Distribution Agreement

In presenting this thesis or dissertation as partial fulfillment of the requirements for an advanced degree from Emory University, I hereby grant to Emory University and its agents the non-exclusive license to archive, make accessible, and display my thesis or dissertation in whole or in print in all forms of media, now or hereafter known, including display on the world wide web. I understand that I may select some access restrictions as part of the online submission of this thesis or dissertation. I retain all ownership rights to the copyright of the thesis or dissertation. I also retain the right to use in future works (such as articles or books) all or part of this thesis or dissertation.

Signature

_____ _____

Aaron T. Vissman, MPH Date

HIV Prevention in Transnational Communities: Developing a Model of Trust and Social Influence among Immigrant Latinos in North Carolina

By

Aaron T. Vissman

Doctor of Philosophy

Behavioral Sciences and Health Education

_____

Frank Y. Wong, Ph.D.

Advisor

_____

Michael Windle, Ph.D.

Committee Member

_____

Ralph DiClemente, Ph.D.

Committee Member

_____

Scott D. Rhodes, Ph.D., MPH

Committee Member

Accepted:

_____

Lisa A. Tedesco, Ph.D.

Dean of the James T. Laney School of Graduate Studies

_____ Date

HIV Prevention in Transnational Communities: Developing a Model of Trust and Social Influence among Immigrant Latinos in North Carolina

By

Aaron T. Vissman

MPH, San Diego State University, 2007

Advisor: Frank Y. Wong, Ph.D.

An abstract of

A dissertation submitted to the Faculty of the

James T. Laney School of Graduate Studies of Emory University

In partial fulfillment of the requirements for the degree of

Doctor of Philosophy in

Behavioral Sciences and Health Education

2015

Abstract

HIV prevention in transnational communities: Developing a model of trust and social influence among immigrant Latinos in North Carolina

By

Aaron T. Vissman

Early detection of HIV-positive status and entry into treatment is the most efficacious way to prevent the spread and/or progression of the disease. However surveillance data and cohort studies indicate Latinos in the United States (U.S.) are more likely than non-Latino blacks and whites to delay testing, present to care with an AIDS defining illness, and die within one year of learning their HIV-positive status. Recent studies have shown that U.S. immigrants from Mexico and Central America are more likely to delay testing and treatment compared to other foreign-born groups; and Latinos in southeastern settlement states may delay seeking care longer than Latinos in more established immigrant destinations. Because time lived in the U.S. and acculturation are often associated with increased behavioral risk and suboptimal health outcomes among Latinos, it is important to understand how combinations of sociopolitical and acculturative influences in new settlement areas may affect personal health assessments, socio-medical intuitions, and likelihood of HIV-testing/treatment-adherence over time.

This research develops emerging theories linking socio-acculturative factors and endorsements of trust in medical care to HIV-prevention and public health criteria. The research uses data collected in 2008-2009 from three NIH and extramurally funded studies to address three specific aims: (1) Assess validity of the adapted Wake Forest University Medical Trust Scale among Spanish-speaking men and women from Mexico and Central America; (2) Estimate structural relationships between socio-acculturative influences, self-rated health status, and HIV-testing, adjusting for length of residence in the U.S.; and (3) Examine how legal stress and medical trust modulate effects of the *HoMBReS* HIV prevention intervention. This research advances theory and measurement of psychological processes in the most rapidly growing U.S. populations experiencing the most severe AIDS-related outcomes.

HIV Prevention in Transnational Communities: Developing a Model of Trust and Social Influence among Immigrant Latinos in North Carolina

By

Aaron T. Vissman,

M.P.H., San Diego State University, 2007

Advisor: Frank Y. Wong Ph.D.

A dissertation submitted to the Faculty of the

James T. Laney School of Graduate Studies of Emory University

In partial fulfillment of the requirements for the degree of

Doctor of Philosophy in

Behavioral Sciences and Health Education

2015

Table of Contents

List of Tables

List of Figures

CHAPTER 1

Literature Review and Program of Research

Keywords: HIV/AIDS, Self-Rated Health Status, Racial/ethnic bias, Dis/fluency bias, Immigrant Status, Legal Stress, Acculturation, Language Use, Language Proficiency, Physician Trust, Researcher Trust, Medical Trust, Social Trust, Socio-medical Trust, Sojourner Social Support, Group Reasoning, Social Desirability, Sexual Risk, Eco-Social Theory, Social Cognitive Theory, Social Intuitionist Model, Dual-Process Model, Social Influences Model, Health Services Model.

Study Context and Rationale

Disparities research increasingly has measured medical mistrust as a potential HIV risk regulator [1-6]. However, the properties of Spanish language trust measures have not been thoroughly investigated. Moreover the question of how adults learn to judge the trustworthiness of medical providers and cooperate within contexts of immigration, criminalization, and language-discordant healthcare systems is open for exploration. This dissertation draws together emerging analytical frameworks for understanding human ecology, social cognition, and the role of racial/ethnic bias in population health outcomes [7-9]. It considers Alderete's *Legal Stress Index,* the *Wake Forest University Medical Trust Scale*, and *Self-Rated Health Status* as potentially useful measures in Latino population health and HIV prevention research [10-13]. Cross-sectional and longitudinal analyses examine these measures for differential-item-functioning and advance "multi-causal" understanding of socio-medical trust as a target of public health interventions [14]. Multivariate path models examine how latent and manifest variables may contribute directly and indirectly to HIV treatment disparities observed in the U.S. [15-17].

Data were collected in the U.S. during 2008-2009 when the *Secure Communities* immigration and customs law-enforcement (ICE) paradigm was first nationally implemented. This paradigm expanded Clinton-era reforms that degraded the rights of U.S. immigrants—rendering all foreign born residents vulnerable to deportation proceedings without judicial review [18, 19]. During this period about half of all HIV incidence in U.S. Latino and Asian populations was detected in foreign-born persons [15]. Mexicans and Central Americans were more likely to experience delayed testing and treatment compared to other foreign-born groups [16]; and environmental and

behavioral effects of ICE were described among researchers as exacerbating HIV testing and treatment delays in vulnerable communities [20-23].

Structural and Socio-Acculturative Influences in New-Growth Areas

Demographics, socio-political trends, and local characteristics of HIV disparities have been of particular concern in Latino "new-growth" areas (counties illustrated in the Appendix; Figure 1.1.A., Census Map 1) where history of providing bilingual and bicultural services may be limited and anti-immigrant discrimination may be high [24-26]. Under these conditions foreign born status theoretically heightens vulnerability to HIV infection and/or progression of the disease [7, 27, 28]. From a human social ecology perspective environmental differences in population density and resource availability can be manifest according to regionally enacted *societal* constructs (e.g., legally defined districts and non-/citizen political networks) which partially determine *acculturative* processes (e.g., residential patterns, language selection, incarceration rates, selection of medical treatment/provider) and distribution of health outcomes [1, 29-31]. In addition to non-/citizen status, racial/ethnic inequalities and gender inequalities also may affect expression of individual susceptibility and population distribution of HIV outcomes from an eco-social theoretical perspective [7, 32].

Accordingly, U.S. surveillance and racial/ethnic disparities research has revealed increased HIV incidence in the U.S.-Mexico border region (2003-2006) [33]. Independent studies have reported significant links from nativity, Spanish language use, "documented-status" and non-urban place of residence in the U.S. to suboptimal HIV/AIDS outcomes among Latinos [15, 20, 33-36]. Research also has revealed different patterns of HIV-survival for Latino men and women. National surveillance (1996-2004) revealed average years of life lost after HIV diagnosis is greatest for Latinos compared to other racial/ethnic groups [37]. Latino men had shorter estimated life

expectancy than non-Latino whites. However, estimates indicate Latina women may have the shortest life expectancy compared to non-Latina whites and non-Latina blacks [37]. Both Latino men and Latina women experienced greater odds of late HIV diagnosis compared to non-Latinos in the U.S.-Mexico border region [33]. However only Latino men experienced significantly greater odds of late diagnosis due to foreign born status.

