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Title: Adherence: Compliance, Persistence and Concordance in the Management of Glaucoma Part II

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Key Points:

It is recognised by healthcare practitioners that adherence to long-term intraocular pressure (IOP) lowering medication is poor in patients with glaucoma, which is a significant factor in disease progression.

A significant problem associated with adherence is the patient's failure to recognise there is a need to administer their eye drops as prescribed.

Theories are essential in promoting an understanding of human behaviour, directing research and facilitating transferability from one health issue, geographical area or health care setting to another.

Grounded in health and social psychology, the IMB model asserts that self-management and adherence is a health behaviour determined principally by individuals relevant information, attitudes toward following treatment regimen and ability to perform necessary adherence and self-management tasks together with a sense of self-efficacy.

Key Words: Adherence, compliance, persistence, concordance, intraocular pressure, glaucoma.

Adherence: Compliance, Persistence and Concordance in the Management of Glaucoma Part II

Abstract

Adherence was noted in Part I of this series as a concept laden with difficulties in relation to the management of glaucoma. A significant issue associated with a lack of adherence is the patient's failure to recognise there is a need to administer their eye drops as prescribed. Part I identified that the greatest issue is that patients experience no pain with their debilitating eye disease. It is not until there is considerable loss of vision that awareness of the need to administer eye drops becomes a reality. It was further noted that understanding the complexities of adherence and its association with persistence, compliance and concordance can assist the healthcare practitioner in developing models of care that help the patient in self-management of their glaucoma. This article addresses the Theory of Adherence and Self-Management of Chronic Open Angle Glaucoma and discusses perspectives, theories and models that help the patient in self-management of their glaucoma.

Introduction

As noted in the previous article, Part I, Adherence: Compliance, Persistence and Concordance in the Management of Glaucoma, adherence is a term that is frequently discussed by healthcare practitioners in relation to patients managing their health. It was further noted that it is recognised by healthcare practitioners that adherence to long-term intraocular pressure (IOP) lowering medication, in particular, is poor in patients with glaucoma, which is a significant factor in disease progression. A significant problem associated with adherence is the patient's failure to recognise there is a need to administer eye drops as prescribed. This is associated with the issue is that patients experience no pain with their debilitating eye disease (Amro et al, 2011). It is not until there is considerable loss of vision that awareness of the need to administer eye drops becomes a reality. This article addresses the Theory of Adherence and Self-Management of Chronic Open Angle Glaucoma (COAG) and

discusses perspectives, theories and models that help the patient in self-management of their glaucoma.

Theory of Adherence and Self-Management of COAG

Theories are essential in promoting an understanding of human behaviour, directing research and facilitating transferability from one health issue, geographical area or health care setting to another (Michie, et al., 2005). However, early programmes related to self-management of different chronic conditions frequently lack an explicit theoretical basis. The problem of adherence remains a challenge as it relates to human behaviour and self-management of COAG.

Munro, et al. (2007) examined the empirical evidence and theories applied in changing behaviour interventions in relation to long-term disease self-management and treatment regimen adherence. Their review revealed that certain theories have the potential to both improve understanding of behaviour change and contribute to the design of more effective interventions that promote collaborative partnerships and adherence. Several interventions have been designed to improve patients' treatment adherence, but few theories describe the processes involved in doing so (Michie, et al., 2005; Olthoff et al, 2005). With more than 30 theories of health behaviour change available, choosing the most appropriate theory when designing an intervention is far from an easy task (Munro, et al., 2007). This is particularly problematic in the field of adherence to long-term medications, such as medications required to manage COAG where the cost of non-adherence is quite severe with an ultimate eye sight loss.

Leventhal and Cameron (1987) initially classified five theoretical perspectives (models) related to long-term treatment adherence: (1) Biomedical; (2) behavioural; (3) communication; (4) cognitive; and (5) self-regulatory. Recently a sixth domain, stage perspective, has emerged. Each perspective (model) includes several theories, where the most commonly used theories are those within the cognitive perspective and the transtheoretical model of the perspective stage (Redding, et al., 2000). Each of these perspectives will be reviewed in the narrative that follows.

