Moving beyond single issue priority setting: associations between gender inequality and violence and both HIV infection and poor maternal health in Malawi

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Introduction

Addressing gender inequality has been enshrined in one of the MDGs, and also identified as a crucial enabler to achieve other MDGs, including MDGs 5 on maternal health and 6 on combating HIV/AIDS. Several commitments have been made to address gender equality and violence against women, both important structural components to reduce early sexual activity, maternal mortality, as well as to reduce women's vulnerability to HIV. This includes the inclusion of the elimination of sexual and gender based violence as a core pillar of HIV prevention for UNAIDS [1]. However, integrated strategies to address the gender norms, relations and inequities that underlie women's vulnerability of HIV/AIDS and poor maternal health have received relatively limited health or development investment.

Especially in generalised HIV epidemic settings, women are at greatest risk of HIV infection – with a high incidence of HIV among adolescents in many sub-Saharan African settings being of particular concern [2]. Yet the current portfolio of proven HIV prevention interventions often fail to offer meaningful prevention options for adolescent and older women, with a cluster randomised controlled trials of school based interventions failing to show a significant impact on HIV infection. Indeed, the most promising interventions that has shown to impact on HIV prevalence among adolescents in Sub-Saharan Africa was a cash transfer programme, that did not include an explicit HIV component, but instead provided cash incentive payments to girls and their parents to keep girls in school [3]. Similarly, initiatives to prevent the vertical transmission of HIV have achieved variable levels of uptake and adherence, with both demand and supply side factors influencing the extent to which women are tested for HIV, and able to adhere to the recommended ART protocols over time (Colombini forthcoming).

Risk for poor maternal health and mortality are strongly linked to antenatal care provision, services and skilled attendance at delivery and adequate services at the intra-partum period [4]. For this reason, initiatives to reduce poor maternal health and mortality generally have a strong focus on improving health service provision and access, with a focus on improving women's health care seeking behaviour, including encouraging women to deliver in facilities with skilled birth attendants [5]. These particular risk factors and programmes focuses are important to achieve both a reduction in HIV infection rates and improved maternal health. Still, one important aspect that affects both issues and has received limited attention despite its importance to achieve sustainable changes once HIV treatment and prevention mechanisms are available or adequate health services are available is gender equality. The vast literature on both topics has explored the importance on gender inequality on both setbacks in improving HIV prevention efforts and lagged improvements in maternal health, still no study until now has explore if indicators of gender inequality affect women's risk of HIV infection in a similar way as they impact women's risk of suffering from poor maternal health by using the same data.

Using population data from Malawi, this study explores the degree to which different forms of gender inequality are associated with HIV infection and poor maternal health, and the extent to which these forms of poor sexual and reproductive health are borne by the same women.

Methods

Malawi - Country background

Malawi with a population of 13.1 million is a sub-Saharan African country located south of the equator, bordering the United Republic of Tanzania, the People's Republic of Mozambique, and the Republic of Zambia. Malawi adopted in 1994 a National Population Policy, which was designed to reduce population growth to a level compatible with Malawi's social and economic goals, by improving family planning and health care programmes, by increasing school enrolment with an emphasis on raising the proportion of female students to half of total enrolment, and by increasing employment opportunities. This is supplemented by their 1994 strategy to eradicate poverty, with the MGDS being the overarching development strategy for the country [6].

[Add more information on the status of women in Malawi – e.g. cite previous study on IPV]

Dataset

For this study, we utilized the 2010 Malawi Demographic and Health Survey (DHS), a nationally representative survey of more than 27 000 households, which was implemented by the Malawi National Statistical Office and the Community Health Sciences Unit from June through November 2010. All eligible women age 15-49 in these households in a subsample of one-third of the households were individually interviewed [6].

Malawi is divided into 28 administrative districts. For the 2010 DHS each district was subdivided into smaller enumeration areas, which were either classified as urban or rural. The 2010 MDHS used a stratified, two-stage cluster design to select its samples, with enumeration areas being the sampling units for the first stage. It included 849 clusters, 158 were classified as urban and 691 as rural [6].Lists of households in each enumeration area served as a sampling frame for selection of households, with households comprised the second stage of sampling. A representative sample of 27,345 households was selected for the 2010 MDHS survey. A subsample of one-third of the households was selected to conduct HIV testing for eligible women age 15-49. In the same subsample of households, anaemia testing was conducted for eligible children age 6-59 months and eligible women age 15-49 year. Additionally, domestic violence questions were asked of one eligible woman per household in the same subsample of households [6].