Among foreign born Latinos in states like North Carolina and Georgia, men diagnosed with HIV had worse health profiles than women [17, 38]; and men were more likely to have virologic failure after achieving an undetectable HIV RNA level [38]. National and regional HIV surveillance research and disparities research described above is represented in Table 1.1. For each study represented in Table 1.1 significant structural and socio-acculturative variables are highlighted. Also represented in Table 1.1 are the federal and state level variables identified by the North Carolina Institute of Medicine as Latino population health priorities (N.C.-IOM, 2003) [39]. The rationale for improving measurement of legal stress, language use, insurance status, and socio-medical distrust was outlined carefully by the N.C.-IOM report. However, in 2011 Dennis and colleagues described persistent system-wide inabilities to evaluate migration history and address HIV treatment disparities in states like North Carolina [17]. Illustrative quotes from the N.C.-IOM report and conclusions of Dennis and colleagues (2011) and are presented in the Appendix, Figure 1.2.A.

Table 1.1. Treatment Disparities and Population Socio-acculturative Variables

Study	Year, Source of Data, Location	Study population	N; %male; %Hispanic	Socio-Acculturative	Results
Prosser 2011	2007-2010, National HIV Surveillance System, 46 states and 5 US territories	Persons diagnosed with HIV in the U.S.	N=191,967; M: 77%; H: 22%	Birth Country; Race/ethnicity	Proportion of HIV Incidence in Foreign-born Persons Percent White 3 Black 10 Latino 42 Asian 64
Espinoza 2008	2005 CDC surveillance from 33 states	≥ 13 year old Hispanics with HIV diagnosis in 2005	N=7,561; M:77%; H: 100%	Birth Country; Race/ethnicity	Late HIV Diagnosis Percent / AOR for Late Diagnosis* U.S.-born 39 / Ref. Puerto Rico 40 / 1.2 (0.9-1.5) Mexico 55 / 2.2 (1.8-2.5) Central America 59 / 2.5 (2.0-3.2) *adjusted for sex, age group, place of birth, and transmission category
Espinoza 2009	2003-2005 CDC surveillance from 48 U.S. border counties in 4 states	≥ 13 year old with HIV diagnosis	N=3,090; M: n/a; H: 46%	Birth Country; Race/ethnicity	Late HIV Diagnosis Percent / Male / AOR for Late Diagnosis* Female White 37 / Ref. / Ref. Black 37 / 1.0 (0.7-1.4) / 1. 3 (0.7-2.5) Hispanic 46 / 1.4 (1.2-1.7) / 2.2 (1.2-3.8) U.S. born 39 / Ref. / Ref. Foreign born 51 / 1.7 (1.4-2.2) / 0.9 (0.6-1.5) *adjusted for sex, age group, place of birth, race/ethnicity, and transmission category
Espinoza 2012	2006-2008 CDC surveillance from 40 U.S. states and Puerto Rico	≥ 13 year old with HIV diagnosis	n=8,533; M:78%; H:100%	Birth Country; Race/ethnicity; Urban Residence	Short HIV-to-AIDS Interval Percent / Prevalence Ratio / Adjusted PR* U.S. born 33 / Ref. / Ref. Foreign born 43 / 1.3 (1.2-1.3) / 1.2 (1.2-1.2) Urban Residence 37 / Ref. / Ref. Nonurban Residence 47 / 1.3 (1.2-1.3) / 1.2 (1.2-1.3) *adjusted for sex, age group, place of birth, residence, and transmission category
Wohl 2009	2000-2004, Los Angeles County	≥18 year old, Latino, diagnosed with AIDS and reported to Los Angeles County	N=383; M:83%; H:100%	Birth Country; Language Use	Odds ratio of Late HIV testing Unadjusted OR / Adjusted OR* Birth Country U.S. Ref. / Ref. Foreign-born 2.4 (1.4-4.0) / 0.9 (0.4-2.0) Interview Language Used English Ref. / Ref. Spanish 3.0 (1.9-4.8) / 2.9 (1.4-6.0) *Adjusted for age, birth country, language use, and history of IDU)
Torrone 2007	2000-2004, North Carolina (PRCS) Surveillance Database Records	Men (age 18-30) diagnosed with HIV between January 1, 2000, and December, 31, 2004	n=1,117; M: 100%; H:100%	Urban Residence; Prior Incarceration; Ethnicity	Late HIV diagnosis / Percent / AOR* Non-Hispanic 12 / 12 / Ref. Hispanic 29 / 29 / 2.23 (1.37-3.65) *Adjusted for urban residence, college enrollment, prior incarceration, history of IDU, use of internet to meet sexual partners, syphillisco-infection, partner with known HIV, sexual risk, age.
Dennis 2011	1999–2009 University of North Carolina Center for AIDS Research Clinical Cohort.	Patients, initiated HIV care (1999-2009)	n=853; M: 76%; H:11%	Urban Residence; Distance to clinic; Race/ethnicity	Late HIV Diagnosis Percent / Unadjusted PR / Adjusted PR* White 56 / Ref. / Ref. Black 58 / 1. 03 (0.90-1.18) / 1. 01 (0.92-1.12) Hispanic 76 / 1.35 (1.15-1.58) / 1. 31 (1.14-1.50) *Prevalence Ratio adjusted for sex, age group, distance; non/urban residence, race/ethnicity, year entering care; and transmission category
Poon 2013	2003-2008, Electronic medical and administrative databases at Thomas Street HC, Houston, TX	> 18 year old ARV-naive HIV patients; TSHC, (2003-2008)	N=1620; M: 69%; H 29%	Legal Status; Race/ethnicity; Language proficiency	Treatment Outcomes / CD4 (cells/mm3) / Optimal Retention / Suppression Achieved Undocumented Hispanic 132 / Ref. / Ref. Documented Hispanic 166 / 0.93 (0.45-1.23) / 0.69 (0.33-1.14) Black 226 / 0.65 (0.45-0.94) / 0.32 (0.45-0.94) White 264 / 0.74 (0.45-1.23) / 0.95 (0.35-2.59) *Analyses were adjusted for age, sex, HIV risk factors, marital status, income relative to FPL, baseline absolute CD4 cell count ,200 cells/mL, and baseline HIV viral load .105 copies/mL.
Harrison 2010	1996-2005, CDCsurveillance data from 25 states	≥13 year old, diagnosed with HIV between 1996 and 2004	n=220,646; M:74%; H:9%	Race/ethnicity	Estimated Life Expectancy Years (Male) / Years (Female) White 25.5 (24.9-26.1) / 21.4 (20.8-22.0) Black 19.9 (19.6-20.2) / 24.2 (23.3-25.1) Hispanic 22.6 (21.9-23.3) / 21.2 (19.8-22.7) Average Years of Life Lost* 20 y.o. / 40 y.o. / 60 y.o. White 24.4 / 16.9 / 9.3 Black 26.4 / 18.1 / 10.1 Hispanic 30.2 / 23.3 / 15.3 *AYLL calculated by subtracting ELE after HIV diagnosis from LE in general population (matched by age, sex, race, and calander year)
NC-IOM 2003	2003, North Carolina Latino Health Summary	North Carolina Residents	n/a	Federal & State Law; Federal Health System Discontinuities; Employer Regulations; Incarceration; Political Status & Civil Rights	NC Population Health Priorities* (1) Poverty & "acculturation" / (4) "Health literacy" / (7) Health resources (2) Latin American health systems / (5) Insurance laws / (8) Insufficient data (3) Language use & related barriers / (6) Migrant farmworker injury *Authors Note: Latinos are disproportionately uninsured; and more likely to work for small employers/industries with no insurance coverage. Recent immigrants are unable to qualify for publicly-funded insurance (Medicaid or NC-Health Choice). Some are afraid of seeking assistance for eligible citizen children, because this would affect their ability to obtain lawful permanent residence status.