Biomedical Perspective

Patients in this perspective are viewed as a passive recipient of the doctors' instructions, where patients who fail to adhere is understood to be caused by patient characteristics like age and gender (Blackwell, 1992). Technological innovations to monitor adherence to medications, such as the "unobtrusive eye drops monitor" are rooted in this perspective.

A fundamental limitation of this perspective is that it fails to consider factors other than patient characteristics that may affect their health behaviours (WHO, 2003), for example, patients' perspectives of their own illness; psycho-social factors; socio-economical environment; and/or demographic factors. An attempt to incorporate these factors with the biomedical perspective has produced a more integrated theory, the "bio-psycho-socio-environmental" theory, in which the wider socio-environmental context is considered (Ross and Deverell, 2004).

However, the assumption that patients are passive recipients, while placing a greater emphasis on biomedical factors has made this theory less popular and unlikely to significantly improve glaucoma patient medication adherence. Patients these days are more active and want to be part of decision making. Generally they no longer receive and follow instructions passively. Van Dulmen et al (2007) commented that in spite of the many advances in adherence and adherence research amongst glaucoma patients, non-adherence rates have remained nearly unchanged from the previous decade. They concluded that the interventions and theories adopted, by and large belong to this perspective, have failed to predict and explain non-adherence adequately.

Behavioural Perspective

This perspective includes behavioural learning theory (BLT) which focuses primarily on environmental factors as well as the teaching of skills to manage adherence (WHO, 2003). The likelihood of a patient following a specific behaviour will partially depend on internal (thoughts) and external factors (environmental cues), while

consequences in the form of punishments or rewards will discourage or encourage such behaviour respectively as illustrated in Figure (1).

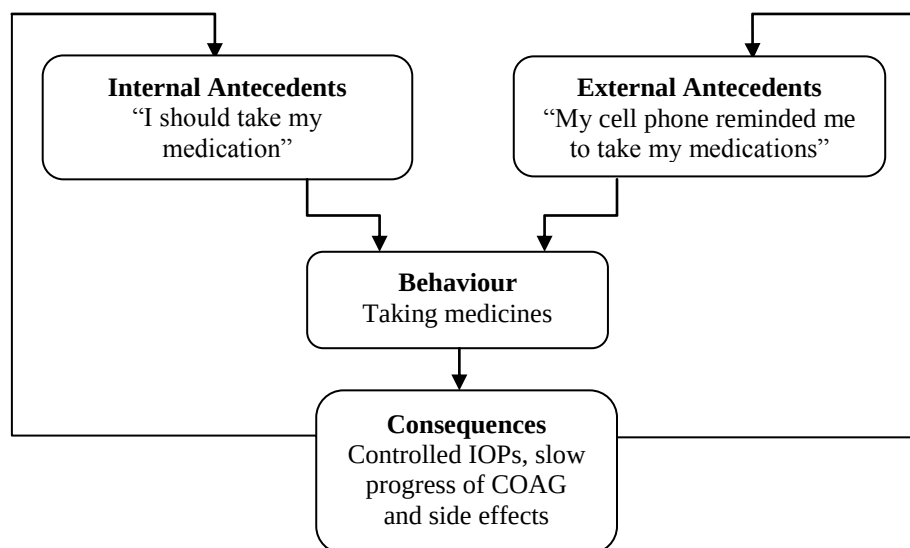


Figure 1: Behavioural Learning Theory

Glaucoma adherence interventions associated with this theory tend to break down the complex behavioural changes into small steps that can be sequentially learned and reinforced by external reminders. Whilst Munro et al (2007) claimed that glaucoma interventions that are informed by this perspective such as patient reminders have been found to influence health behaviours and improve adherence. A meta-analysis conducted by Simoni et al. (2006) examining adherence to therapy in HIV management concluded that interventions with cue dosing and external reward approaches derived from BLT were as effective as those without. Although this analysis was not associated with COAG it does have relevance as COAG is a long term chronic condition. Blackwell (1992), however, criticises BLT for lacking an individualised approach and for failing to consider factors that are not linked to immediate rewards but are influential to health behaviour change including past behaviour; habits; or lack of acceptance of the diagnosis. This perspective has also been criticised for regarding patients as passive and failing to consider patient empowerment.

