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SUPPLEMENT ARTICLE

The Integrated Gateway Model: A catalytic approach to behavior change

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ABSTRACT

Objectives: To develop and test an Integrated Gateway Model of behaviors and factors leading to subsequent positive reproductive, maternal, and child health behaviors. *Methods:* A secondary analysis was conducted using previously published household survey data collected from men (n = 5551; 2011) and women (n = 16 144; 2011) in Nigeria and women in Egypt (n = 2240; 2004–2007). The number of health behaviors each potential gateway behavior predicted was assessed by multivariate regression, adjusting for potential confounders. The influence of gateway factors on gateway behaviors was tested via interaction terms. Gateway behaviors and factors were ranked by the number of health outcomes predicted, both separately and synergistically. *Results:* The key gateway behavior identified in both datasets was spousal communication about family planning, whereas the key gateway factor was exposure to family planning messages. *Conclusions:* The model could facilitate innovative research and programming that in turn might promote cascades of positive behaviors in reproductive, maternal, and child health.

1. Introduction

Low-income countries face a multitude of health problems including malaria, HIV/AIDS, problematic pregnancies and deliveries, neonatal mortality, tuberculosis, and other communicable and chronic diseases. Many of these health problems, if not all, are directly affected by the health behaviors of individuals, families, and communities. To increase the efficiency of behavioral change programs, while ensuring that scarce resources are used effectively, it is advantageous to understand how one behavior might influence future lifestyle choices. Such behaviors are referred to as gateway behaviors.

The concept of gateway behaviors has existed since at least the 1970s [1]. The term is most often used to describe the role of tobacco, alcohol, or marijuana use as introductory or 'gateway' drugs to other substances, such as heroin. Contextual factors that influence how the process works have gained growing attention; for example, the gateway might not be the actual substance abuse but rather the social interactions that surround it [2].

In the past decade, research has shifted focus to the facilitating power of a positive health behavior or factor that can catalyze other positive health behaviors. The gateway approach draws on the notion that successful change in one behavior creates self-efficacy to make change in other behaviors [3]. To date, most research in this area has been conducted on healthy eating and physical activity in high-income countries [4,5], with few studies exploring the gateway concept in other health areas, especially among low-income countries.

1.1. The Integrated Gateway Model

We developed the Integrated Gateway Model shown in Fig. 1 to provide a framework that can be used by researchers and policy makers in the design of effective behavior change programs.

In this model, three gateway concepts—behaviors, factors, and moments—are presented as a set of interrelated components. The gateway behavior is an action initiated by the individual, which takes place within a gateway moment. Gateway moments refer to key transitional points in life (e.g. menarche, marriage, or first birth) when individuals or families could be particularly receptive to new information and motivated to make positive health changes. These life transitions might be developmental, situational (such as pregnancy or marriage), health-related, or illness-related (such as learning HIV status) and are characterized by three elements: cognitive (perception of personal risk and outcome expectancies, personal efficacy, readiness to change, and awareness of resources); emotional (prompting of a strong affective response); and self-concept (redefining self-image or social role). During this time, one or more gateway factors operate to influence the gateway behavior. A gateway factor refers to the context, attributes, or conditions that facilitate behavior change and might have a positive or negative influence on downstream behaviors.

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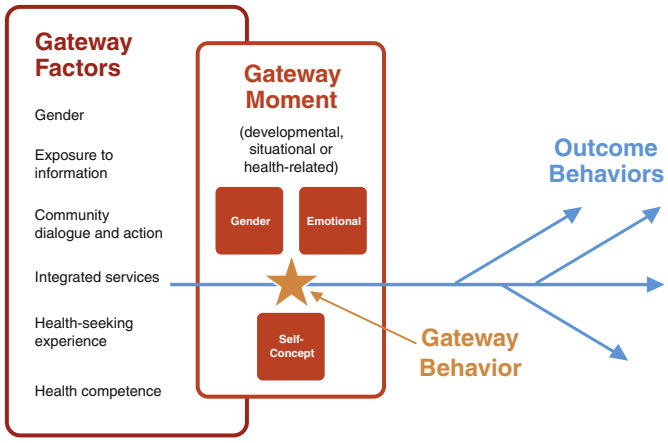

Fig. 1. The Integrated Gateway Model.

Working together, the three gateway components lead to multiple outcome behaviors. If the outcome behaviors are themselves gateway behaviors, then a chain of behavioral changes is set in motion. Interventions can focus on any or all of these components to influence outcome behaviors.

1.2. Gateway behaviors

Four gateway behaviors have been associated with other positive reproductive, maternal, and child health behaviors; namely, prenatal care, immunization, HIV testing, and interpersonal communication.