Conceptual Framework

This dissertation responds to measurement challenges identified in U.S. population-based mortality research and eco-social health determinants research [7, 12]. This dissertation assumes responses on adapted versions of the *Legal Stress Index* (LSI) and the *Wake Forest University Medical Trust Scale* (WFUMTS) may account for latent socio-medical trust and associated HIV/AIDS risk among immigrant Latino men and women in North Carolina. In Chapters 2-4 cross-sectional and longitudinal analyses examine differences in latent variables according to nativity, English language use, non-/clinic study sample, and participation in a locally-developed small-group intervention (designed to promote HIV-screening). Chapter three specifically examines the focal relationship between marginal English language use, "better" self-rated health status (SRHS), and potential mediating and moderating variables. This inquiry extends research by Lee and colleagues (2014) demonstrating a language-SRHS bias among Latinos in U.S. mortality research [12]. Chapters 2-4 collectively address measurement gaps and theoretical problems imposed by nativity, language fluency and expressions of health and susceptibility in U.S. population based structural determinants research. These problems have been defined and investigated by Krieger, Schwarz, and others [7, 8, 12, 31, 40, 41].

Specifically this dissertation posits situated and embodied theories of socio-medical trust to account for SRHS bias and differences in HIV screening observed among U.S. Spanish speakers, including non-native English speakers, and immigrants [16]. Products of this dissertation include feasible reduced-item measures that may be administered in Spanish or English to evaluate personal/network-level effects of community or clinic-level interventions. This dissertation advances Eco-social theory [7] and SRHS-measurement theory [42] in the most rapidly growing U.S. populations

experiencing the most severe AIDS-related outcomes [17, 38]. The research includes data from three National Institutes of Health and extramurally funded studies (data collected 2008–2009) to address three specific aims. Chapter 2 assesses construct validity of medical trust among Spanish-speaking men and women from Mexico and Central America, using the adapted WFUMTS in HIV-clinic and non-clinic samples. Chapter 3 estimates the structural relationships between socio-acculturative factors, SRHS, and HIV-screening, adjusting for length of residence in the U.S. Chapter 4 tests whether 'legal stress' or 'medical trust' changed over time or modulated effects of group assignment in a randomized-control trial of the *HoMBReS* HIV-prevention intervention [43].

Structural Links and Socio-Acculturative Processes

A preliminary overarching conceptual framework for this program of research is represented in Figure 1.1. In this illustration, immigrant status and language use (including varying fluency) contribute directly and indirectly to systematic differences in evaluated health status (e.g., SRHS) and associated health outcomes (e.g., HIV-screening and HIV-regimen adherence) in transnational populations. Socio-medical trust is illustrated in Figure 1.1 as part of a feedback loop that regulates preventive health behavior and contributes cumulatively to predisposing inequalities, sub-population risks, perception of resources, need, and outcomes. Socio-medical trust is theoretically affected by local health system outcomes and the general environment, including experiences of ICE policing, public health services, and legal services.

Figure 1.1 includes Andersen's (1995) Health Services Model [**bolded**] and incorporates concepts drawn from Krieger's (1994-2012) Eco-social Theory of Disease Distribution [7, 44]. Within this framework it is assumed that English language use and experiences of translation services, legal-aid services, and social affiliations (e.g. social

support, intuitive medical trust, and insurance status), may contribute directly and indirectly to heath behaviors and health outcomes. Higher level environmental and health system variables are not included in Figure 1.1 but may be considered in future research. At higher levels differences in health system performance may come from regional variation in (HIV) pathogenicity [45], state/federal safety-net programming (e.g., Emergency Medicaid [25]), and local/federal judicial processes explicitly designed to regulate immigration and constituent cultural processes (e.g., granting refugee status or expedited deportation) [18, 22].

Recursive feedback loops illustrated within Figure 1.1 are the subject of substantive legal, social psychological, and public health discourse, but limited cross-cultural, prospective, or health-services research [9, 40, 46-49]. The hypothetical function of socio-medical trust (as represented in Figure 1.1) is defined in work by Caterinicchio (1979) Hall (2001) and others [2, 9, 50-52]. The direct pathway from English language use to evaluated health status (e.g., SRHS) is attributed to *fluency* as defined by Alter, Schwarz, and others [40, 53]. Recursive links reproducing population inequalities via service utilization and associated outcomes are supported by U.S. health-disparities research [12, 20, 30, 34]. Extended definitions of medical trust, SRHS, dis-/fluency, and other key concepts are included in the Appendix (Figure 1.3.A).

The following studies [Chapters 2-4] were designed to evaluate construct validity of factors/processes operating within this preliminary overarching framework (Figure 1.1.). Primary hypotheses (illustrated in Figure 1.1, and represented in Figures 1.2 and 1.3) are founded in (a) empirical research concluding that “the meaning of health” may be systematically different for Spanish-speaking Latinos in the U.S. [12]; and (b) longstanding assumptions that physician reputations [54] and trust-building activities are necessary elements of population health and HIV/AIDS prevention initiatives [55, 56].

Empirical research supporting these assumptions has linked the WFUMTS and other trust measures to population-health and HIV-prevention criteria [2, 11, 57]. Criteria include: self-rated health status, insurance status, insurer satisfaction, satisfaction with healthcare [11, 57]; increased HIV-related outpatient clinic visits, fewer emergency room visits, increased use of antiretroviral medications, and improved reports of physical and mental health [2]. Self-rated health status (SRHS) has also been independently linked to a range of morbidity [58] and mortality outcomes that are important for the public's health [59, 60].

Unfortunately these empirical links and their theoretical foundations are not well established in epidemiological research designed to include linguistically diverse samples or transnational populations. Measures have not been cross-validated among Spanish speakers, English speakers, and non-native English speakers in the U.S.; and few analyses have been designed to address the "unresolved and underappreciated problems" of nativity and racial/ethnic-biases in population based health disparities research [7].

The "*HoMBReS"* intervention has targeted social networks of immigrant Latinos in new growth areas, using a strategy designed to (a) strengthen bridging relationships, (b) optimize HIV-prevention resource allocation, and (c) increase knowledge and advocacy for structural change in local health systems [55]. However intervention effects on network structures and socio-medical intuitions or attitudes have not been examined. Before future eco-social and multi-level research can investigate embodiment of socio-political/-institutional inequalities [14, 22] and related health outcomes among Latinos in the U.S., or evaluate trustworthiness-detection or risk-regulation hypotheses [1, 42, 53, 59, 61] using interviewer-administered measures in linguistically discordant healthcare/network models, the following empirical tasks must be accomplished:

(i) Cross-validate measurement models for medical trust in clinic and population based samples, using English and Spanish-language measures;

(ii) Test for group differences in latent medical trust and associations with correlates such as age, sex, language use, and known-groups criteria (e.g., health status, insurance status, and HIV-treatment status);

(iii) Explore the availability of intuitive “trust” and “health” to introspection; assuming that personal reports may be valid expressions of health and susceptibility [1].

(iv) Examine in/direct effects of internally consistent “legal stress” (aka, social distrust) measures; and establish behavioral correlates in sufficient samples of migrants.

(v) Test models that assume human intuitions (e.g., sense of trust and trustworthiness detection) are “products of the integration of social contextual knowledge, social semantic knowledge and basic emotional and motivational drives”, consistent with generally established social cognitive science [62].