Communication Perspective

Communication is understood to be *“the cornerstone of every patient-practitioner relationship”* (Ross and Deverell, 2004:56). This perspective suggests that improving communication between health professionals and patients will improve adherence which can be achieved through patient education and health professional communication skills (Ross and Deverell, 2004). An example of an intervention informed by this perspective is one that aims to improve patient-professional interaction placing emphasis on the timing of the treatment, instruction and comprehension (Munro et al., 2007).

Reviewers examining the effects of interventions including communication elements have rarely examined the effects of communication on health behaviours specifically (Lewin et al., 2001). In relation to this, two reviews showed that improved communication interventions led to improved communication in consultations, improved patient satisfaction with care and improved health outcomes (Lewin et al., 2001). However, these reviews also show limited and mixed evidence on the effects of such interventions on patient health care behaviours such as adherence (Munro et al., 2007). A more recent study conducted by Friedman et al (2008) explored doctor-patient communication and its effect on glaucoma adherence. The findings supported the importance and the association between effective doctor-patient communication and improved adherence levels. The limitation of this perspective is that it fails to acknowledge attitudinal, motivational and interpersonal factors that might influence the reception of the information and its translation into behaviour change (Blackwell, 1992).

Self-Regulation Perspective

Self-regulatory theory is the main theory in this perspective. It proposes that it is necessary to examine an individual's subjective experience of health threats to understand the way in which the individual adapts to these threats (Leventhal et al., 1992). According to this theory, individuals' illness representations of health threats that combine new information with past experience are key determinants of their behavioural and emotional response to illness (Edgar and Skinner, 2003). These representations guide their selection of particular behaviours for coping with health threats and consequently influence associated outcomes. This process of creating

health threats and choosing coping strategies is assumed to be dynamic and informed by the individual's personality, religion and socio-cultural context (Leventhal et al., 1992). Skinner et al (2003) identified five core elements that form people's illness representation. These elements are shown in Table 2.

Table 2: Core elements of illness representation

1. Identity: What is glaucoma? What symptoms are experienced? What is actually wrong?
2. Cause: What caused my glaucoma?
3. Timeline: How long will it last?
4. Consequence: How will glaucoma affect me now and in the future?
5. Treatment effectiveness: How good is my treatment at controlling or curing my glaucoma?

Munro et al. (2007) suggested that this theory offers little guidance to the design of the interventions. With no meta-analysis available to examine its effectiveness, specific suggestions are required as to how these processes could promote adherence.

Stage Perspective

This perspective includes the transtheoretical model (TTM) as its main theory. This theory hypothesises a number of different, discrete stages and processes of change, and reasons that people move through, relapsing and revisiting earlier stages before success (Sutton, 1997). This model assumes that health behavioural changes are the result of a logical process, divided into five stages as illustrated in Figure 2.

This theory has received criticism. According to Bandura (2004) this theory violates the three basic assumptions of stage theory. Bandura suggested that human functioning is too multifaceted to fit into separate and discrete stages. While Munro et al. (2007) praised TTM as a popular theory amongst practitioners; it has received little direct research support for its efficacy. The meta-analysis identified for this review did not offer direct support for this theory while another review identified that

interventions that used the stage perspective were no more efficient than those not using the theory (Marshall and Biddle, 2001). In a glaucoma context, the barriers to adherence according to this theory are 'temptations' and the question framed here is: How tempted can an individual be to engage in an unhealthy behaviour across different challenging situations?

