

**Research Supporting and Related to Undetectable = Untransmittable (U=U)**

**Pivotal Research on HIV Sexual Transmission / The Underlying Science Proving U=U**

<b>Name of Study</b>	<b># of Condomless Sex Acts</b>	<b>Date</b>	<b>Link to Study</b>
HPTN 052	1,763 couples (not measured by individual condomless sex acts)	August, 2016	<p>Summary: <a href="http://www.aidsmap.com/news/jul-2011/treatment-prevention-5n-hptn-052-study-shows-96-reduction-transmission-when-hiv-positive">http://www.aidsmap.com/news/jul-2011/treatment-prevention-5n-hptn-052-study-shows-96-reduction-transmission-when-hiv-positive</a></p> <p>Study: <a href="https://www.nejm.org/doi/full/10.1056/NEJMoa1600693">https://www.nejm.org/doi/full/10.1056/NEJMoa1600693</a></p>
Opposites Attract	12,447 acts of condomless anal sex among 152 couples, zero linked transmissions when HIV+ partner was undetectable and HIV- partner not on PrEP.	July, 2018	<p>Summary: <a href="#">No HIV transmissions from HIV-positive partner seen in Australian gay couples study</a></p> <p>Study: <a href="https://www.thelancet.com/journals/lanhiv/article/PIIS2352-3018(18)30132-2/fulltext">https://www.thelancet.com/journals/lanhiv/article/PIIS2352-3018(18)30132-2/fulltext</a></p>
PARTNER 1:	~58,000 condomless sex acts with zero transmissions when undetectable  888 couples	July, 2016	<p>Summary: <a href="#">More confidence on zero risk: still no transmissions seen from people with an undetectable viral load in PARTNER study</a></p> <p>Study: <a href="#">Sexual Activity Without Condoms and Risk of HIV Transmission in Serodifferent Couples When the HIV-Positive Partner Is Using Suppressive Antiretroviral Therapy   HIV   JAMA</a></p>
PARTNER 2:	~77,000 condomless sex acts w/ zero transmissions when undetectable  Addtl 635 gay couples from PARTNER1	May, 2019	<p>Summary: <a href="#">Zero transmissions mean zero risk – PARTNER 2 study results announced</a></p> <p>Study: <a href="https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(19)30418-0/fulltext">https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(19)30418-0/fulltext</a></p>

### Research on U=U and surrounding attitudes

Name of Study / Article	Date	Main Takeaways	Link to Study
<p>U=U – A Destigmatizing Message Inconsistently Communicated by Clinicians to PLHIV (Abstract 223) José M. Zuniga, PhD, MPH President/CEO, IAPAC</p>	<p>June, 2018</p>	<p>Overview:</p> <ul style="list-style-type: none"> <li>U=U is not consistently integrated into practice by clinicians (notably PCPs); HIV-positive patients with undetectable viral loads are thus not hearing message</li> <li>33% of providers are not sharing the information with their patients</li> <li>Education/support regarding science behind U=U and how to communicate message to HIV-positive patients with undetectable viral loads is needed</li> </ul> <p>Notes:</p> <ul style="list-style-type: none"> <li>Provider rationale for not sharing: <ul style="list-style-type: none"> <li>“U=U negates personal responsibility.” – “Patient abandons treatment but continues thinking U=U.”</li> <li>“Being undetectable reduces risk, but there is still a risk.”</li> <li>“Adherence is not 100%.”</li> </ul> </li> <li>Providers surveyed: 587</li> </ul>	<p><a href="#">U=U – A Destigmatizing Message Inconsistently Communicated by Clinicians to PLHIV</a></p>
<p>NAM aidsmap: “Most UK clinic staff now tell people about U=U, but not always in the same way”</p>	<p>April, 2019</p>	<p>Overview:</p> <ul style="list-style-type: none"> <li>In the UK, most clinic staff are now telling people about U=U, but are often doing so in inconsistent ways and at varying times.</li> <li>Some patients are also misunderstood or developed inaccurate beliefs, such as believing U=U applies to breastfeeding.</li> </ul> <p>Notes:</p> <ul style="list-style-type: none"> <li>Some healthcare providers are waiting to tell someone about U=U until they have an undetectable viral load.</li> <li>Bloomsbury Clinic survey canvassed 81 patients and 31 healthcare workers</li> <li>BHIVA Study surveyed 270 providers</li> </ul>	<p><a href="#">Most UK clinic staff now tell people about U=U, but not always in the same way</a></p>
<p>Understanding the perception and potential promise of U=U and TasP among sexual minority men (SMM) in the U.S., Rendina et al</p>	<p>June, 2019</p>	<p>Overview:</p> <ul style="list-style-type: none"> <li>The vast majority of HIV+ sexual minority men said U=U made them feel better about their HIV status.</li> <li>Virtually no SMMLWH (sexual minority men living with HIV) had heard about TasP/U=U from their medical providers</li> <li>Compared to research in 2016, a greater</li> </ul>	<p><a href="https://58b1608b-fe15-46bb-818a-cd15168c0910.filesusr.com/ugd/de0404_f6a6dc8f1323">https://58b1608b-fe15-46bb-818a-cd15168c0910.filesusr.com/ugd/de0404_f6a6dc8f1323</a></p>