(vi) Assess construct reliability and malleability via experimentation; and,

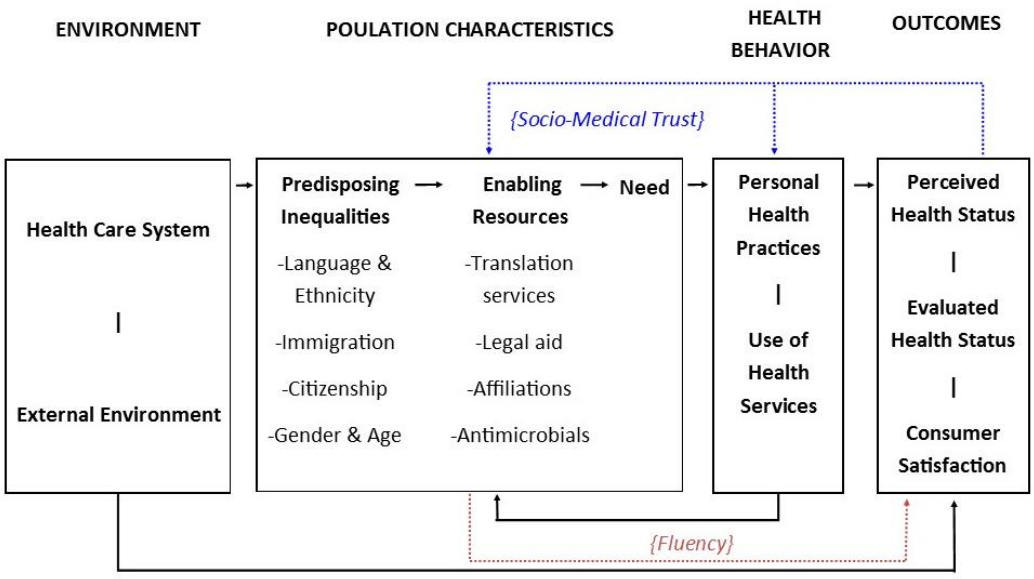
(vii) Generate/Specify/Test theories that address important empirical problems, such as the dual-process assumptions within health systems research (e.g., extending person-level theories of language fluency to underdetermined health systems models that have random effects, recursive properties, and group/structural conditions).

The overriding proposition of this program of research is that developmental and generalizable concepts of socio-medical trust and related structural conditions have the potential to limit/explain HIV-testing and treatment-delays observed among U.S. immigrants [15, 16]; and the potential to promote/explain antimicrobial drug stewardship [63] and HIV/AIDS survival.

This dissertation examines how structural conditions and associated factors [13, 22] may contribute to population-attributable risks [12, 64] and the distribution of HIV outcomes. The full context for this research includes the recent histories and policies criminalizing immigrants and persons living with HIV in the U.S. [19, 65] and the phenomenon of “acculturation” in contemporary trans-national and Pan-American communities [31]. It also includes social-network-oriented HIV-prevention interventions*;* item-response theory; social desirability bias; and emerging theories of social cognition described in the literature [66].

The proceeding sections of this chapter outline socio-medical trust research findings from different units of analysis to inform a multi-level (eco-social) foundation of research. Results from Chapters 2-4 inform a prevention science program of research using person-level data drawn from non-/clinic samples. Drawing data from (a) the *HoMBReS* randomized-control-trial, (b) respondent-driven-sampling, and (c) the WFU-infectious-disease-clinic survey, Chapters 2-4 specifically address: (1) malleability of concepts currently targeted in community-level and network-oriented HIV-prevention interventions [67]; (2) potential stratification of analyses using politically vulnerable and linguistically diverse subsamples; and (3) ways to reduce sampling and measurement error and ameliorate racial/ethnic biases in HIV prevention research and practice.

Figure 1.1. Eco-Social Framework for HIV-prevention in Transnational Populations



Notes: Measures within affiliations may include scales for medical trust, social support, social-ethnic relations, and insurance status. Items measuring difficulties with translation services and legal-aid services fall within a healthcare barriers index and a legal stress index. Length of time in treatment for HIV and self-reported patterns of antiretroviral adherence are measures of health behavior associated with antimicrobial resources among clinic-based participants. Among community-based participants, measured outcomes and health behaviors include self-reported health status and HIV-screening in the past 12-months.

Chapters 2-3 test strong factorial invariance of the WFUMTS measurement model (across community and clinic based groups) and evaluate differences in item responses according to predisposing inequalities. Chapter 3 estimates fluency-effects in a multi-variate path model. Note that the *HoMBReS* intervention package is a community-level network-oriented intervention supported by the U.S. Centers for Disease Control. It facilitates inter-agency resource sharing and builds cooperative-skills between health-clinic administrators and 'key'-social-actors (i.e., popularly elected lay-health-advisors). As part of the intervention, groups and organizations are trained to generate innovative cooperative solutions to problems using the *HoMBReS* curriculum. Chapter 4 examines differences in latent constructs within an individual-level RCT of this curriculum.

Introduction to the Literature

From 2007 to 2010 there were 16% (N=30,995) of persons diagnosed with HIV in the U.S. who were born in a different country, and of those 41% were born in Mexico or Central America [15]. Foreign-born persons diagnosed with HIV were more likely to be Hispanic/Latino and to have acquired HIV through heterosexual transmission [15]. Compared to U.S.-born Latinos, immigrants from Mexico and Central America have greater odds of late HIV diagnosis (AOR 2.2 and 2.5 respectively), are more likely to have an opportunistic infection at HIV diagnosis, and experience increased risk of death [16]. Because length of residence in the U.S. and measures of acculturation are often associated with increased behavioral risk and mixed morbidity/mortality outcomes in Latino populations [68-71], it is important for prevention research to more narrowly articulate how combinations of structural and socio-acculturative influences may affect/bias medical trust and self-rated health status in new settlement areas, where HIV-screening and medication adherence programs appear to be limited [17, 38].

Study Area and Theoretical Context

Understanding the combination of personal and situational factors that may affect sense of trust, limit delays in HIV testing, and promote long-term medical adherence among Latinos in North Carolina (NC) is particularly important given the region's rapid disproportionate population growth, large unauthorized and "undocumented" subpopulation, and the state's limited public health infrastructure [72-75]. In NC the Latino population is disproportionately male, less educated, and comprised of a higher percentage of working-age adults (1990-2010) [74]. HIV and sexually transmitted infection (STI) rates are 3 and 4 times higher among Latinos living in NC than among non-Latino whites, and these numbers likely underrepresent the magnitude of the epidemic among Latinos, given the multilevel barriers to accessing counseling and

testing services [39, 76]. Purposive samples of immigrant Latinos in NC indicate that while illicit drug use is low, patterns of partner concurrency, use of sex workers, and inconsistent condom use are comparable to, or higher than, more established settlement areas [77-79]. State level data show that among men and women, Spanish-preferring Latinos in NC report less healthcare access and greater HIV risk [80].

In the area of HIV and sexual health, there is broad evidence in recent years that length of residence in the U.S. including acculturation (i.e., adopting the attitudes, values, beliefs, and behaviors of English-speaking North American culture) is associated with worse health profiles among Latinos [68, 69]. Unidirectional unilinear concepts of acculturation are associated with increased behavioral risk, reduced health screening, and suboptimal HIV outcomes [69, 81] [28, 82-85]. Recent studies have also reported "balanced acculturation," bilingualism, and "Spanish-dominant acculturation" may be linked to increased HIV testing, intentions to test, and other psycho-social correlates of HIV testing in the U.S. However these studies often examine second or multi-generation samples without examining structural risks and "socialization and selection norms" [86] that are specific to first-generation immigrants in transnational communities [28]. These oversights in surveillance and prospective research, and the lack of valid measures, could obscure racial/ethnic biases that "set-the-stage" for sub-population treatment delays and intergenerational health risks [6, 22, 65].