Of the 27307 selected households 25311 were occupied and 24,825 were successfully interviewed, yielding a response rate of 98 percent. In the interviewed households, 97 percent of the identified 23748 eligible women were successfully interviewed [6].

Questionnaires

Three questionnaires of the 2010 Malawi DHS used for this analysis are the Household Questionnaire and the Woman's Questionnaire, which have been adapted to reflect the population and health issues relevant to Malawi. In addition to English, the questionnaires were translated into two major languages, Chichewa and Tumbuka [6]. The woman's questionnaire covers the following topics of interest: background characteristics, birth history and childhood mortality, knowledge and use of family planning methods, fertility preferences, antenatal, delivery, and postnatal care, breastfeeding and infant feeding practices, women's

and children's nutritional status, vaccinations and childhood illnesses, marriage and sexual activity, women's work and husband's background characteristics, awareness and behaviour regarding AIDS and other sexually transmitted infections, and domestic violence [6].

Main outcome variables

HIV

In a subsample of one-third of all households, blood specimens were collected for HIV testing from all women aged 15-49 who consented to the test, which were then merged with the socio-demographic data collected in the individual questionnaires. Any information that could potentially identify an individual is destroyed before data linking took place.
Interviewers explained the procedure, the confidentiality of the data, and the fact that the test results would not be made available to the respondent. If a respondent consented to the HIV testing, five blood spots from the finger prick were. Each household, whether individuals consented to HIV testing or not, was given an information brochure on HIV/AIDS and a list of fixed sites providing voluntary counselling and testing services in surrounding districts within the region [6].

Indication of maternal health

While the DHS offers several indicators on maternal health, there is not a single item in the questionnaire that is known to represent a reliable measure of maternal health. In this study maternal health was therefore measured through the use of a proxy index to capture whether women are likely to suffer from poor maternal health by combining several conditions that are known to be associated with poor maternal health outcomes, such as women being anaemic, underweight, having short pregnancy spacing, having had a miscarriage or abortion, teenage pregnancy and gave birth to more than 3 children. For the purpose of this study women are perceived to show conditions of poor maternal health if they reported more than two of these conditions.

Variables capturing gender inequality

The choice of gender inequality measures used in this analysis were guided by the availability of information collected by the Malawi DHS and are restricted to individual experiences of women. They included experiences of first sex being forced, sex before the age of 16, marriage before the age of 16, having a child before the age of 16, living in a polygamous marriage, educational differences with the partner, income disparities with the partners, age differences with the partner, property owning, decision making ability in the household, witnessing fathers violence towards their mother during childhood and experience of sexual or physical intimate partner violence.

Since some questions in the DHS were not asked to all women but only to women who were married or currently lived with a partner, they were coded in a way that excluded women would be captured in a separate category. To capture women's experience of physical and sexual by an intimate partner, not only women who reported experiences of violence by a husband and partner they lived with were coded as experiencing intimate partner violence, but also women who reported a boyfriend being the perpetrator of physical violence they experienced and women who reported that their first sexual intercourse with their partner was forced.

Controlling factors

Additional factors to control for in this analysis relate to women's sexual autonomy and sexual risk taking and they included whether the current partner was the women's first partner, alcohol usage of the partner, number of sexual partners of the woman, ability to

access condoms, women's ability to negotiate safe sex with her partners and whether the couple agrees on the women's fertility choices.

Statistical analysis

This analysis was restricted to women who participated in the HIV testing section of the DHS and were selected for the domestic violence module, which resulted in a total of 5838 women who were included in the analysis. In the bivariate analysis it was investigated in how women's increased risk of HIV infection was associated with the proxy used to measure poor maternal health and whether indicators of gender inequality and other risk factors for HIV and poor maternal health were associated each other and with women's increased HIV infection risk and the proxy used to indicate women's poor maternal health. For the multivariate analysis all factors were added into a stepwise multivariate model that were significantly associated with HIV or the proxy used to measure poor maternal mortality after controlling for women's current age, urban and rural differences, the district they were living in as well as for poverty. Variables that remained significant were added into the stepwise model according to the conceptual framework outlined in Table 1, starting with gender inequality indicators occurring in women's first sexual relationship and early life, indicators of gender inequality in their current relationship and factors related to women's sexual autonomy and risk taking. The later being more often discussed in terms of HIV prevention and programming since they are known risk factors for HIV infection. The step-wise multivariate analysis allows to observe which factors might be significantly associated with women's increased HIV infection risk or their increased likelihood to experience poor maternal health in earlier stages in their life before they have experiences portrayed by factors related to gender inequality and reduced sexual autonomy, which occur in their current relationship or later in their lives.