		<p>proportion of HIV-negative and HIV-unknown men believed in U=U from 2017-18.</p> <p>Notes:</p> <ul style="list-style-type: none"> <li>• Disbelief in U=U appears directly related to a lack of understanding of TasP with fewer than 1 in 5 HIV+ men and substantially fewer HIV-men believing a lack of risk during sex with an HIV+ and undetectable partner – it does not appear to be about the wording of U=U</li> <li>• Among HIV+ men, fewer than half overall understood that TasP was associated with “essentially no risk” of transmission.</li> <li>• Total surveyed: 111,747</li> </ul>	<a href="#">4cf484aab8bbc16807af.pdf</a>
North Carolina AIDS Action Network Public Opinion on HIV Policy in Seven Southern States	July, 2019	<p>Overview</p> <ul style="list-style-type: none"> <li>• Only a small minority (12-18%) of residents across seven states in the Southern United States believes the statement “People living with HIV who regularly take their medication, and achieve viral suppression, cannot transmit HIV through sexual contact.”</li> <li>• Total surveyed: 4,306</li> </ul>	<a href="#">Breaking Survey Data: Public Opinion on HIV Policy in Seven Southern States</a>
U=U in Practice: Results from a Midwest Provider Survey, MATEC and Minnesota Department of Health	September, 2019	<p>Overview:</p> <ul style="list-style-type: none"> <li>• Most providers had heard of U=U and self-reported that they discussed U=U with their patients; ½ thought there were potential clinical ramifications and ⅓ thought there were potential legal ramifications</li> <li>• ⅓ thought patients would be more likely to engage in sexual risk taking behaviors</li> <li>• Physicians are most comfortable discussing U=U in absence of condoms or PrEP, PAs and Nurses the least.</li> <li>• There is a need for education for providers around consistent messaging, especially among those who do not have a lot of experience or many HIV patients</li> <li>• The public health benefit, getting patients to be more adherent and retained in care, and that PLWH have the right to accurate information are the most convincing arguments for healthcare providers to discuss U=U</li> </ul>	<a href="#">U=U in Practice_Final.pptx</a>
“Growing acceptability of Undetectable = Untransmittable but widespread misunderstanding of	December, 2019	<p>Overview:</p> <ul style="list-style-type: none"> <li>• Study of nearly 112,000 men who have sex with men in the United States has found increasing acceptance of the U=U message in this population.</li> <li>• Overall, 38% agreed that U=U was completely</li> </ul>	<a href="#">Growing Acceptability of Undetectable = Untransmittable</a>