For example Whol (2009) reported that HIV treatment delays in Los Angeles were largely explained by Spanish-language use (AOR: 2.9, 1.4-6.0) over and above foreign-born status (AOR: 0.9, 0.4-2.0) after adjusting for multiple HIV risk factors [34]. Researchers in Texas adjusted for language use and HIV-risks, but not foreign-born status [20]. They demonstrated that "undocumented" Hispanics entered care later than "documented" Hispanics. In the same study Poon and colleagues (2013) also reported

that “undocumented” Hispanics had the best odds of retention in care and the best odds of viral suppression. In unrelated research from Texas that did not account for language use or ‘documented’ status, late HIV-diagnosis (i.e., CD4 <200 cells/mm^3) was associated with greater healthcare system trust scores in bivariate analysis [6]. Compared to other groups in Graham’s study, Latinos reported significantly higher trust scores, for healthcare system trust and physician trust, after adjusting for multiple risk factors.

Findings from these studies (and other studies represented in Table 1.1) identify possible risk and protective factors among Latinos using clinic based cohort data and surveillance data. However, these studies offer vague HIV-prevention recommendations because each study failed to sufficiently account for: birthplace, time in the U.S., degree of Spanish/English proficiency, degree of legal stress, and comorbidities. These interrelated factors may each contribute to rates of health service utilization and item-response biases among Latinos, particularly those living in new growth areas [30, 71].

This dissertation is designed to pay specific attention to variation in English-language use and indicators of legal stress reported by NC immigrants whose first language is Spanish. In NC-based research, ICE-247(g) law-enforcement policies have recently been studied for county-level effects, and researchers discovered no significant differences in prenatal care utilization [22]. However qualitative themes of “profound distrust” and avoidance of health services were discovered among Spanish speakers with limited English proficiency.

Examining marginal differences in English language use on latent socio-medical trust scores across non-/clinic samples in Chapters 2-4 may help to identify differences in latent medical-care attitudes and/or intuitions that are uniquely attributable to language-use, “patient”-status, and “legal”-status. This approach also may improve

understanding of how socio-acculturative influences theoretically "bias" SRHS and other expressions of health and susceptibility [87]. Additional analyses are designed to illuminate whether or not existing small group HIV-prevention interventions improved rates of HIV-screening by ameliorating effects of legal stress, or by increasing participants' latent trust in medical care providers [13]. Improved measurement, structural, and predictive models developed in Chapters 2-4 may be used in future multi-level research to evaluate efforts to improve health and stem per-person/per-year costs of HIV prevention, possibly by incorporating regional, jurisdictional, and/or clinic-level variables [23].

Population Distribution of Socio-Medical Trust

In population based research within the U.S., adults' self-reported trust in medical providers has been shown to vary significantly across metropolitan statistical areas [88]. At the person or patient level greater reported trust in medical providers is associated with increased age, white race, greater education, higher family income, smaller household size, health insurance coverage, better physical and mental health, and perceived quality of care [2, 9, 88, 89]. Unfortunately, epidemiological research exploring social or medical trust within the context of HIV care-seeking in politically marginalized southern communities is quite limited [2, 3, 90]. Therein evidence of self-reported *mis*trust is often explained by exposure to violence and discriminatory institutions in the "Deep South" (i.e., Alabama, Georgia, Louisiana, Mississippi, North Carolina, and South Carolina).

In research adjusting for perceived racial discrimination, whites in this region have been shown to unexpectedly endorse higher levels of medical mistrust compared to blacks [50]. In multilevel research, neighborhood disadvantage and residential instability have been associated with medical "*competence* distrust" and "*values* distrust"

[3]. In this research Shoff and colleagues demonstrated that the association between race and values distrust was empirically explained by neighborhood instability (while competence distrust was not associated with race) [3]. In multi-level models adjusting for number of health conditions healthcare access and other variables, medical competence distrust and values distrust scores were each associated with degree of personal stress experienced in the past year. However, only competence distrust was significantly related to healthcare access (i.e., insured β= -0.212; regular-source-of care β= -0.227); and Hispanics were excluded from analyses.

At the largest unit of analysis, Zak and colleagues have shown that interpersonal trust is correlated with countries' gross domestic product [56]. However, there are few if any examples where socio-medical trust has been evaluated in multilevel experimental research, outside of the RAND health insurance experiment [91]. Importantly, while interpersonal trust has been the target of numerous behavioral-economic (game-theory) experiments none of these have targeted trust in medical providers; and the RAND health insurance experiment was designed to understand capitation, fee-for-service arrangements (and moral hazard) –not personal medical intuitions, communication-dis/fluency, or delays in medical treatment.

Indeed very few experiments have been explicitly designed to change participant endorsements of trust in physicians, trust in medical researchers, or trust in public-organizations, institutions or governments [52, 92]. Where *patient-provider communication* has been specifically targeted among linguistic minority groups in the U.S., significant differences have not been reported [47]; and some community-level health promotion interventions have effectively "back-fired" (e.g., South Carolina's social-marketing campaign designed to limit Spanish-speakers' use of antibiotics and other antimicrobials) [48, 93].

Significance of Proposed Research

According to most ecological public health models macro and community-level influences are thought to operate directly and indirectly on individuals via stressful exposures and proximal socio-normative influences [86]. This dissertation presents an emerging eco-social research framework that includes Andersen's Health Services Model and incorporates elements of Krieger's theory of disease distribution [7], along with the "risk-regulator" concept proposed by Glass and colleagues [1, 14]. As Illustrated in Figure 1.1 this framework identifies predisposing inequalities described in the literature and specific pathways by which socio-medical trust and language discordance may hypothetically 'up-regulate' or 'down-regulate' HIV-risk in transnational populations via patterns of medical screening and adherence [2, 3].

Analyses in Chapters 2-4 specify measurement models and evaluate structural pathways by which evaluated-health-status and HIV-screening could be systematically biased among Latino immigrant men and women. Chapters 2-3 investigate endorsements of trust in medical providers and medical researchers, and estimate the marginal probability of experiencing different legal stressors. Chapter 2 was specifically designed to test (for internal consistency and measurement invariance) a two-factor Spanish-language model of trust. This model identifies indicators of trust in medical *providers* and trust in medical *researchers* for use in future HIV cascade-of-care research. Factorial invariance is compared across HIV-clinic and community-based samples. Chapters 2-3 examine 'medical trust' and 'legal stress' measures for item-response-bias according to subgroup vulnerabilities described in the literature. Chapter 4 evaluates change in latent 'stress' and 'trust' constructs among men who participated in a randomized-control-trial of the *HoMBReS* HIV-prevention curriculum.

A primary aim of Chapter 3 is to better understand the SRHS-"bias" in Latino population-based research. This effect is important because SRHS provides a counterexample to the so-called "Latino Health Paradox" –wherein less acculturated Latinos typically have better health outcomes than the socio-economic gradient would otherwise predict [94, 95]. SRHS is considered to be a counterexample because less acculturated immigrant Latinos generally report "worse" health than their U.S.-born counterparts (adjusting for age). However, Lee and Schwarz demonstrated that groups of older Spanish speakers and non-native English speakers have unstable reports of SRHS –resulting in low predictive validity when mortality is the criterion of interest [64]. Lee and Schwarz conclude that Latino health disparities estimates in the U.S. may be routinely based on false measurement assumptions when using the CDC-recommended SRHS metric [12, 96]. Yet to date the language-SRHS relationship and the predictive validity of SRHS has not been investigated among immigrants or among relatively healthy groups of young adults.