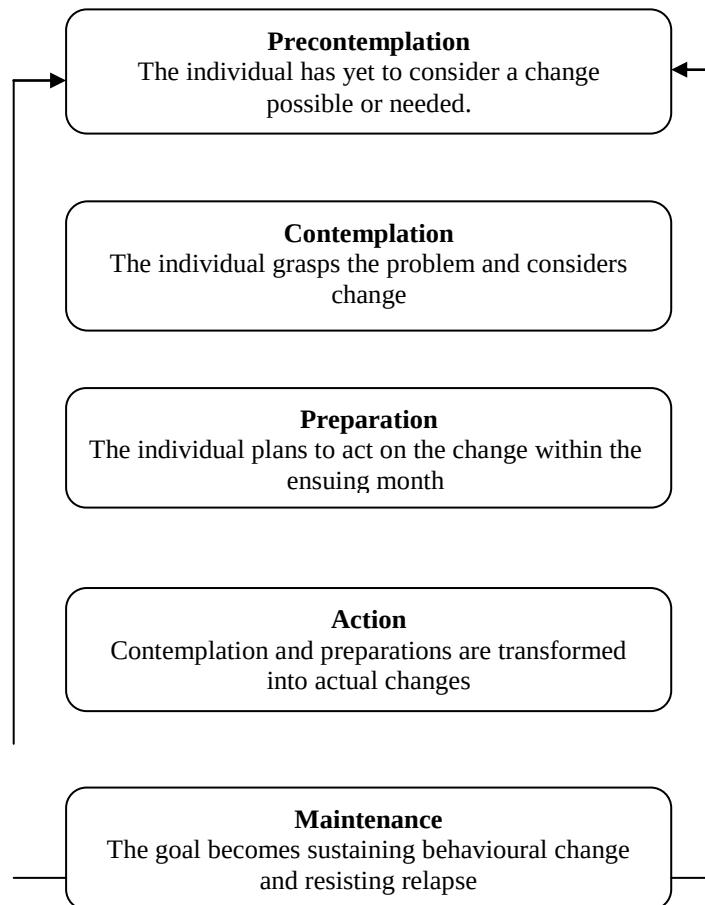


Figure 2: Transtheoretical Model. Adapted from Sutton (1997)

Cognitive Perspective

The cognitive perspective includes theories such as the health belief model (HBM), social cognitive theory (SCT), the theories of reasoned action (TRA), the theory of planned behaviour (TPB), the protection motivation theory (PMT) and the information-motivation-behaviour skills (IMB) model. These theories share the assumption that attitudes and beliefs as well as expectations of future events and outcomes are major determinants of health related behaviours (Stroebe, 2000). They

focus on cognitive variables as part of behaviour change and so propose that individuals will choose the action that most likely will lead to positive outcomes (Gebhardt and Maes, 2001). Munro et al. (2007) argued that these theories have major weaknesses including: failing to recognise the influence of non-voluntary factors on health behaviours, failing to address the behavioural skills needed to ensure adherence, and finally giving little attention to the origin of beliefs and how they may affect other behaviours. Furthermore, it has been argued that these theories have failed to recognise the impact of other factors that may compromise the adherence behaviour, such as power relationships and social reputation (WHO, 2003). However, what is emerging is that the IMB model has the potential to facilitate the development of self-management skills in relation to COAG (Amro et al., 2011).

Information-Motivation-Behavioural Skills (IMB) Model

Grounded in health and social psychology, the IMB model asserts that self-management and adherence is a health behaviour determined principally by individuals relevant information (knowledge), attitudes toward following treatment regimen (motivation) and ability to perform necessary adherence and self-management tasks together with a sense of self-efficacy (behavioural skills). As illustrated in Figure 3, these constructs are essential prerequisites for behavioural change but not necessarily sufficient in isolation (Fisher and Fisher, 1992).

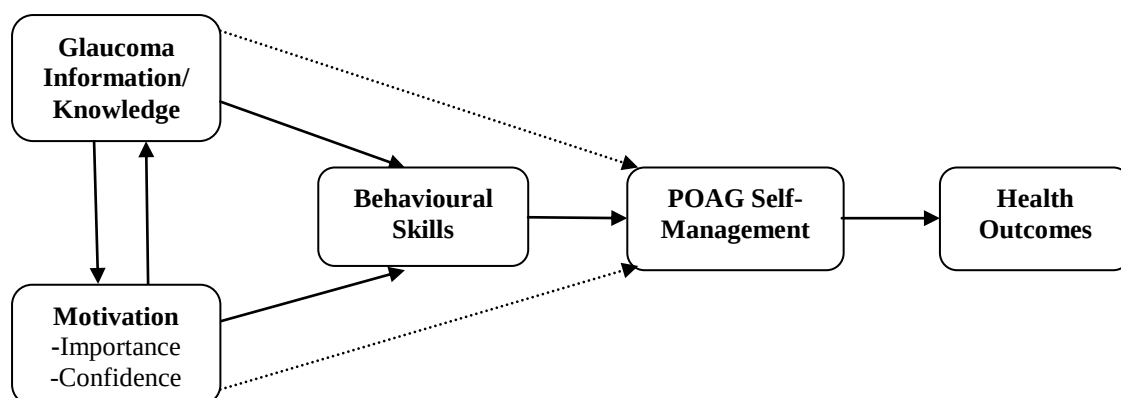


Figure 3: Contribution of information, motivation, and behavioural skills to COAG self-management and health outcomes. Adapted from Fisher et al. (2003)

