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Insights from Behavioral Economics to Design More Effective Incentives for Improving Chronic Health Behaviors, with an Application to Adherence to Antiretrovirals

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There is a growing recognition that many of today's health problems are not just medical in origin but also behavioral [1]. Unhealthy behaviors are responsible for an estimated 40% of premature deaths in the U.S. annually [2], and adherence to long-term therapy for chronic diseases is only about 50% [3]. For those living with HIV, the effectiveness of antiretroviral (ART) drugs is hampered by suboptimal medication adherence: only about 60% of people with HIV and in treatment take their medication as prescribed, even among relatively affluent populations where structural barriers such as transport or medical costs likely play a minor role [4].

Financial incentives have long been recognized as a tool for influencing behavior as evidenced by a large and established literature on contingency management (CM), which rewards desired behaviors with financial or other prizes. CM is typically rooted in traditional economic theory, the idea being that financial incentives decrease the cost of certain desired behaviors. While such financial incentives have been found to be successful in some cases, they are typically resource-intensive (i.e., require large rewards sometimes exceeding 1,000 USD in the U.S. [5] or several months of wages in Sub-Saharan Africa [6]) and often show only short-term effects [7,8]. Furthermore, some recent trials cast doubt on the effectiveness of the CM approach. In particular, HPTN065 – a large Test, Link-to-Care Plus Treat (TLC-Plus) study – gave significant financial incentives for 2 behaviors: (a) linkage to care for those detected to be positive, and (b) viral suppression for those engaged in care [9]. Financial incentives for linkage to care did not show an effect, and the incentives for viral suppression had no overall effect, but some (modest) effects in some settings and circumstances. An increasing number of interventions have begun using smaller incentives based on insights from behavioral economics – sometimes called ‘nudges’ – in both developed and developing country contexts to influence health behaviors [10,11].

There are various reasons why financial incentives are sometimes not effective or can even go awry [12]. One is that they can “crowd out” or tarnish potentially stronger, intrinsic

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motivation. One example that has been studied for decades is blood donations – that paying people to donate tends to be less effective than relying on altruistic motivations. Relatively large financial payments can also have unintended consequences – such as when men who had been paid for remaining HIV free reported increased risky sexual behaviors after receipt of the cash payment [6].

We call for the increased use of a strand of economics called behavioral economics (BE) that integrates insights from psychology into the economic framework and may offer a richer toolset for the design of incentives for chronic behavior change. BE departs from the dominant focus on information and prices/monetary rewards as the key policy levers. We lay out three insights for rethinking incentives – (1) conceptualizing incentives as nudges rather than price changes; (2) making use of non-monetary incentives, such as enhancing personal commitment and taking advantage of social norms; and (3) emphasizing that the way in which incentives are communicated and delivered matters. As most BE-based studies in the field of HIV have focused on preventive activities [13,14], we focus on a chronic behavior – that of adherence to antiretroviral (ART) medication for people living with HIV.

Insight No. 1: Conceptualizing Incentives as Nudges rather than Price Changes

Traditional economic thinking assumes that people have fixed, stable preferences and that to change an unhealthy behavior, prices need to be altered to the point that the behavior becomes financially unattractive -- which often requires large monetary incentives. In contrast, behavioral economics suggests that people have unstable preferences such as ‘present bias’, e.g., overly discounting the future resulting in low antiretroviral adherence [12]. This systematic decision-making error can be overcome by providing small, frequent incentives while the behavioral change is going on to keep people on the right path. It is not always straightforward to make a clear distinction between nudges and traditional monetary incentives, but payments of several hundred dollars or the equivalent of several months’ wages fall clearly in the ‘traditional economics’ category. While ‘nudging’ has been found effective outside the field of HIV such as for smoking cessation [16] or adherence to blood-thinning medication [17], no published studies exist for ART adherence. Work in progress by one of the authors finds that present bias seems to be an important correlate of ART adherence, and shows promising results of small prizes awarded for high ART adherence at relatively frequent intervals in a sample of HIV-positive clients in treatment in Uganda [15,18]. However, there are a number of other biases that influence HIV-related behaviors [15,19], and further research into how they may be overcome is warranted.

Insight No. 2: Making Use of Non-monetary Incentives

Nearly all research to improve health behaviors in HIV/AIDS has emphasized monetary incentives. Non-monetary incentives, however, can be particularly valuable in resource-constrained countries; two promising and related such BE techniques are: (1) establishing strong commitments to healthy behaviors that capitalize on intrinsic motivation, and (2) relying on social norms. The idea behind commitment is that once people have announced – to themselves or, better yet, publicly – that they will abide by a particular plan of healthy

behaviors, they are more likely to follow through. For example, voluntary offers to commit money that would only be returned conditional on a negative nicotine test six months later showed a 3% points improvement in smoking cessation in a study in the Philippines, and the effect persisted even 12 months later [20].

Social norms as another type of non-monetary incentive can influence behavior through peer influence and peer pressure. Knowing that your behavior – particularly for socially undesirable ones – doesn't stack up well to one's peers can be a strong motivator. In a series of programs across the U.S., utility customers received letters comparing their energy consumption with that of their neighbors, which led to an electricity reduction of 2% or the equivalent of a price increase of 11% - 20% [21]. In the field of HIV, one of the authors is currently implementing an NIH-funded project to test the effect of informing HIV-positive youth of their own as well as the average adherence in a peer group as a way to create a social norm for high ARV adherence [22].

Insight No. 3: The Way Incentives are Communicated and Delivered Matters

Traditional economics predicts that only the size of an incentive matters, but not how it is communicated or delivered. BE in contrast recognizes that people's perceptions matter greatly: for example, framing an incentive to change a certain behavior in terms of a loss ("don't smoke or you lose your chance of winning") rather than a gain ("win a prize if you don't smoke") has been shown to be more effective by leveraging the human tendency to experience the disutility of a loss more than the utility of an equivalent gain [23]. Similarly, when monetary prizes are delivered as part of a larger program, sending them as a separate check rather than including them in the total payment for the task has been found to lead the recipient to experience them as more tangible or 'salient' [24].

Another way that the perception and salience of rewards can be leveraged is to use lotteries rather than fixed payments of equivalent expected value: lotteries can be an inexpensive motivation because BE shows that people usually overestimate small probabilities and thus their chance of winning. Lotteries have been successfully used in the HIV field to increase turnout for male circumcision drives [13] or HIV prevention [14].

Conclusion

We have discussed how BE could be used to design incentives to improve ART adherence that are more effective yet often also cost less -- a critical consideration for HIV, which is concentrated in resource-poor countries and among less advantaged populations in wealthy countries. Incentives can be of much lower monetary value than previously thought, need not necessarily be monetary but can encompass other dimensions of a person's utility function such as self-image or social prestige, and that the way these incentives are communicated and delivered (and not just their size) matters for their effectiveness.

BE insights can be used to complement traditional incentives, such as through appropriate messaging of information or paying attention to the delivery of incentives. But BE is not a "one-size-fits-all" and has to be carefully adapted to local conditions to ensure that study participants do not feel coerced or 'tricked' into participation, just as when using traditional

economics incentives. We encourage HIV researchers to explore this opportunity to gain new insights about how people living with HIV make decisions, and how these decisions can be improved to enhance their health. Let's not lose this opportunity to design and test novel types of incentives based on BE that many researchers in other, related fields, have used successfully.

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