Table 1: Conceptual framework of factors enabling both women's increased HIV risk and poor maternal health

First relationship and early life	Indicators of gender inequality in women's current relationship	Factors related to woman's sexual autonomy and sexual risk
Witnessing parental violence Forced first sex Early first sex Age at first marriage	Polygamy Educational disparity Income disparity Age disparity Woman owns land Decision making ability on household expenditure Sexual and/or physical IPV	First sexual relationship also current relationship Men's alcohol use Number of sexual partners in her lifetime Agrees with her partner over her fertility choices

All analyses were conducted using STATA 12.00. Statistical significance is considered at the 5% level. We use the terms risk- and protective-factors loosely to indicate the direction of association with IPV rather than to imply causality, as we are analysing cross-sectional data. The analysis was weighted for the available sampling weights and women's selection into the domestic violence module.

Results

Of the 5838 women who agreed to be tested for HIV and who were eligible and participated in the domestic violence module, 12% were HIV infected. As shown in Table 2, the majority of women in this sample lived in rural areas, 21% of women had their first sexual intercourse before the age of 16, 20% married before the age of 16, and 25% reported experiences of intimate partner violence.

Of the HIV positive women, 26% reported more than two of the selected indications of poor maternal health, which was significantly associated with their HIV status (p=0.033). 31% of all HIV positive women also reported more than two indicators of poor maternal health. As can be seen in Table 2, most indicators of gender inequality, except for first intercourse being forced by a partner are significantly associated with both women's increased HIV infection risk and poor indications of maternal health. Table 2 further shows that several associations lost their significance once the analysis controlled for women's current age, urban rural differences, region and poverty, for example, whether the partner makes most decisions and whether their mother was hit by their father.

Table 2: Factors associated with HIV and maternal health risk: prevalence and p-values

	Sample		HIV infection risk					Indication of maternal health				
	N	%	-	+	p-value	AOR [1]	CI	not poor	poor	p-value	AOR [1]	CI
Residence												
urban	713	19%	17%	33%				21%	14%			
rural	5123	81%	83%	67%	<0.001	0.44***	[0.33,0.59]	79%	86%	<0.001	1.98***	[1.40,2.81]
region												
northern	975	11%	12%	7%				12%	10%			
central	2039	43%	45%	30%		1.00	[0.68,1.49]	43%	45%		1.06	[0.78,1.45]
southern	2822	45%	43%	63%	<0.001	2.26***	[1.61,3.18]	46%	45%	0.451	1.06	[0.78,1.45]
Poorest 20%												
No	4679	83%	82%	88%				85%	78%			
Yes	1157	17%	18%	12%	0.002	0.76	[0.55,1.04]	15%	22%	<0.001	1.68***	[1.36,2.08]
Partner forced first intercourse												
No	5047	87%	87%	87%				87%	87%			
Yes	789	13%	13%	13%	0.724	1.14	[0.82,1.59]	13%	13%	0.666	1.25	[0.95,1.65]
Age at first sex												
16+	4599	79%	80%	73%				84%	67%			
<16	1237	21%	20%	27%	0.001	1.31	[0.99,1.74]	16%	33%	<0.001	3.05***	[2.41,3.85]
Age at first marriage												
16+	4536	80%	81%	71%				85%	64%			
<16	1300	20%	19%	29%	<0.001	1.49**	[1.13,1.96]	15%	36%	<0.001	3.92***	[3.14,4.90]
Mother beaten by father												
No	4326	74%	75%	69%				74%	73%			
Yes	1510	26%	25%	31%	0.041	1.21	[0.93,1.56]	26%	27%	0.416	1.02	[0.80,1.28]
Ever lived in polygamy												
No	5183	90%	90%	89%				93%	82%			
Yes	653	10%	10%	11%	0.699	0.97	[0.67,1.41]	7%	18%	<0.001	1.39*	[1.05,1.84]
Educational differences												
Same	4544	77%	77%	74%				74%	86%			
Only she has	433	9%	10%	5%		0.62	[0.36,1.06]	12%	1%		0.35***	[0.19,0.65]
Only he has	859	14%	13%	21%	<0.001	1.53**	[1.15,2.03]	14%	12%	<0.001	0.83	[0.62,1.13]
Who earns more												
Same	5139	87%	89%	75%				87%	87%			
She	95	2%	2%	2%		0.78	[0.37,1.62]	2%	2%		0.86	[0.40,1.86]
He	591	11%	10%	24%	<0.001	2.00***	[1.46,2.74]	12%	11%	0.660	0.57**	[0.40,0.82]
Age difference to partner												
Same or no partner	3486	56%	57%	47%				53%	63%			
10+	809	12%	12%	15%		1.29	[0.92,1.82]	9%	20%		1.34*	[1.02,1.75]