The IMB model has been constructed to be conceptually based, generalisable and simple to promote contraceptive use and prevent HIV transmission (Fisher et al., 2003). It has been tailored and applied to numerous health promotion behaviours, with particular attention to adherence for treatment regimens in chronic conditions (Fisher and Fisher, 1992). Kalichman et al (2006) empirically examined the associations between the constructs of this model in changing behaviour amongst patients with sexually transmitted infections. He commented that the IMB model is particularly interesting because of the intuitive appeal that behaviour change requires knowledge of the health implications of behaviour, the need to enhance motivation for behaviour change, and the requisite skills needed to enact behaviour change. It is probably that these observations have relevance for patients with COAG.

The IMB model is the only theory of this category that recognises the necessity and importance of a set of behavioural skills in initiating a positive self-management skill. Furthermore, the IMB model has other applications in health behaviour change as it provides a conceptual basis for analysis and insight into the determinants and dynamics of adherence to medical treatment behaviours (Fisher et al., 2003). Those two main advantages make this model particularly interesting and useful in self-management of COAG (Amro et al., 2011).

Building on the Fisher et al. (2003) IMB model, Starace et al. (2006) developed the IMB model of adherence. This model demonstrates that adherence to a medical regimen has much in common with other complex health behaviours; therefore, adherence will occur as a function of the presence of a set of relevant information, motivation, and behavioural skills factors.

According to this model adherence-related information is an essential prerequisite for consistent adherence and includes accurate information regarding a specific regimen, potential drug interaction and side effects. Personal motivation includes the patient's attitude and beliefs toward potential outcomes and suboptimal adherence, whereas social motivation includes the patient's perception of support for adherence behaviours from significant others' wishes. Subsequently, glaucoma patients who

are well informed about their condition, motivated to act, and possess the requisite behavioural skills to act effectively are more likely to adhere to treatment regimens and reap substantial health benefits. Conversely, patients who are poorly informed, unmotivated to act, and lack the requisite behavioural skills for effective adherence will likely be non-adherent to treatment regimens and will fail to realise its health benefits.

Although this model provides a good understanding of patients' behaviours regarding adherence, the relationship between adherence-related information and motivation is not assumed in this model. For example, there are cases where motivation does not imply correct information (e.g., the patient may be highly motivated to follow what he or she understands to be his or her prescribed treatment regardless of whether that understanding is accurate), nor does accurate information imply high motivation (e.g., one may be entirely accurate in understanding the requirements of his or her treatment regimen and still feel unmotivated to fulfil those requirements) (Starace et al., 2006). According to this model, adherence behavioural skills include both objective ability and perceived self-efficacy for performing critical adherence-related skills. Examples of this include acquiring and self-administering medications, incorporating treatment regimens into daily life, minimising side effects, seeking out new information when needed, and developing self-reinforcement strategies for establishing and maintaining adherence (Rollnick et al., 2000).

As illustrated in Figure 4, behavioural skills are directly related to adherence behaviour, whereas adherence-related information and motivation are related to adherence behaviour primarily through behavioural skills. Specifically, the IMB model of adherence predicts that, to the extent that the skills required for adherence behaviour, behaviour skill will mediate the relationship between information and motivation and adherence behaviour (Fisher et al., 2003). Consistent with the available literature, the IMB model of adherence predicts that high levels of adherence will result in favourable health outcomes and that poor adherence will result in unfavourable health outcomes. Moreover, the model assumes that favourable or unfavourable health outcomes will affect subsequent levels of adherence-related information, motivation, and behavioural skills through a feedback loop (Fisher and Fisher, 1992). Finally, the model identifies several potential factors

that may moderate (strengthen or weaken) the relationship between adherence-related information, motivation, behavioural skills, and adherence per se (Starace et al., 2006).