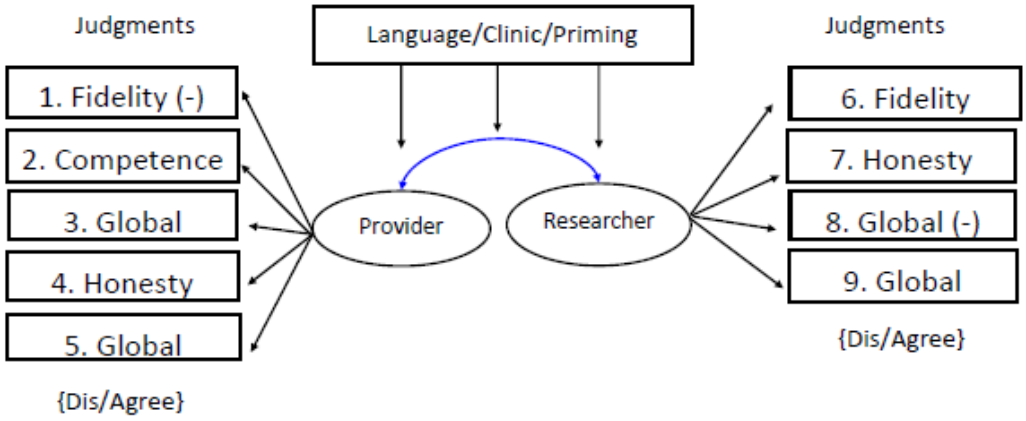
Although models proposed in this dissertation are not definitive, this dissertation was designed to address intervention potency, and develop measures for HIV prevention interventions delivered at person, clinic, and community levels, pursuant to NIMH Division of AIDS and Health Behavior Research priorities. By combining three datasets this research increases the power to detect robust effects using structural equation models (SEM). The application of SEM to existing data offers several advantages related to the cost and efficiency of this research. The next section describes statistical modeling approaches used in Chapters 2-4 to test hypothetical construct validity and directional hypotheses.

SPR.1. Modeling Categorical Indicators of Latent Variables

SEM is a confirmatory technique for conceptually derived *a priori* models [97]. SEM accounts for measurement error, and allows for multiple dependent variables in a model, where variables are allowed to correlate, and not simply be adjusted-for [97]. In Chapters 2-4 SEM is used to test group differences in multi-sample analysis; strength of association in path models; and strength of prediction and construct reliability in a longitudinal model.

In Chapter 2 the unique dimensions of medical trust described by Hall and colleagues (e.g., *competency, fidelity, honesty*) [9] –these are presumed to be indicators of a single latent construct ("intuition" or "attitude") consistent with results of prior empirical analyses [11, 98, 99]. As illustrated in Figure 1.2 the single-factor model is extended to two theoretically distinguishable medical *provider* and medical *researcher* constructs. As represented in Figure 1.2 the residual variances for *fidelity* indicators (items 1 and 6) are theoretically independent. Residual variances for global indicators (e.g., items 3 and 5) are also independent, as are all other item residuals. As represented in Figure 1.2 any residual variance for items is considered error after identifying the underlying factors of *provider* and *researcher* trust using theoretically associated indicators. The two-factor Spanish language WFUMTS is comprised of nine statements (judgments read aloud by administrators). Strength of dis-/agreement is measured using four response categories, with no midpoint, and a fifth "Don't Know" response option.

Figure 1.2. Wake Forest University Medical Trust Scale: Two-Factor Model



In Chapter 2 the model illustrated in Figure 1.2 is tested for bidimensionality and factorial invariance across non-/clinic samples. The primary goals of Chapter 2 include: (a) identify items with unique or extreme thresholds in clinic and non-clinic samples – items that participants may find *impossible* to disagree with; (b) identify participant subgroups that may respond differently to negatively-worded statements (i.e., items 1 and 8) as demonstrated elsewhere [3, 50, 51, 99]); and (c) confirm latent-variable associations with "known groups" criteria, including age, HIV-treatment status, and health-insurance status [9].

In order to modify the conventional measurement model for 4-point (strongly-agree, strongly-disagree) indicators, latent underlying variables are linked to observed categorical responses via threshold models, yielding probit measurement models [100]. Each ordinal observed response y_{ij} is related to a latent continuous response y^*_{ij},

$$\boldsymbol{y}*_{ij} = \boldsymbol{v} + \boldsymbol{\Lambda\eta}_j + \boldsymbol{K}\boldsymbol{x}_{2j} + \boldsymbol{\epsilon}_j$$

Here $\boldsymbol{v}$ is a vector of intercepts, $\boldsymbol{\Lambda}$ a factor loading matrix, $\boldsymbol{K}$ a regression parameter matrix for the regression of $\mathbf{y}^*_j$ on observed explanatory variables x_{2j} and $\boldsymbol{\epsilon}_j$ a vector of unique measurement errors [100]. It is assumed that:

$$y_{ij} = \begin{cases} 0, if -\infty < {y^*}_{ij} \leq \kappa_{1i} \\ 1, if\ \kappa_{1i} < {y^*}_{ij} \leq \kappa_{2i} \\ 2, if\ \kappa_{2i} < {y^*}_{ij} \leq \kappa_{3i} \\ 3, if\ \kappa_{3i} < {y^*}_{ij} \leq \infty \end{cases}$$

For the dichotomous case it is assumed that:

$$y_{ij} = \begin{cases} 0, if -\infty < {y^*}_{ij} \leq \kappa_{1i} \\ 1, if\ \kappa_{1i} < {y^*}_{ij} \leq \infty \end{cases}$$

Thus, there are three thresholds for each item when considering responses on the adapted WFUMTS. There is a single threshold to consider for responses on the Legal Stress Index (LSI), where participants respond “Yes” or “No” on each of five items. WFUMTS and LSI items and translations are included in the Appendices: Chapter 2 Table 2.1.A and Chapter 3 Table 3.1.A.

Threshold estimates may be used to consider the “difficulty” of participants transitioning from “Strongly Disagree” to “Disagree”, from “Disagree” to “Agree”, and from “Agree” to “Strongly Agree” in response to each WFUMTS item (e.g., *“*Medical researchers treat people like guinea pigs”). In Chapter 2 item-difficulty comparisons are made for clinic and community based samples.

In Chapter 3 threshold models are used to estimate the marginal probability of experiencing events included in the *Legal Stress Index* (e.g., “Have you had difficulties finding legal services?”). Thresholds for a 5-item index are estimated first in a measurement model. Results are then compared to those in a formative factor model where one index-item (i.e., “Have you been questioned about your documentation status?”) is treated as an independent exposure. Additional “causal” variables are regressed on a formative factor model for legal stress in subsequent models.

Attention to these modeling techniques is particularly important for valid measurement when the nature of the relationship between a latent trait (or factor) and its

indicators may be non-linear and the differences in item salience (or difficulty) should be captured using factor scores; also, when language or cultural differences may contribute to specific factor or item uniqueness that should not be conflated with error variance [100] [101].

Additional steps are necessary for validating measures when personal or situational characteristics are expected to bias participant responses. In Chapters 2-3 multiple indicator multiple cause (MIMIC) models are used to test whether Clinic-sample, Study-sample (including context/interviewer effects) or socio-demographic traits/characteristics explain differential item functioning (DIF).

Assessing DIF involves testing unique contributions of exogenous variables ('causes') on manifest variables (WFUMTS and LSI items) over and above effects on latent factor variance, and examining the corresponding factor loadings and factorial structure. Literature on socio-medical trust supports examining potential biases related to sex, age, and education status. Possible differences according to sexual orientation, language fluency, national origin, and legal status are also supported by the literature [49].