<p>transmission risk: Findings from a very large sample of sexual minority men in the United States.” Rendina et al.</p>		<p>accurate</p> <ul style="list-style-type: none"> <li>• Among those who agreed that U=U was “completely accurate,” only 31% and 39% believed transmission risk is zero when the insertive or receptive partner, respectively, has undetectable virus.</li> <li>• Individuals with lower perceived risk of HIV transmission through any form of condom-less anal sex were more likely to accept U=U</li> </ul>	<p><a href="#">able but Widespread Misunderstanding of Transmission Risk</a></p>
<p>Merck and Prevention Access Campaign: “Owning HIV: Young Adults and the Fight Ahead”</p>	<p>December, 2019</p>	<p>Overview:</p> <ul style="list-style-type: none"> <li>• Nationwide survey of millennials and Gen-Z individuals</li> <li>• Only 31% of HIV+ respondents (254/750) reported that “undetectable” meant that a person living with HIV cannot transmit the virus sexually.</li> <li>• Nearly 50% (412/846) of HIV-negative respondents believed the virus could be transmitted when someone is undetectable.</li> <li>• 28% of HIV-negative millennials said they have avoided hugging, talking to or being friends with someone with HIV</li> </ul> <p>Notes:</p> <ul style="list-style-type: none"> <li>• Almost all respondents living with HIV (90%) agree that someone may avoid sharing their status because of the fear of losing friends or family, or experiencing mental, physical or emotional abuse</li> <li>• 41% of HIV-negative Gen Z respondents said they were either not at all informed or only somewhat informed about HIV, compared to 23% of HIV-negative millennials.</li> </ul> <p>1,596 total people surveyed</p>	<p><a href="#">New Survey of Young Adults Uncovers Low Levels of Accurate Knowledge About HIV</a></p>
<p>The Well Project, “Together We Are... Making an Impact: The Well Project Survey Report” Measuring Impact of U=U</p>	<p>December, 2019</p>	<p>Overview:</p> <ul style="list-style-type: none"> <li>• 85% of women surveyed were either very familiar or extremely familiar with U=U</li> <li>• 78% were very confident or extremely confident in U=U</li> <li>• 72% said U=U had a significant or tremendously positive impact on their lives</li> <li>• 64% had not heard it from their healthcare providers</li> </ul> <p>239 total women surveyed</p>	<p><a href="https://www.thewellproject.org/news-press/well-project-user-survey-results-together-we-are">https://www.thewellproject.org/news-press/well-project-user-survey-results-together-we-are</a></p>
<p>JIAS: “I just believe there is a risk”</p>	<p>March, 2020</p>	<ul style="list-style-type: none"> <li>• Despite awareness that effective ART use eliminates HIV transmission risk, there is both a</li> </ul>	<p><a href="https://onlinelibrary.wi">https://onlinelibrary.wi</a></p>

<p>understanding of undetectable equals untransmissible (U=U) among health providers and HIV-negative partners in serodiscordant relationships in Kenya</p>		<p>lack of in-depth knowledge and conviction about the strategy among health providers and HIV-negative partners in serodiscordant relationships.</p> <ul style="list-style-type: none"> <li>• New strategies that go beyond communicating the science of U = U to consider the local social and clinical environments could maximize the effectiveness of U = U.</li> <li>• Concerns that communicating the U=U message to ppl w//HIV would: <ul style="list-style-type: none"> <li>○ lead them to engage in multiple sexual relationships.</li> <li>○ being blamed if HIV transmission occurred</li> <li>○ Stop using condoms (risk compensation)</li> </ul> </li> </ul>	<p><a href="https://doi.org/10.1002/jia2.25466">doi.org/doi/full/10.1002/jia2.25466</a></p>
<p>Deutsche Aidshilfe More and more people know: HIV is not transmittable during treatment</p>	<p>June, 2020</p>	<p>Overview:</p> <ul style="list-style-type: none"> <li>• A representative survey commissioned by Deutsche Aidshilfe in April 2020 shows knowledge about the non-transmissibility of HIV during treatment has nearly doubled in Germany, from 10% in 2017 to 18% in 2020.</li> </ul>	<p><a href="#">More and more people know: HIV is not transmittable during treatment</a></p>
<p>Undetectable equals untransmittable (U = U): awareness and associations with health outcomes among people living with HIV in 25 countries</p>	<p>July, 2020</p>	<ul style="list-style-type: none"> <li>• Those in the study who reported being informed of U=U by their health care provider (HCPs) (66%, 1,588/2,389) reported more favourable health outcomes - increased viral suppression, adherence, and treatment satisfaction - than those reporting they were not informed by their HCPs</li> <li>• 1/3 (34%, 801/ 2389) of PLWHIV were not being told about U=U by their healthcare provider, with men who have sex with women the least likely group to have been given this information</li> <li>• 1/3 women living with HIV (34%, 196/571) reported their HCPs had not told them about U=U and did not believe that maintaining effective treatment prevents transmission</li> </ul>	<p><a href="https://sti.bmj.com/content/early/2020/07/29/sextrans-2020-054551">https://sti.bmj.com/content/early/2020/07/29/sextrans-2020-054551</a></p>
<p>'...if U equals U what does the second U mean?': sexual minority men's accounts of HIV undetectability and untransmittable scepticism</p>	<p>July, 2020</p>	<ul style="list-style-type: none"> <li>• Most Sexual Minority Men (SMM) understood undetectability as a marker of HIV treatment success and a 'low risk' of being able to sexually transmit HIV.</li> <li>• Many men discussed their reluctance to incorporate a partner's undetectable HIV status into their sexual decision-making and revealed fears associated with knowingly</li> </ul>	<p><a href="https://www.tandfonline.com/doi/full/10.1080/13691058.2020.1776397">https://www.tandfonline.com/doi/full/10.1080/13691058.2020.1776397</a></p>