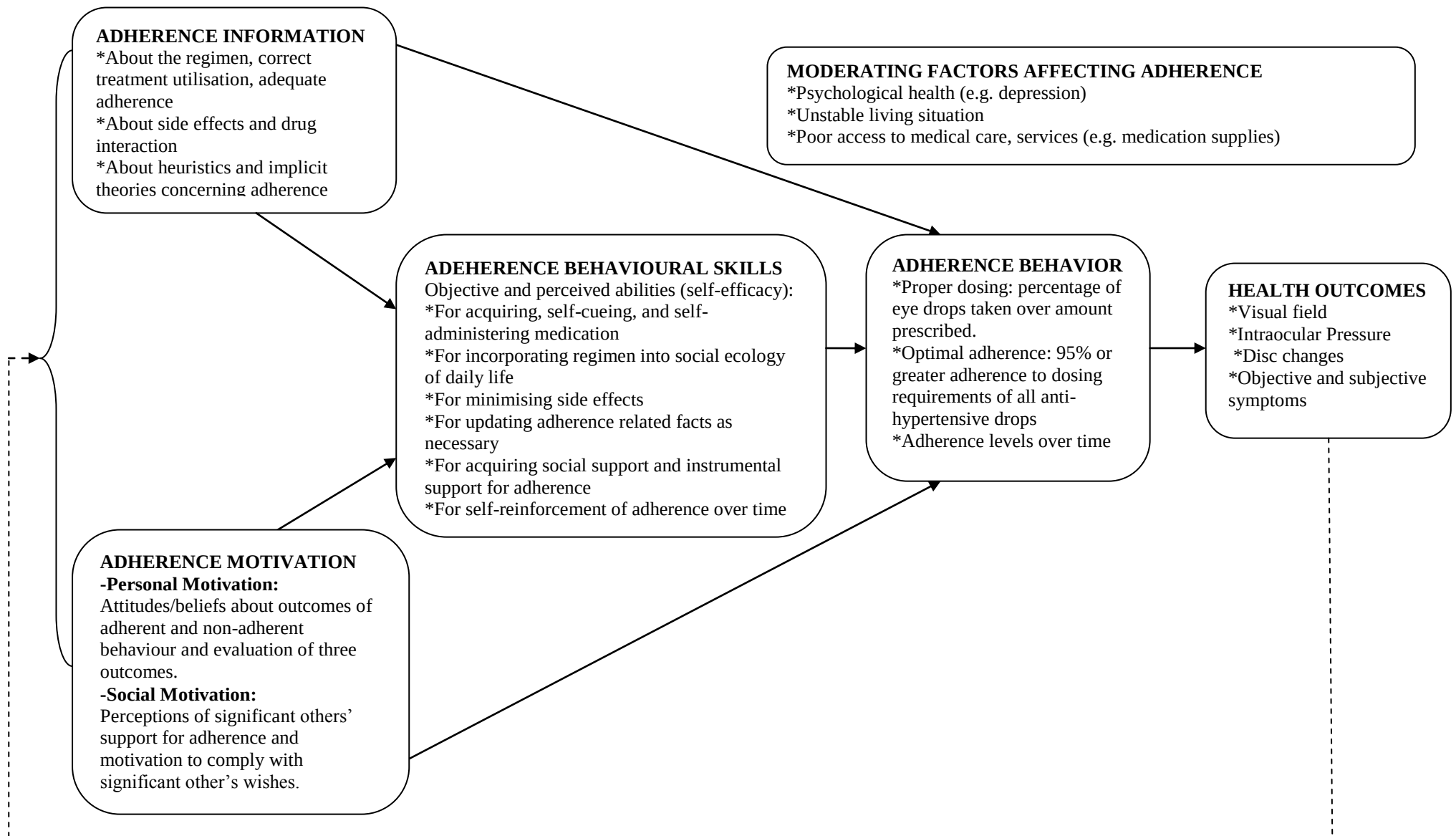


Figure 4: An information-motivation-behavioural skills model of therapy adherence (adapted by Starace et al., (2006) from the model developed by Fisher, et al., 2003).

