on ART, as described below.

Information The information construct in the IMB model for adherence was represented in the form of participants' understanding of adherence requirements and their knowledge of the regimen and its side effects. A 24-year-old woman on ART (participant #2) was very mindful of information about her daily regimen and discussed details about how she ensured that she took her medications as needed. For this young woman, medication adherence was just one part of a broader knowledge base about maintaining a healthy lifestyle.

> I take it (medications) every day, never miss any dose but some days I take the medicine 5 or 10 minutes late . . . but it has never exceeded half an hour late . . . most of the time I take the medicine at 11 p.m . . . I didn't take medicine before (enrollment in the program) but I have always taken care of my health. However, it might be better since I have started taking medicine . . . I also eat food which give benefits and which does not have bad effects on my body.

A 23-year-old woman (#9) who was reluctant to start ART discussed about the side effects of ART that "I still don't want

to take the medicine. Taking too many medicines is not good for my liver."

Information was also represented in the form of participants' knowledge of the negative outcomes associated with non-adherence. A 22-year-old woman currently on ART (#4) had become infected during her relationship with an older man. It was his illness that she recounted in relation to information about negative outcomes associated with non-adherence.

> . . .I reacted like it was just a normal disease . . . when I knew about this (HIV status). I took care of my boyfriend. His mother took him to many places to get treatment but it seemed like he didn't accept what he had. He didn't take medicines and he started to get skin rashes . . . later he got fungal infections in his mouth, his eyes, his brain . . . his health was getting worse because he didn't take his medications.

A 23-year-old man (#3) noted how information was utilized to sustain motivation and also to enact behaviors that would complement adherence:

> I read in the manual that the symptoms will last for two months. It would be terrible. It would affect everything. Later, I tried to comfort myself, and I ate an extra meal a day . . . I drank a lot of water. I ate, I took medicine, and I felt better quite quickly.

Motivation The motivation construct in the IMB model for adherence was represented through the statements of social influences on adherence from partners and family members. Daily reminders from significant others and family members provide the needed incentives for taking their medications. A 23-year-old man (#3) stated that, "When I am at home, my sister prepares medications for me." A 24-year-old woman currently on ART (#2) noted that "My boyfriend warns me every day before 11 PM that it is time to take my medication . . . he warns me everyday. . . .I feel good that he still cares."

A 22-year-old woman (#4) who contracted HIV from an older boyfriend later married and had a child. She described the moment of disclosing her HIV status to her husband. Her disclosure came as she told him that the medications she took were antiretroviral drugs. Rather than rejection, her husband emphasized their mutual responsibilities to one another:

> We talked seriously about my situation and I told him the medications I had been taking were HIV medications. My husband didn't look at my face. I thought everything would have changed from now. He would kick me out of his life like a cat or dog . . . He said, well it depended on the karma . . . we had a baby now and we had been together already, so we must face the future together . . . we had to take care of each other.

Motivation was signified through the statement of commitment to adherence as well as one's responsibility *to* others. The 24-year-old woman (#2) described her understanding of adherence as a process. When she first started taking medications, she questioned her ability to do so over the long term. However, as she discussed her role as a mother, she felt that part of her responsibilities to her child included self-care. For this young woman, it was her responsibility to support and provide for her son which was the primary motivation leading to self-efficacy for adherence:

> At first I was worried that I might not be able to do it. How long did I have to take the medicine? It became a major thing in my life . . . however, I can do it now . . . I know the reasons of why I have to take the medicine. I know the goals. I have a will to live, so this makes me continue to take the medicines on time . . . I don't have many goals. I want to extend my life. I want to see my son grow up . . . this is good enough.

Lack of social motivation was also potentially associated with nonadherence. A 17-year-old woman (#8) reported only 50% adherence to her medications in the past 30 days. Her conversations indicated that she did not always live in the same place. At the time of the interview, she was living with an aunt to whom she had not disclosed her HIV status. She did not discuss her relationships with family members. She also expressed desire for an alarm clock to help with adherence. She stated "The (alarm clock) will make me take the medicine on time." However, this statement might indicate recognition of intention to improve adherence *or* suggest a passive reliance on the clock for adherence rather than her own self-efficacy or available social support.