		<p>having sex with someone who is HIV-positive.</p> <ul style="list-style-type: none"> <li>The sexual stigma attached to HIV and condomless anal sex remain durable among some sexual minority men</li> </ul>	
<p>Awareness and Acceptability of Undetectable = Untransmittable Among a U.S. National Sample of HIV-Negative Sexual and Gender Minorities</p>	<p>September, 2020</p>	<p>Overview:</p> <ul style="list-style-type: none"> <li>U=U messaging can boost HIV prevention efforts by neutralizing the stigma associated with being HIV-positive which, in turn, may increase uptake in HIV testing and treatment (i.e. viral load and thus infectiousness toward partners).</li> <li>Our findings underscore the need to continue developing strategies to spread community awareness and build trust around the message of U=U.</li> </ul> <p>Notes:</p> <ul style="list-style-type: none"> <li>In total, 85.5% of participants (n=5,000) reported having heard of U=U.</li> <li>Among those aware of U=U, 42.3% indicated they trusted it, 19.8% did not, and 38.0% were unsure about it.</li> <li>Latinx, Asian, lower income, and Southern participants were less likely to have heard of U=U.</li> <li>Having had a recent clinical discussion about PrEP or being a former-PrEP user were associated with trust in U=U.</li> </ul>	<p><a href="https://bit.ly/3j0iSwh">https://bit.ly/3j0iSwh</a></p>
<p>“Treatment Is More Than Prevention: Perceived Personal and Social Benefits of Undetectable=Untransmittable Messaging Among Sexual Minority Men Living with HIV.” Rendina et al.</p>	<p>October, 2020</p>	<p>Overview:</p> <ul style="list-style-type: none"> <li>The benefits of U=U go above-and-beyond the well-documented health benefits of viral suppression, suggesting that providers should consider routinely initiating conversations with patients around the multifaceted benefits (personal health, sexual safety and intimacy, increased self-image, and reduced social stigma) of viral suppression.</li> </ul> <p>Notes:</p> <ul style="list-style-type: none"> <li>Approximately 80% of SMM-LHIV reported that U=U was beneficial for their self-image and societal HIV stigma</li> <li>58.6% reported it made them feel “much better” about their own HIV status</li> <li>40.6% reporting it had the potential to make HIV stigma “much better.”</li> </ul> <p>30,361 sexual minority men (SMM) surveyed</p>	<p><a href="https://www.liebertpub.com/doi/10.1089/apc.2020.0137#.X44Phx4!EoM.twitter">https://www.liebertpub.com/doi/10.1089/apc.2020.0137#.X44Phx4!EoM.twitter</a></p> <p><a href="#">U=U improves gay men's sense of self and many believe it will reduce HIV-related stigma</a></p>