Empirical Support of the IMB Model

Beyond its established strength in predicting, understanding, and intervening to change HIV risk behaviours, the IMB model is viewed as a generalisable approach to understanding and promoting health behaviours more broadly defined as examined earlier (Fisher and Fisher, 2000). In establishing the generalisability of this model, Fisher and Fisher conducted a review of the correlational research literature concerning socio-psychological factors linked to performance of diverse health behaviours. Fisher and Fisher (1999) found that in correlational research, information, motivation and behaviour skills elements are consistently related to health behaviour performance across diverse areas such as exercise behaviour, smoking cessation, breast cancer and cardiovascular health. In effect, there is considerable empirical support for the IMB model's fundamental assumptions that information, motivation and behavioural skills in the model are critical determinants of health behaviour change outside the domain of HIV prevention (de Vroome, et al., 1996).

A further review was conducted by Fisher, et al. (2006) in which they examined interventions that contain information, motivation and behavioural skills elements. They observed that interventions that included the three elements were more effective in promoting health behaviour change than interventions that lacked one or more of these elements. When comparing the strength of the three elements contents of interventions that had strong health behaviour change effects, versus those with weak effects, they observed that the former had greater information, motivation and behavioural skills related content in comparison with the latter (Fisher and Fisher, 1996). Overall, the findings provide support for the IMB model elements as determinants of intervention efficacy across diverse domains of health behaviour change including disease preventive behaviour, disease screening and detection behaviour and behaviour related to adherence to medical treatment.

Conclusion

This article has followed on from the delineation of adherence, compliance, persistence and concordance by addressing the Theory of Adherence and Self-

Management of Chronic Open Angle Glaucoma. It has discussed perspectives, theories and models that help the patient in self-management of their glaucoma. It has concluded that the IMB model is suitable for facilitating the development of self-management skills in patients with COAG.

References

Amro, R., Cox, C., Waddington, K. and Siriwardena, D. (2011) Glaucoma Expert Patient Programme. *International Journal of Ophthalmic Practice*, 2(1): 32 – 38

Bandura, A. (2004) Health promotion by social cognitive means. *Health Education and Behaviour*, 31:143-64.

Blackwell, B. (1992) Compliance. *Psychotherapy and Psychosomatics*, 58:161-9.

De Vroome, E., De Wit, J., Sandfort, T., et al., (1996) *Comparing the Information-Motivation-Behavioural Skills Model and the Theory of Planned Behaviour in Explaining Unsafe Sex among Gay Men*, Unpublished manuscript, Utrecht University, Department of Gay and Lesbian Studies and Department of Social and Organisational Psychology, Utrecht, Netherland.

Edgar, K. and Skinner, T. (2003) Illness representations and coping as predictors of emotional wellbeing in adolescents with Type I diabetes. *Journal of Paediatric Psychology*, 28:485-93.

Fisher, J. and Fisher, W. (1992) Changing AIDS risk behaviour, *Psychological Bulletin*, 111:455-74.

Fisher, J. and Fisher, W. (1996) *The Information-Motivation-Behavioural Skills Model of AIDS risk behaviour change: Empirical support and application*. In Oskamp, S. and Thompson, S. (Eds), *Understanding and preventing HIV risk behaviours: Safer sex and drug use* (pp. 100-127). Thousand Oaks, CA: Sage.

Fisher, J. and Fisher, W. (2000) *Theoretical approaches to individual-level change*, In J. Peterson and R. DiClemente eds., *HIV prevention handbook* pp. 3-55, New York: Kluwer Academic.

Fisher, J., Fisher, W., Amico, K. and Harman, J. (2006) An information-motivation-behavioural skills model of adherence to antiretroviral therapy. *Health Psychology*, 25:462-73.

Fisher, W. and Fisher, J. (1999) Understanding and promoting sexual and reproductive health behaviour: Theory and method. In Rosen, R., Davis, C. and Ruppel, H. (Eds). *Annual Review of Sex Research*, IX: 39-76. Mount Vernon, IO: Society for the Scientific Study of Sexuality.

Fisher, W., Fisher, J. and Harman, J. (2003) *The Information-Motivation-Behavioural skills Model: A General Social Psychological Approach to Understanding and Promoting Health Behaviour*. Blackwell Publishing.

