Reviewer's report

Title: Modified Social Ecological Model: A tool to guide the assessment of the risks and risk contexts of HIV epidemics

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Reviewer: Susan Cassels

Reviewer's report:

Thank you for the opportunity to review the manuscript (debate) “Modified Social Ecological Model: A tool to guide the assessment of the risks and risk contexts of HIV epidemics.” This is a very nice, succinct review of risk embedded in social-ecological theory and contribution to an expanded model.

I mention a few of the larger issues first for each section, then some minor comments in addition.

Abstract:
I would suggest that you mention the two case studies somewhere in the abstract. You could say that you demonstrate how the model can be fit to very different contexts.

Discussion: First sentence is missing some words “, such as parenteral and sexual transmission among, is necessary...”.

Summary: a comma instead of period after “HIV interventions, While ...”

Background:
I don’t fully understand how you differentiate your work “to contextualize individual level risks with higher order levels of risk”, from other reviews like Poundstone et al (2004). Please flesh out your argument more, and explain in more detail how you link individual risk with higher orders both in the introduction and in each of the examples.

Typo in last paragraph “as well as epidemic stage..”

Discussion:
A very interesting and challenging issue is how to translate a SEM (originally built for non-communicable disease?) to be used for infectious diseases – with dynamic feedback loops and non-linear infection processes. You had mentioned both acquiring and transmitting disease in the background section, but this issue might be useful to raise again in the discussion section. “Individual factors...associated with vulnerability to illness or infection”. Consider adding some text about vulnerability to transmit infection as well. Of course, this has individual as well as higher order factors associated with it (stigma, access to care, adherence to ART, etc).
I see the network level in a couple of different ways. One is the interconnected sexual network, or the people in direct risk of exposure and transmission. Then there is the social network, with can provide both increased risk and/or protective effects (norms, support, etc). Is there a better way to differentiate these two distinct networks within the framework? (I notice they are listed separately in the model in Figure 1).

One of your additions to the model is stage of epidemic. This is very interesting, and I suggest more discussion of this addition to the model in the text. Often you sneak this in at the end of the paragraph, but it should have its own paragraph (e.g. end of case study #1). The issue of stage of epidemic/HIV prevalence is also challenging because it comes into play at a couple of different levels. (Relatedly, many of the issues your raise can span levels – this might be useful to highlight as well. For example in Poundstone they use dotted lines to illustrate the porous nature...). Back to stage: imagine the issue of race disparities in HIV. Individuals selectively choose partners by race, but then their partners may be more likely to be HIV-positive. Thus HIV prevalence varies significantly by subpopulation (network, and community).

Note: paragraph#5 in discussion: I don’t understand the sentence “...MSM have a higher baseline risk secondary to the lack of scientifically...”

Case study #1:
The writing is dense in these case studies – you include some wonderful references and quickly explain many of the risk factors, but it is hard to follow. In the network paragraph, many of your examples seem to span the range of "network": population mobility (individual?), HIV/STI prevalence (epidemic level?), drug costs (community?). A careful consideration of these risk factors, and an in-depth consideration may clarify some of these issues.

Case study #2:
The issue of spanning bounds and infectious disease process (risk of acquisition/transmission) arises again. Take sexual position: correlates of receptive anal sex may be an individual level risk, but then the partnering is ultimately a dyadic process (requiring of an insertive partner). There may also be cultural norms around who is a top/bottom (community level).

Summary:
Here I see a sentence “...and there is interaction between each level and factors within levels”. Consider expanding this issue. And possibly discuss the unique challenges of conceptualizing a model for infectious disease processes.

Overall, I enjoyed reading this paper. It will be very useful for students and researchers/public health practitioners considering prevention interventions.

**Level of interest:** An article of importance in its field
Quality of written English: Acceptable

Statistical review: No, the manuscript does not need to be seen by a statistician.

Declaration of competing interests:

I declare that I have no competing interests