Not available	1541	32%	31%	37%	0.002	1.87***	[1.39,2.51]	38%	16%	<0.001	0.45***	[0.34,0.60]
Owns land												
No	3691	67%	67%	72%				76%	63%			
Yes	2145	33%	33%	28%	0.026	0.75*	[0.59,0.95]	24%	37%	<0.001	1.21	[0.98,1.50]
Sexual and or physical IPV												
No	4292	75%	76%	67%				77%	69%			
Yes	1544	25%	24%	33%	<0.001	1.43**	[1.11,1.85]	23%	31%	<0.001	1.13	[0.92,1.39]
Partner is making most decisions												
No	3095	49%	49%	49%				45%	60%			
Yes	1200	19%	20%	14%		0.86	[0.61,1.22]	17%	23%		1.07	[0.84,1.35]
NA	1541	32%	31%	37%	0.010	1.71***	[1.28,2.28]	38%	16%	<0.001	0.43***	[0.32,0.58]
Current partner is also the first sexual partner												
Yes	3399	60%	64%	27%				63%	50%			
No	2437	40%	36%	73%	<0.001	3.62***	[2.85,4.59]	37%	50%	<0.001	0.91	[0.73,1.13]
Partner's drinking pattern												
Not	3884	69%	71%	56%				72%	63%			
Drinks	1324	21%	20%	29%		1.68***	[1.25,2.25]	20%	23%		0.80	[0.60,1.05]
Drinks heavy	628	10%	9%	16%	<0.001	2.22***	[1.53,3.22]	8%	14%	<0.001	0.90	[0.65,1.23]
Number of lifetime sex partners												
0-2	5072	87%	91%	63%				88%	84%			
3 or more	764	13%	9%	37%	<0.001	4.11***	[3.21,5.28]	12%	16%	0.001	0.77	[0.57,1.05]
Couple agrees on contraceptive use and number of children												
Yes	1321	21%	23%	13%				18%	30%			
No	4515	79%	77%	87%	<0.001	2.54***	[1.86,3.46]	82%	70%	<0.001	0.67***	[0.54,0.84]

A further examination of those risk factors that remained significant after controlling for women's current age, urban-rural differences, district and poverty were further examined in a staged regression model. As shown in Table 3, indicators of gender inequality in women's first relationships or their current relationship, such as marrying before the age of 16, sexual and physical intimate partner violence, educational differences and income disparities favouring the partner and property ownership were all significantly associated with women's increased HIV infection risk.

Factors related to women's sexual autonomy or sexual risk taking, such as their current partner also being the first partner they had sexual intercourse, having had less than three sexual partners in their life, having a partner that is not drinking – neither drinking at all or drinking heavily and agreeing with their partner on the number of children and contraceptive use - had a mediating influence on most factors of gender inequality. Young age at first marriage, experience of violence and property ownership became insignificant, which suggests that they are strongly linked to the factors related to women's sexual autonomy and sexual risk taking, or may even be on the causal pathway.