SPR.2. Evaluating Measurement Invariance in Non-/Clinic Samples

Assessing measurement invariance across groups can involve multiple tests [100, 102]. From least to most restrictive these include: configural invariance, weak factorial invariance, partial strong factorial invariance, strong factorial invariance, and strict measurement invariance. Configural invariance implies that the form of the measurement and structural models are equivalent across groups (i.e., no parameters that exist for one group are constrained to zero for another group), but all of the parameter estimates are allowed to differ. Weak factorial invariance furthermore assumes that factor loadings are equivalent for the two groups. Partial strong factorial

invariance constrains some but not all intercepts [/thresholds] leaving a subset to be estimated across groups. This standard is usually considered when strong invariance deteriorates model fit. Strong factorial invariance assumes that all indicator intercepts [/thresholds] and factor loadings are equal across groups. Strict (or full) measurement invariance adds explicit equality constraints for the residual variances for the groups in question [103].

SPR.3. Hybrid Model Estimation

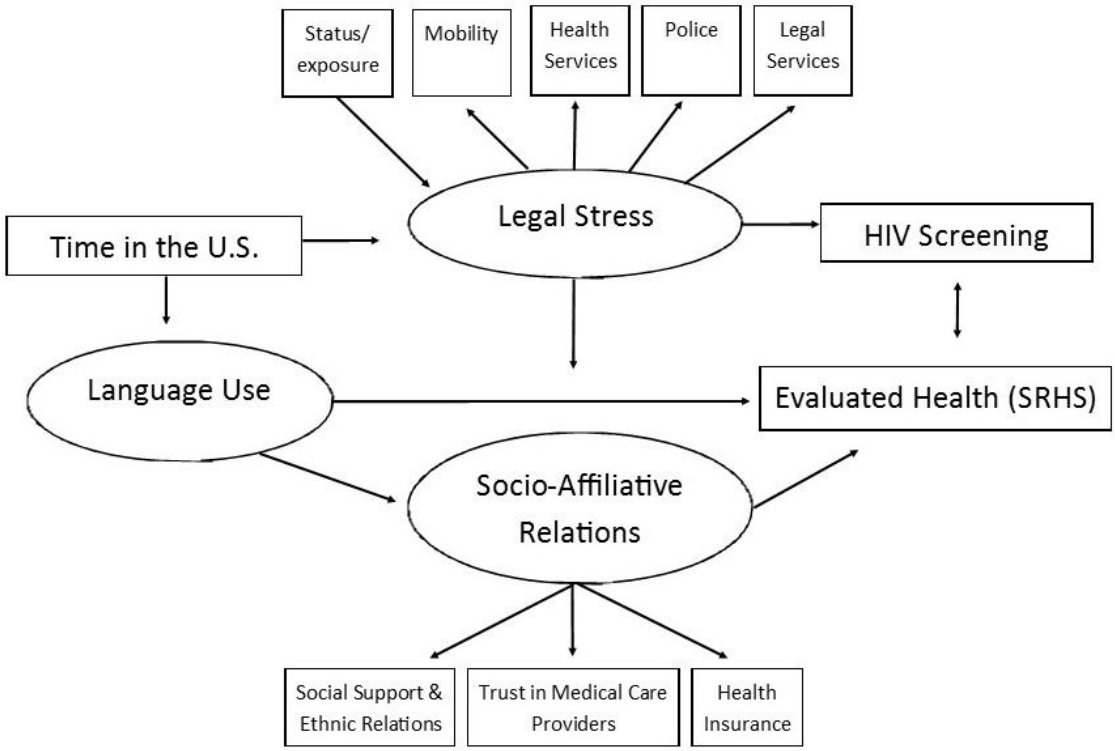
Analyses in Chapters 3-4 test path models that include results of Chapter 2 factor analysis. Using hybrid models, Chapter 3 tests theoretical assumptions about how structural conditions (including time lived in the U.S. and degree of legal stress) may facilitate or constrain social-ethnic relations and sense of trust in medical care. These effects theoretically moderate and mediate the association between English-language fluency and “better” health status. Chapter 4 tests theoretically moderating effects of legal stress on HIV-screening, in the context of a randomized-control-trial. It also examines factorial structure of latent ‘stress’ and ‘medical trust’ (among men) at baseline and 3-month follow-up.

Chapters 2-4 use the limited information estimation approach suggested by Muthén and Skrondal for probit models with multivariate-normal latent responses [102, 103]. This approach estimates first the tetrachoric correlations (pairwise, between latent responses); next the asymptotic covariance matrix of the tetrachoric correlations; and finally the parameters of the model, using weighted least squares, fitting model implied to estimated tetrachoric correlations. The inverse of the asymptotic covariance matrix of the tetrachoric correlations serves as the weight matrix [102].

The final preliminary model (illustrated in Figure 1.3) represents a full hypothetical model for investigating the internal consistency of the LSI and multivariate

socio-acculturative effects on population health criteria. The arrows illustrated in Figure 1.3 represent three directional hypotheses regarding marginal English-language use and time lived in the U.S. First, adjusting for time in the U.S. and age, legal stress will be inversely associated with HIV-screening. Legal stress is indicated by experiences of mobility constraints, health services constraints, avoiding police, and difficulties with legal services. Second, the association between marginal English language use and "better" SRHS will be explained in-part by socio-affiliative relations (social support, social-ethnic relations, and medical trust) –these potential mediators are measured using multi-item scales, subject to preliminary factor analyses. Lastly, any significant language-SRHS associations will be moderated by effects of legal stress. This hybrid formative-factor model is estimated in Chapter 3 and particular constructs are re-tested for reliability in Chapter 4. Preliminary data screening (for country and language inclusion criteria) and preliminary factor analyses are reported in Appendix A.

Figure 1.3. Dual-process Model of Language Fluency and Legal Stress



CHAPTER 2

Trust in Medical Providers and Medical Researchers: Construct validity among Latino immigrants in HIV-clinic and community based samples

Key Words: Medical Trust; Provider Trust; Researcher Trust; Immigration; Legal Stress; HIV screening; antiretroviral adherence; Non-native English Speakers; Spanish Language Scales

Abstract

Prevention and adherence research is hampered by a lack of psychometrically validated Spanish language instruments that measure subjects' trust in medical care. This study was therefore designed to aggregate data from three immigrant health studies which administered an abbreviated two-factor Spanish-language version of the Wake Forest University Medical Trust Scale (WFUMTS) and investigated construct validity. Analyses tested measurement dimensionality and invariance across HIV-clinic and community based samples. Analyses examined distribution of latent factor scores according to socio-acculturative variables and health criteria. Using probit models and confirmatory factor analysis there was evidence of intermediate bi-dimensionality for the adapted *medical-provider* and *medical-researcher* trust measure among native Spanish speakers (n=370) from Mexico and Central America. There was partial-strong measurement invariance across clinic and non-clinic samples.

Structural differences indicate that latent factor variance among community based participants was more attributable to endorsements of global trust and less attributable to endorsements of medical treatment decisions. In exploratory analyses anticipated fear of police had significant negative effects on WFUMTS factor scores among clinic-based participants. Ranking trust in U.S. doctors compared to non-U.S. doctors emerged as a relatively strong single-item correlate of latent trust scores among community-based participants. Failure of negatively-worded WFUMTS items; residual variance for *honesty* indicators; differential effects of language-related social influences across groups; and weak or negative associations with insurance status and other "known groups" criteria are discussed.

Introduction

Developers of the Wake Forest University Medical Trust Scale (WFUMTS) have defined trust as a "global attribute of treatment relationships", one that may require "optimistic acceptance of vulnerability" [9]. The WFUMTS measure of trust in medical providers has been correlated with general satisfaction, patient satisfaction, willingness to recommend friends, and other treatment related variables [6, 11, 99, 104]. The WFUMTS measure of trust in medical researchers has been applied less widely. Its correlates include personal health status, prior participation in medical research, and willingness to participate in a hypothetical research study [98].