Motivation was also represented through the statements of confidence in the health benefits of ART. The 24-year-old woman (#2) noted that "(medicines) benefit my body. I have to put up with it." The 23-year-old man (#3) discussed his early experiences with side effects from the medications, and the challenges he faced in trying to adhere to the medication. A key motivation was his desire to maintain weight, as unexplained weight loss may be perceived by others in the community as possibly having HIV/AIDS[29]:

> When I first started the medication, I told myself I would never lead my life this way again. I had to get better. I wanted my body to get used to the medicine and become strong. When I was sick, I felt like I wanted to vomit. . . .It was a real torture. If I took the medicine, I lost my appetite. I tried to eat my favorite foods so that I could eat more and it became a routine. But I had to take the medication as well. I have to do it or I will lose weight. . .

Behavioral skills The behavioral skills construct in the IMB model for adherence was represented in the statements of strategies devised for taking the medications properly and minimizing side effects. One key issue for the participants was the need to consistently take the medications at the same time on a daily basis. For many, their schedules are irregular as they study, work, and socialize with peers. It is necessary, therefore, for these youth to consciously think about their schedules on a long-term basis and to develop a strategy based on their activities. The 24-year-old woman (#2) noted:

> I chose to take medicines at night because in the morning I go out . . . (so) it is not convenient. At night, we come home, I take the medicines everyday and go to bed . . . At first I was worried that if I have taken the medicines then I would have some effects. I was worried that I might not be able to work. I took the medicines at night and it was okay.

The physical features of the medications can also be a challenge. This same participant talked about difficulty swallowing the larger pill and the "bad smell" of the pill making her nauseous. In order to tolerate the pill, she described her strategy to minimize the adverse effects by taking the medication with milk rather than water. In her conversation with the therapist, she expressed her self-efficacy about taking medications regardless of the regimen:

> Therapist: No problem if there are many (pills)? If there is more than this (what you are currently taking)?

YLWHA: It will be fine.
Therapist: Do you think there is anything else that will make you not able to take medicine up until now?
YLWHA: Nothing. I get used to it. Now I am used to it.

- **Are the basic concepts important to the setting of Thai YLWHA represented in the IMB model?**

While the three key concepts of the IMB model are evident in the data, the question remains whether or not there are other sociocultural concepts important to adherence among Thai YLWHA which are not adequately represented within the model. Our data suggest two possible aspects of Thai culture with potential relevance to the IMB constructs: mutual social support and responsibility, and philosophical Buddhist tenets.

Within the IMB model, social motivation is described in terms of perceptions of having support for adherence from important others. We found social support a meaningful component of the 'motivation' construct for Thai YLWHA. A 22-year-old woman currently on ART (#4) described how her family's knowledge of her status and their support has helped her emotionally. "I have support from people around me. My sister and brother know, my family, my mom, my husband know (my status)....(otherwise) I would have been under more pressure than this." For others, the support they perceive is not just immediate but a lifelong relationship which has resulted in their own development as a person. As a 20-year-old man currently on ART (#5) noted that "I have to thank my mom and dad for their teaching about life. I also learned how to properly behave from my mom."

One aspect of the motivation construct in the IMB model that needs a further expansion in Thai setting is the perceptions shared by Thai YLWHA of the social, emotional, and economic support that they provide to others. Social motivation, to better match this population, would likely require a specific emphasis on the mutual and shared responsibility in relationships. Not only did participants find support from others useful, they described their support of others as essential to maintaining their physical health and wellness through adherence. As a 20-year-old woman currently on ART (#1) noted "the reason I want to set this plan (adherence to ART) is I love myself and other people as well." She noted in regards to continuing to participate in the MI study that "I want to do whatever is good for the society."