Table 3: Staged regression model for factors associated with women's increased HIV infection risk

	Model 1		Model 2		Model 3	
	AOR	CI(95%)	AOR	CI(95%)	AOR	CI(95%)
Current age (cont.)	1.35***	[1.27,1.44]	1.33***	[1.24,1.41]	1.26***	[1.18,1.35]
Type of place of residence						
urban						
rural	0.42***	[0.31,0.57]	0.48***	[0.35,0.66]	0.46***	[0.33,0.64]
Region						
Northern						
Central	1.02	[0.69,1.52]	1.00	[0.67,1.50]	1.05	[0.69,1.61]
Southern	2.21***	[1.57,3.10]	2.15***	[1.50,3.06]	1.82**	[1.24,2.66]
Poverty	0.75	[0.55,1.02]	0.77	[0.56,1.05]	0.69*	[0.49,0.96]
Age at first marriage						
16+						
<16	1.49**	[1.13,1.96]	1.39*	[1.05,1.85]	1.28	[0.96,1.71]
Sexual and or physical partner violence						
No						
Yes			1.31*	[1.02,1.69]	0.89	[0.68,1.16]
Educational differences						
Same						
Only she has			0.62	[0.35,1.09]	0.58	[0.31,1.08]
Only he has			1.47**	[1.10,1.95]	1.45*	[1.08,1.95]
Who earns more						
Same						
She			0.83	[0.41,1.71]	0.73	[0.32,1.66]
He			1.96***	[1.44,2.67]	1.74***	[1.26,2.40]
Woman owns land						
No						
Yes			0.74*	[0.58,0.94]	0.83	[0.64,1.07]
Current partner is also the first sexual partner						
Yes						
No					2.41***	[1.82,3.20]
Partner's drinking pattern						
Not						
Drinks					1.64***	[1.25,2.16]
Drinks heavy					1.67*	[1.10,2.53]
Number of sex partners in her life						
0-2						
3 or more					2.24***	[1.68,2.99]
Couple agrees on contraceptive use and children						
Yes						
No					2.21***	[1.58,3.09]

The pattern that emerged when investigating the impact of gender inequality indicators on poor maternal health, as displayed in Table 4, shows striking similarities to the pattern that emerged for the risk factors for HIV infection, with age at first marriage and educational and income disparities playing an important role. In addition to that, age at first sex also played an important role, while living in a polygamous relationship and age differences became insignificant once they were included into a model controlling for indicators of gender inequality that occur in early life or in the first relationship.

Table 4: Staged regression model for factors associated with women's reports of indicators of poor maternal health

	Model 1		Model 2		Model 3	
	AOR	CI(95%)	AOR	CI(95%)	AOR	CI(95%)
Current age (cont.)	2.71***	[2.53,2.91]	2.73***	[2.54,2.94]	2.72***	[2.53,2.92]
Type of place of residence						
urban						
rural	1.84***	[1.31,2.58]	1.59**	[1.13,2.23]	1.60**	[1.13,2.25]
Region						
Northern						
Central	1.18	[0.85,1.64]	1.15	[0.84,1.58]	1.14	[0.84,1.56]
Southern	0.95	[0.69,1.32]	0.98	[0.72,1.35]	0.99	[0.72,1.35]
Poverty	1.61***	[1.30,2.01]	1.63***	[1.30,2.03]	1.65***	[1.32,2.06]
Age at first sex						
16+						
<16	1.49**	[1.12,1.98]	1.42*	[1.07,1.88]	1.43*	[1.08,1.90]
Age at first marriage						
16+						
<16	3.06***	[2.36,3.98]	3.02***	[2.30,3.95]	3.03***	[2.31,3.97]
Lives in a polygamous marriage						
No						
Yes			1.06	[0.77,1.44]	1.08	[0.79,1.48]
Educational differences						
Same						
Only she has			0.52*	[0.28,0.98]	0.53*	[0.28,0.98]
Only he has			0.88	[0.66,1.17]	0.88	[0.66,1.18]
Who earns more						
Same						
She			0.77	[0.33,1.82]	0.78	[0.32,1.86]
He			0.60**	[0.42,0.86]	0.59**	[0.41,0.85]
Age difference						
10+ years			1.11	[0.85,1.46]	1.13	[0.86,1.49]
Couple agrees on contraceptive use and children						
Yes						
No					0.77*	[0.61,0.97]

Discussion

This study found significant overlaps in the effect of gender inequality indicators on both HIV infection risk and a score that indicates poor maternal health. Early marriage, education and income disparities and agreements over fertility are all factors that are significantly associated with both increased indication of poor maternal health and increased HIV infection risk.