Friedman, D., Hahn, S., Gelb, L., Tan, J., Shah, S., Kim, E., et al. (2008) Doctor-Patient Communication, Health-Related Beliefs, and Adherence in Glaucoma: Results from the Glaucoma Adherence and Persistency Study. *Ophthalmology*, 115(8):1320-1327.

Gebhardt, W. and Maes, S. (2001) Integrating social-psychological frameworks for health behaviour research. *American Journal of Health Behaviour*, 25:528-536.

Kalichman, S., Simbayi, L., Cain, D., Jooste, S., Skinner, D. and Cherry, C. (2006) Generalising a model of health behaviour change and AIDS stigma for use with sexually transmitted infection clinic patients in Cape Town, South Africa. *AIDS Care*, 18(3):178-82.

Leventhal, E. and Cameron, L. (1987) Behavioural theories and the problem of compliance. *Patient Education and Counselling*, 10:117-38.

Leventhal, H., Leventhal, E. and Schaefer, P. (1992) *Vigilant coping and health behaviour*. In *aging, health and behaviour*. Edited by Ory, M., Abeles, R. and Lipman, P. (1992). Newbury Park: Sage. pp. 109-140.

Lewin, S., Skea, Z., Entwistle, V., Zwarenstein, M. and Dick, J. (2001) Interventions for providers to promote a patient-centred approach in clinical consultations. *Cochrane Database of Systematic Reviews*, 4: DC003267.

Marshall, S. and Biddle, S. (2001) The transtheoretical model of behaviour change: A meta-analysis of applications to physical activity and exercise. *Annals of Behavioural Medicine*, 23:229-46.

Michie, S., Johnston, M., Abraham, C., Lawton, R., Parker, D. and Walker, A. (2005) Making psychological theory useful for implementing evidence based practice: A consensus approach. *Quality and Safety in Health care*, 14:26-33.

Munro, S., Lewin, S., Swart, T. and Volmink, J. (2007) A review of health behaviour theories: how useful are these for developing interventions to promote long-term medication adherence for TB and HIV/AIDS? *BMC Public Health*, 7(104).

Olthoff, C., Schouten, J., van de Borne, B. and Webers, C. (2005) Noncompliance with Ocular Hypotensive Treatment in Patients with Glaucoma or Ocular Hypertension: An Evidence-Based Review. *Ophthalmology*, 112 (6):953-61.

Redding, C., Rossi, J., Rossi, S., Velicer, W. and Prochaska, J. (2000). Health Behaviour Models. *The International Electronic Journal of Health Education*, 3:180-93.

Rollnick, S., Mason, P. and Butler, C. (2000) *Health behaviour change: a guide for practitioners*. London: Churchill Livingstone.

Ross, E. and Devereil, A. (2004) *Psychosocial approaches to health, illness and disability: A reader for health care professionals* Pretoria: Van Schaik; 2004.

Simoni, J., Pearson, C., Pantalone, D., Marks, G. and Crepaz, N. (2006) Efficacy of interventions in improving highly active antiretroviral therapy adherence and HIV-1 RNA viral load: a meta-analytic review of randomised controlled trials. *Journal of Acquired Immune Deficiency Syndrome*, 43(1).

Skinner, T., Cradock, S., Arundel, F. and Graham, W. (2003) Four Theories and a Philosophy: Self-Management Education for Individuals Newly Diagnosed With Type 2 Diabetes. *Diabetes Spectrum*, 16(2):75-80.

Starace, F., Massa, A., Amico, K. and Fisher, J. (2006) Adherence to Antiretroviral Therapy: An Empirical Test of the Information-Motivation-Behavioural Skills Model, *Health Psychology*, 25(2):153-62.

Stroebe, W. (2000) *Social psychology and health; 2nd edition*. Buckingham: Open University Press.

Sutton, S. (1997). *Transtheoretical model of behaviour change*. In *Cambridge handbook of psychology, health and medicine*. Edited by: Baum, A., Newman, S., Weinman, J., West, R. and McManus, C. Cambridge: Cambridge University Press: 180-182.

Van Dulmen, S., Sluijs, E., van Dijk., de Ridder, D., Heerdink, R. and Bensing, J. (2007) Patient adherence to medical treatment: a review of reviews. *BMC Health Service Research*, 7(55).

World Health Organisation (2003) *Adherence to long-term therapies: Evidence for action*. Geneva, 2003.