Expressions of familial responsibility and obligations are tied to traditional beliefs in Thailand and many other Asian cultures that a child must "repay" his/her parents for giving birth and raising him/her.[30] An 18-year-old man who was not on ART (#6) did not want his mother or other family members to know that he would go into the hospital to start a therapy program. Within this context, he noted his feelings of obligation to his mother:

> Well, I am very close to my mum and love her dearly. I want to give her anything I can. When I was young, I knew that we were poor . . . I knew that it was difficult for her to raise me. . . At the moment I can work . . . I think it is my duty. I must give something back to her. I cannot just only take.

A 22-year-old man who was currently not on ART (#7) described his increasing responsibilities to his family as he matures into adulthood:

> I think after finishing my studies and about my (love) relationship, I will take care of my family . . . I have my full responsibility because I don't have to study any more. My duty for life is about my family. I would have job and money. . . I will be a better head of the family. I will change from a student or a teenager to an adult.

Buddhism is deeply integrated within Thai culture and social relations. While Buddhism was not often directly discussed in relation to adherence to medications, some of the youths' discussions around social relations and responsibilities could be interpreted within the philosophical tenets of the religion. In particular, concepts of negative consequences because of one's actions (defilements) as harmful both to oneself and to others could be expressed as social responsibility. The 18-year-old man currently not on ART (#6) discussed his HIV status and prevention of the spread of the disease beyond him and his boyfriend:

> After I knew I got infected, I stopped everything. No hookup or sex. I don't want to hurt others. The virus better stops here (in my boyfriend and me). Other people have their future and love their future, and why do I want to destroy their future?

A 20-year-old man currently on ART (#5) related his social responsibility to a Buddhist value as he stated:

> We can share our life experience and participate in the research to answer questions for someone else to use for him/herself. This is very good karma . . . Mom and dad have told me that if I can do anything for someone else, then I should do so.

More directly, this young man discussed his exposure to Buddhist principles and how these beliefs served as a coping factor in his day-to-day living with HIV. He noted:

> I learned from the monks that we did not have anything with us when we were born. So why should we feel bad about losing . . . I may have to accept that I might not have done as good things as others in my previous lives.

Discussion

The IMB model, similar to many health behavior theories, is focused on individual agency rather than on broader social, political, and economic contexts of the disease. While these theories and their associated measures and interventions have proved to be salient for engagement in a variety of health-related behaviors in Western populations, continued research is needed to assess their relevancy in other cultural settings.[31] Therefore, as the first step toward assessing the cross-culture application of the IMB model for adherence to HIV-positive Thai youth, we used Ware's heuristic approach as our guidance in this study.[22]

The IMB model assumes mutual feedback between adherence information and motivation, with a lineal relationship between these two constructs and behavioral skills and actual adherence behavior.[12] A key assumption of the model is that the defining attributes of the constructs (information, motivation, behavioral skills) are universal and complete. Through our data, the existing definitions for information and behavioral skills in the IMB appear to fit within the context of Thai YLWHA. However, the IMB definition for motivation requires further consideration to represent the mutual and shared social support and responsibility emphasized in Thai culture through family relationships and the core values of Buddhism. In the IMB model, social motivation for adherence is limited to the person living with HIV/AIDS perceptions

of available support from others and his/her desire to comply and/or cooperate with others' wishes and mandates.[17] This aspect of adherence motivation is consistent with the current literature on the roles that families and partners of persons living with HIV/AIDS play in cultures outside of the United States.[32–34] In our data from Thai YLWHA, a substantial portion of the interview texts in relation to adherence is embedded in stories about consanguine and affine social relations and support. However, beyond the YLWHA perceptions of support from others, what emerges from these texts is the emphasis on mutual obligations and responsibilities between the YLWHA and his/her family members. The data further indicate a developmental context in which these youth describe their transitioning roles from that of a dependent child/adolescent to an independent adult. In these changing roles, the youth discuss new and expanding filial, marital/partner, and parental obligations and responsibilities. Meeting these responsibilities is a part of both family life and one's duty toward the larger community, commonly observed in a collectivistic society.[35]

Our data suggest that for this population and perhaps others, consideration should be given to broadening the motivation construct within IMB to include these interactive relational factors. We suggest that the motivation construct for medication adherence should include three subcategories of personal motivation, social motivation, and interrelational motivation, defined as perceived obligations and responsibilities of self and significant others toward increasing adherence to medications for the short- and long-term well being of self, family, and society. This expanded definition would likely be relevant beyond the contexts of the Thai youth, in other cultural settings with more collectivistic worldviews.