**Research on Implementation of U=U and Population-Level Effects**

Name of Study	Date	Main takeaways	Link to Study
CROI 2020: HIV incidence fell by three-quarters in Australian gay men, with strong association with treatment as prevention	March, 2020	<p>Overview</p> <ul style="list-style-type: none"> <li>Between 2012 and 2017, there had been major increases in treatment uptake for HIV-positive gay and bisexual men, with subsequent drops in viraemia.</li> <li>This decreased level of community viraemia was strongly associated with a reduction in the number of men diagnosed HIV positive in this period.</li> <li>A significant point is that this relationship existed prior to the introduction of PrEP in these Australian states.</li> <li>U=U is a public health strategy</li> </ul> <p>Notes:</p> <ul style="list-style-type: none"> <li>The study took place in Australia's two most populous states, New South Wales and Victoria from 2012 to 2017.</li> <li>Data was taken from 67 sites including sexual health clinics, hospitals, general practices and community testing sites.</li> <li>The final longitudinal cohort consisted of a total of 115,982 gay and bisexual men (101,143 of these were HIV negative while 14, 839 were HIV positive).</li> </ul>	<a href="https://www.aidsmap.com/news/mar-2020/hiv-incidence-fell-three-quarters-australian-gay-men-strong-association-treatment">https://www.aidsmap.com/news/mar-2020/hiv-incidence-fell-three-quarters-australian-gay-men-strong-association-treatment</a>
CROI 2020: African studies show that lowering viral load in the community reduces HIV incidence, but is not enough to eliminate HIV	March, 2020	<p>Overview:</p> <ul style="list-style-type: none"> <li>Pooled data from over a quarter of a million people, taking part in four randomised studies of 'test and treat' in sub-Saharan Africa, confirm that reducing the proportion of people with HIV who are virally non-suppressed reduced the rate of new HIV infections in those communities.</li> <li>But while the scale-up of testing and treatment was impressive, it was still not enough to halt the epidemic</li> </ul>	<a href="https://www.aidsmap.com/news/mar-2020/african-studies-show-lowering-viral-load-community-reduces-hiv-incidence-not-enough">https://www.aidsmap.com/news/mar-2020/african-studies-show-lowering-viral-load-community-reduces-hiv-incidence-not-enough</a>
AIDS2020 Roundup: "Can U=U be used to reshape HIV programmes globally?"	July, 2020	<p>Overview:</p> <ul style="list-style-type: none"> <li>Plenary: In Brazil, data shows that beyond groups directly affected by HIV, widespread awareness and acceptance of U=U remains limited in the country.</li> <li>Oral abstract: In Vietnam, broad success of the K=K campaign was dependent on the</li> </ul>	<a href="https://www.aidsmap.com/news/jul-2020/can-uu-be-used-reshape-hiv-programmes-glob">https://www.aidsmap.com/news/jul-2020/can-uu-be-used-reshape-hiv-programmes-glob</a>

		<p>following factors:</p> <ul style="list-style-type: none"> <li>○ Government endorsement of the U=U message</li> <li>○ Community leadership</li> <li>○ City campaigns in the 2 largest cities in Vietnam</li> <li>○ Getting healthcare providers onboard</li> <li>○ Finding programme “champions”</li> <li>○ Creating a national campaign</li> <li>○ Evolution to an antiretroviral prevention framework and status-neutral services</li> </ul>	<a href="#">ally</a>
Promoting Undetectable Equals Untransmittable in Sub-Saharan Africa: Implication for Clinical Practice and ART Adherence	August, 2020	<p>Overview:</p> <ul style="list-style-type: none"> <li>● U = U has consequences in HIV clinical practice in Sub-Saharan Africa (SSA), as it can influence adherence to ART and potentially decrease seroconversion and prevalence.</li> <li>● Health ministries in SSA countries should initiate policy changes that will promote U = U in HIV clinical practice.</li> <li>● U = U can be made useful in SSA with a combined clinical and social approach.</li> <li>● This concept, if expertly packaged by policy-makers, clinicians, health service providers, and HIV control programs, will help to stem the tide of the epidemic in SSA.</li> </ul>	<a href="https://www.mdpi.com/1660-4601/17/17/6163#versions-div">https://www.mdpi.com/1660-4601/17/17/6163#versions-div</a>
U=U encourages men in South Africa to test for HIV	December, 2020	<p>Overview:</p> <ul style="list-style-type: none"> <li>● When peer promoters told men that an undetectable viral load means that, if they test positive, they cannot pass the virus to sexual partners, they were more likely to go for HIV testing.</li> <li>● Peer promoters delivered 1048 invitations over 12 days. They delivered 544 invitations on the standard-of-care days and 504 on the U=U days.</li> <li>● The researchers found that rates of testing differed significantly between the two groups: 125 men returned for testing in the U=U group (25%) and 76 (14%) in the standard-of-care group.</li> </ul>	<a href="https://www.aidsmap.com/news/dec-2020/uu-encourages-men-south-africa-test-hiv">https://www.aidsmap.com/news/dec-2020/uu-encourages-men-south-africa-test-hiv</a>
US HIV infections could drop by 94% before 2030, if treatment is prioritised	December, 2020	<p>Overview:</p> <ul style="list-style-type: none"> <li>● Modelling estimates suggest that new HIV infections in the US could be reduced by as much as 94% before 2030, if the current HIV prevention budget is spent more efficiently.</li> <li>● Priorities would be linking those diagnosed with HIV to care, ensuring that they receive</li> </ul>	<a href="https://www.aidsmap.com/news/dec-2020/us-hiv-infections-could-drop-94-2030-if-treatm">https://www.aidsmap.com/news/dec-2020/us-hiv-infections-could-drop-94-2030-if-treatm</a>