Early first sex was also found to be associated with indications of poor maternal health independently across all models.

Other indicators of gender inequality and sexual autonomy or sexual risk taking that were also associated with HIV infection risk but not with indications of poor maternal health were not owning land, sexual and physical intimate partner violence, number of lifetime sexual partners, current partner not being the same as the first sexual partner, and problematic alcohol consumption by the women's current partner..

What was especially interesting to observe is that the effect of several gender inequality indicators associated with HIV infection become insignificant once factors relating to the sexual autonomy and sexual risk taking are controlled for. It can be assumed that factors

related to women's sexual autonomy and sexual risk taking are themselves strongly associated with indicators of gender inequality.

Future research needs to ascertain in more detail which indicators of gender inequality are most important. Different to the risk factors for HIV infection, the findings of this study show that indicators of gender inequality are important factors to reduce HIV infections risk and to improve maternal health indicators of women.

As with all cross-sectional studies utilizing existing population based survey data there are several limitations that need to be acknowledged. First, this study is based on cross-sectional data and therefore gives no indication of the causal directions of the associations it established. Given the lack of strong information on maternal health, this study had to measure poor maternal health through the use of a proxy indicator, and therefore can only capture a woman's increased likelihood of experiencing poor maternal health. Linked to that, not all risk factors for HIV and poor maternal health are measurable within a cross sectional survey or are available in this particular dataset. This is especially true for poor maternal health, since limited information is available in the DHS about complications during pregnancy, delivery and postpartum. In addition, no inferences could be made about the effect of laws and policies on gender inequality, HIV infection risk and indicators on poor maternal health. More particular to this particular datasets are issues around missing data, since data to several questions were only available for a subsample of women since the questions were only posed to women who were currently married or lived with a partner. This affected the measurement of partner's age, alcohol consumption or decision making. This is problematic since women who might have more casual partners are likely to have an increased HIV infection risk. Similarly, it cannot be ruled out that social desirability and reporting biases affected the measurement of certain indicators, such as decision making abilities in the relationship, attitudes and whether the couple agrees on the number of children. It is assumed that these measurement errors led to the finding that women who do not agree with their partner on their fertility, including contraception and the number of children, should have a lower risk for indications of poor maternal health.

Implications for further research:

This study investigated the risk factors for poor maternal health and HIV in a generalized epidemic, the associations may be different in a concentrated epidemic. Furthermore, the studies used a fairly limited measure of poor maternal health. Further research, utilizing data with improved measurements of maternal health and mortality are needed

An important potential pathway for improved maternal health and for women's ability to access HIV related care and treatment is their ability to access health services. Further research to explore the extent to which different indicators of gender inequality (including living in a violent relationship) does impact on health seeking behaviour is needed. To date most evidence on this issue does suggest that women who are experiencing violence do use health services more than women in non-violent relationships. However, this use of health services is probably related to the direct health impacts of the violence that they are experiencing (such as outpatient and emergency care), and it is not clear whether violence is a barrier to accessing maternal and HIV related services.

Implications for practice:

Our findings give support to the growing recognition that the Millennium Development Goals need a concerted effort by the international community and countries alike to meet their targets. This work supports previous analyses that suggest that MDG3 on gender inequality underpins the achievement of MDG 5 and 6. In particular, the links shown between early

marriage, education and income disparities and disagreements over fertility were found to be significantly associated with both poor maternal health and increased HIV infection risk.

Our findings are supported by the broader academic literature showing the strong linkages between gender equality and women's empowerment and their reproductive health status, education and employment opportunities and poverty reduction (ADD REFERENCES).

UNAIDS has already responded to this by prioritizing gender equality in its recent strategy: *Getting to Zero*. In addition, the new strategic *Investment Framework*, UNAIDS has defined gender equality as a critical enabler for the basic programmatic interventions to ensure results. However, there is the danger that with increasingly limited resources, priority setting initiatives result in a focus of investment on the more 'downstream' interventions. The findings from this analysis highlights that addressing gender inequality is not a luxury for maternal health and HIV programmes, but an important component of comprehensive programming, that is needed to ensure that future ambitions to eliminate HIV and go to zero are achieved.

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