- **Are the meanings of the IMB model's basic concepts accurate in the setting for Thai YLWHA?**

This question proposed by Ware et al.[22] focuses on the indicators through which basic concepts in IMB are specified. Ability to perform necessary adherence-related tasks is one indicator of the concept of behavioral skills. We found that the meanings or the ways in which the IMB model's basic concepts are specified remain accurate in this study. However it is possible that the meanings may evolve over time as they are applied within different socio-cultural contexts. Therefore it is prudent that the indicators of the basic concepts are regarded as dynamic and should be monitored over time to detect the need to adapt these existing basic concepts or integrate new emergent concepts.

- **Does the model capture the complexity of adherence for these youth?**

Like a majority of persons living with HIV/AIDS throughout the world, these Thai youth are engaging in family and social life, working, studying, while simultaneously coping with a stigmatized long-term illness and associated medical regimens. For youth in particular, the importance of socialization and leisure time spent with peers, can interfere with maintaining scheduled dosing both in terms of timing and anticipated negative side effects. This complexity of adherence is further reflected in the youths' perceptions of their roles and responsibilities within their relationships and toward broader society, and the infusion of Buddhist philosophical tenets throughout Thai society.

Overall, these data support potential adaptation of the IMB model for adherence for use among Thai YLWHA. Assuming the application of the model for the development of interventions with this population, several directions are indicated by the data. First, the concept of information needs to incorporate knowledge and experience, with the emphasis on personalizing knowledge within youths' experiences. Knowledge should be integrated as a part of the development of motivations toward engaging in positive behaviors. Knowledge about how adherence affects HIV viral load and transmission rates and therefore can reduce the risk of sexual transmission of HIV to others could be presented in a context of social responsibility as well as in the context of "good karma," a fundamental Buddhist doctrine. Youths' familial and social obligations should be addressed as a means toward decreasing the role of the young person living with HIV/AIDS as a dependent and at the same time increasing their role as an independent and productive individual. In addition, spiritual and mind-body beliefs have been reported to be related to treatment decision-making and ART adherence,[36] and therefore interventions need to recognize the role of youths' spiritual beliefs in relation to their treatment adherence behaviors.

Some limitations should be considered when evaluating the generalizability of our findings. This was a pilot study with the objective of adapting MI for youth with HIV/AIDS in Thailand. The sample size is small and includes only youth who have access to care, therefore this does not provide for the ability to assess differences across demographics, socioeconomic status, high-risk groups (such as the perinatally infected group), or other hard-to-reach groups of Thai YLWHA. In addition, adherence was only one of three topic areas and further research needs to be conducted with this population focusing specifically on adherence-related IMB in order to clarify the applicability of the IMB model in this setting. Our narrative adherence data are not correlated with quantitative or biological data to more accurately assess adherence to medications and health outcomes, e.g., plasma HIV viral loads or CD4 lymphocyte counts.

Further research is warranted to determine the cross-culture application of the IMB model and its constructs in non-Western settings. Our findings suggest that future adaptations should include the broadening of the motivation construct to incorporate interrelational motivation, defined as perceived obligations and responsibilities to self, family, and the society. We believe that such a modification would likely be relevant in other collectivist societies. Continued cross-cultural testing, adaptations, and expansions of theoretical models such as the IMB model are necessary toward maximizing their applicability for a diversity of populations living with HIV/AIDS globally.

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Address correspondence to:
Chokechai Rongkavilit, M.D.
Children's Hospital of Michigan
3901 Beaubien Boulevard
Detroit, MI 48201

E-mail: crongkav@dmc.org