Research has demonstrated strong links between prenatal care and future positive health behaviors, most notably on other service-level behaviors, such as child vaccination, well-child visits, institutional delivery, and trained assistance at delivery [6–8]. By contrast, the effect on individual behaviors is mixed. In the USA, the frequency and timing of initiation of prenatal care showed no, or unclear, effects on breastfeeding [7]. In Nigeria and China, however, women who experienced high intensity and early initiation of prenatal care were more likely to breastfeed their offspring than those women who received less intense and later prenatal care [9,10]. Prenatal care was also an appreciable predictor of contraceptive use in several countries [11–13].

In the USA, strategies to promote immunization have increased the uptake of other preventive health services [14], whereas child immunization provided as part of a composite index has been associated with contraceptive use in low-income countries [11,12].

Testing for HIV can improve interpersonal communication both with sexual partners and within the wider community [15,16]. An effect of HIV testing on consistent condom use has also been reported [15,16]; However, no effect has been found on the number of sexual partners [17].

The relationship between interpersonal communication and many other behaviors is well-documented. In Lao People's Democratic Republic, spousal communication about breastfeeding was associated with high levels of exclusive breastfeeding at 6 months [18]. Other studies have demonstrated that interpersonal communication reduces violence against women [19], increases condom use [18], and increases uptake of HIV testing [15,16]. The positive effect on contraceptive use has also received considerable attention [20–22].

1.3. Gateway factors

Four gateway factors affect reproductive, maternal, and child health behaviors: health-seeking experience, integrated services, health competence, and community dialogue and action.

Health-seeking experience might influence future behaviors. As individuals access one type of health service, they overcome barriers and so might be likely to seek out other services [11,13]. Increased access to information from healthcare providers can also explain this relationship [12]. However, the content of counseling makes this factor difficult to examine. In some studies, integrated services are thought to explain the gateway effect of prenatal care, maternal and child health care, and HIV testing on family planning service use [11–13].

A health competent society is one in which "individuals, communities, and institutions have the knowledge, attitudes, skills and resources needed to improve and maintain health" [23]. At the individual level, health competence is a gateway factor associated with multiple family health behaviors in Egypt. In South Africa, individuals with high health competence were more likely to have undergone an HIV test and used a condom at their last sexual encounter than those with low health competence [23].

Community dialogue and action around a specific issue, such as neonatal and maternal health, can produce changes in multiple behaviors [24]. For example, engaging Indian communities in shifting gender norms and promoting "evidence-based decision making" within families led to change in broad social structures, such as collective self-efficacy, social norms, and leadership [25].

1.4. Gateway moments

During life transitions, there is the potential for impacts on multidimensional health outcomes [26]; these "teachable moments" motivate individuals to spontaneously adopt risk-reducing health behaviors [27]. Research on teachable moments has predominantly considered how an individual's immediate situation creates susceptibility or openness to persuasive arguments. Nevertheless, no studies have explicitly explored how such a moment creates opportunities to think about the future and to consider not only an immediate behavioral choice but a long-term course of action, a sequence of protective behaviors, even a change in life course.

1.5. Aim

The aim of the present study was to evaluate the Integrated Gateway Model, with an emphasis on identifying and testing gateway behaviors and factors among men and women living in low-income countries.

2. Materials and methods

An exploratory secondary analysis of the gateway concept was conducted using existing data from two household surveys. The datasets used in the present study were the Nigerian Urban Reproductive Health Initiative (NURHI) Measurement, Learning and Evaluation baseline data collected in 2011 [28] and the Egyptian longitudinal Minya Village Health Surveys (MVHS) data (2004–2007) [29,30]. The Egyptian data were included in the analysis as they provided the opportunity to examine the effects of health behaviors on downstream health outcomes among a panel of women. The Nigerian data were selected because future operations research on the gateway concept was already planned in this setting.

2.1. Data Collection

The NURHI baseline household survey was conducted in six Nigerian cities (Abuja, Benin City, Ibadan, Ilorin, Kaduna, and Zaria) between October 4, 2010, and April 15, 2011 [28]. The survey focused primarily on reproductive health. Interviews were conducted among all women aged 15–49 years who were living in selected households in all six cities and with men aged 15–59 years who were resident in half of the selected households in four cities (Abuja, Ibadan, Ilorin, and Kaduna). A two-stage sampling design was used. In the first stage, a random sample of clusters was selected for each city based on probability proportional to their population. In the second stage, 41 households were selected in each cluster to create a sample of approximately 3000 households per city. A total of 19 556 households were selected and interviews were successfully conducted at 16 935 of them, yielding a completion rate of 87%. Among the interviewed households, 16 957 women were eligible for individual interviews; 95% of them were successfully completed.