		<p>treatment and getting them to the point of viral suppression.</p> <ul style="list-style-type: none"> <li>• Less money would be spent on screening low-risk heterosexuals and PrEP.</li> </ul>	<a href="#">ent-prioritised</a>
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### Journal Articles on U=U

Article Title	Journal	Authors	Date	Link to Article
U=U Taking off in 2017	The Lancet	The Lancet Editorial Board	November, 2017	<a href="https://www.thelancet.com/journals/lanhiv/article/PIIS2352-3018(17)30183-2/fulltext?elsca1=etoc">https://www.thelancet.com/journals/lanhiv/article/PIIS2352-3018(17)30183-2/fulltext?elsca1=etoc</a>
For HIV, Treatment is Prevention	NIH Director's Blog	Dr. Francis Collins	January, 2019	<a href="https://directorsblog.nih.gov/2019/01/22/for-hiv-treatment-is-prevention/">https://directorsblog.nih.gov/2019/01/22/for-hiv-treatment-is-prevention/</a>
HIV Viral Load and Transmissibility of HIV Infection: Undetectable Equals Untransmittable	Journal of the American Medical Association (JAMA)	Robert W. Eisinger, PhD; Carl W. Dieffenbach, PhD; Anthony S. Fauci, MD	January, 2019	<a href="https://docs.wixstatic.com/ugd/de0404_377537114644443fa4c6836ac7cb29c0.pdf">https://docs.wixstatic.com/ugd/de0404_377537114644443fa4c6836ac7cb29c0.pdf</a>
Providers should discuss U=U with all patients living with HIV	The Lancet	Dr. Sarah K Calabrese, Dr. Kenneth H Mayer	February, 2019	<a href="https://58b1608b-fe15-46bb-818acd15168c0910.filesusr.com/ugd/de0404_6739336ddf8047799bda35e3f58aed77.pdf">https://58b1608b-fe15-46bb-818acd15168c0910.filesusr.com/ugd/de0404_6739336ddf8047799bda35e3f58aed77.pdf</a>
Stigma impedes HIV prevention by stifling patient-provider communication about U = U	Journal of the International AIDS Society	Dr. Sarah K Calabrese, Dr. Kenneth H Mayer	July, 2020	<a href="https://onlinelibrary.wiley.com/doi/full/10.1002/jia2.25559">https://onlinelibrary.wiley.com/doi/full/10.1002/jia2.25559</a>

### Upcoming Research on U=U:

#### Phoenix Positive Pathways Study:

- “The Arizona Department of Health Services identified where a large percentage of HIV+ clients have been lost to care. This study will assess whether a geo-mapped, targeted, social media campaign delivered to this area, combined with provider-delivered education and leave-behind materials at select clinics encourages PLWHIV to return to and remain in care. This educational campaign, “Undetectable = Untransmittable” or “U=U” seeks to normalize HIV and challenge stigma and discrimination.”

#### South African Study:

- "Integrating U=U into HIV counselling in South Africa (INTUIT-SA)", will develop and evaluate U=U education materials, chiefly a video-based App, that counselors can use with PLWH receiving care at public sector facilities.
- Notes:
  - Jacob Bor, lead investigator, Boston University

#### Ontario HIV Trials Network:

- Study ongoing examining understanding, acceptance, and uptake of the U=U messaging among GBM in Ontario

#### Hunter College, New York:

- #UniquelyU: Ongoing studies done about U=U and surrounding attitudes by Jonathan Rendina at Hunter College, City University of New York