To date most research investigating trust in medical providers/researchers/systems has been limited to English-speaking participants in the United States with U.S.-based health insurance and/or recent experience with clinical care [6, 11, 52, 98]. These limitations have resulted in a failure of research to publish Spanish-language measures [9, 52, 105]; and limited understanding of how structural conditions associated with social stress and sense of medical distrust may contribute to personal susceptibility and progression of disease [2, 3, 50, 51] [6, 16, 17, 20]. This study was designed to address gaps in the literature by examining responses on a Spanish-language version of the WFUMTS –a measure adapted for Latino population-based research and HIV-prevention research conducted in the southeastern U.S. [106].

It is assumed in this study that items measuring trust in medical providers and researchers may be uniquely biased and/or collectively affected by personal traits/characteristics, and external situational conditions experienced by immigrant Latinos living in the southeastern U.S. By cross-validating the adapted WFUMTS measurement properties among study participants in infectious-disease clinic and community-based samples and identifying covariates, this study examines latent medical

trust as a situated, embodied, and potentially measurable “risk regulator” that may be investigated in future HIV-prevention and cascade-of-care research [1, 14].

Analytical Approach

This study was specifically designed to examine responses on adapted WFUMTS subscales and identify covariates of latent medical trust within a largely uninsured and Spanish-dominant immigrant population living in North Carolina. Study samples were drawn from North Carolina based on the state’s disproportionate Latino population growth from 1990 to 2010 [74]; North Carolina’s early participation in local-federal immigration and customs law enforcement partnerships [22]; and the immigrant population’s vulnerability to HIV-infection [15, 17, 28, 76].

Analyses assume participant ratings on adapted WFUMTS subscales are indicators of latent constructs regarding medical providers and medical researchers in transnational communities [1, 9, 66]. Research goals were to (a) confirm acceptable factor loadings as demonstrated elsewhere [11, 98, 99, 104]; (b) identify items with unique or extreme thresholds in HIV-clinic and non-clinic samples –items that participants may find impossible to disagree with; and (c) confirm latent-variable correlations and associations with “known groups” criteria including age, health insurance status, medical treatment status, self-rated health status, and patterns of antiretroviral adherence [6, 9].

Analyses were expected to reveal structural differences between infectious-disease-clinic and community based samples (i.e., factors for provider trust and researcher trust more internally consistent and less inter-correlated among clinic-based participants). Data were expected to support strong bi-dimensionality assumptions of the adapted 9-item two-factor WFUMTS and strong measurement invariance (i.e., equivalent factor loadings and thresholds) across groups [100]. Exploratory path

analyses were expected reveal similar effects for exogenous variables on endogenous medical trust variables.

Methodological Overview

To accomplish this research, data were drawn from three studies conducted at Wake Forest University (WFU) School of Medicine during 2008 and 2009 [43, 107, 108]. Studies were originally designed to evaluate and address HIV risk among immigrant Latinos (age ≥18) living in North Carolina. Primary aims included: (1) estimate prevalence of use of non-medical sources for prescription drugs, using respondent driven sampling (RDS) methods [107]; (2) test the efficacy of an HIV prevention intervention designed for heterosexually active men, using venue based (purposive) sampling methods [43]; and (3) identify correlates of antiretroviral adherence, using chart reviews followed by nurse and project-staff recruitment of all Latinos who were receiving HIV treatment at the WFU infectious disease clinic [108].

Across studies assessments were designed to be administered by members of a WFU-trained project staff who were native Spanish speakers. Assessments included many of the same socio-demographics, health status items, and previously validated Spanish language metrics, including the Short Acculturation Scale for Hispanics [109], the Index for Sojourner Social Support [110] and Alderete's Legal Stress Index [10].

Wake Forest Measures for Trust in Medical Providers and Medical Researchers

Because Spanish language measures for medical trust did not exist during assessment development (2007) items were selected from published English-language scales and pilot tested among WFU project staff, content experts, and volunteers. Items were selected on the basis of original published factor loadings and semantic approximation of English-Spanish back-translations. The adapted scale included five items from Hall's 10-item Physician Trust Scale (2002) and the four items comprising

Hall's (2006) Medical Researcher Trust Scale. Each subscale included *global* statements about "trust" (e.g., "I completely trust doctors who do medical research") and additional statements theoretically related to *honesty, fidelity,* or *competency* (e.g., "Doctors are extremely thorough and careful").[9] The adapted two-factor 9-item measure included one negatively-worded item from each of Hall's original subscales.

Original subscale formats were modified by eliminating "Neither Agree nor Disagree" midpoints and adding "Don't Know" response options. For the provider subscale, in place of "[your doctor]" adapted items refer to "Doctors" in general. This modification allowed responses from participants who had no personal doctor or primary healthcare provider. It also aligned with the general wording of original researcher trust items. Consistent with extant empirical analyses [11, 98, 99, 104] Hall's theoretically unique "dimensions" of trust (i.e., *competency, fidelity,* and *honesty*) were each presumed to be indicators of a single latent factor –one that is generalized to provider and researcher role representations when statements are read aloud by trained interview administrators. The hypothetical first-order two-factor measurement model for the adapted WFUMTS is represented in Figure 2.1. Item translations and adapted scales are reported in the Appendix (Table 2.1.A.).

Figure 2.1. First Order Two Factor Model for Trust in Providers and Researchers

---

Figure 2.1
About Here

As represented in Figure 2.1 the two-factor measure is comprised of nine statements that participants are asked to endorse. Participants rate their strength of agreement or disagreement after each item is read aloud. As represented in Figure 2.1 residual variances for each item are presumed to be independent and not generated by

theoretically distinguishable dimensions of trust (e.g., fidelity) after identifying underlying *provider* and *researcher* trust constructs using theoretically linked subscale indicators.

Examining Construct Validity: Measures selected from clinic and community samples

Original clinic and community based studies were each designed to measure age and health related variables that have been empirically linked to medical trust in the literature [46, 52, 98, 111]. Given the implicit network of theoretical associations and absence of a specific criterion for validation, these variables and additional socio-acculturative variables (including social stress indicators [3]) were selected to investigate construct validity [112].

Community Sample: selected covariate measures and HIV-prevention criteria

In community-based studies (outside the clinic) the first item administered to RDS and purposively sampled participants was self-rated health status (SRHS). Participants were asked to rate their health compared to "other persons your age" (*Comparado con otras personas de su misma edad, ¿cómo clasificaría usted su salud?*); including a 5-point Likert response scale from "Excellent" to "Poor" ("*Excelente*" "*Muy Buena*" "*Buena" "Aceptable*" "*No muy buena*" "*No sé*"). Participants next reported (Yes/No) if they had any form of U.S.-based health insurance. Recent HIV counseling and or testing was assessed, after WFUMTS and other psychometric scales, within a service utilization sequence (i.e."During the past year, have you been to a clinic, hospital, health department, or doctor's office for any of the following?"). Participants in the purposive sample were additionally asked: "Do you have someone you think of as a personal doctor or professional healthcare provider" (PCP; Yes/No).

To assess healthcare barriers and form a related index, participants (only in the RDS study) were asked, "Have any of the following reasons prevented you from seeking or getting health care in the past 12 months?"; and prompted to respond (Yes/No) to 13

potential reasons (e.g., “you could not take time off work”; “you did not know if you were eligible to be seen”). RDS participants, after being administered the WFUMTS, were additionally asked to rank preference for non-U.S. doctors. Participants were asked, “Do you trust doctors in your home country more, about the same as, or less than doctors in the U.S.?”

Among socio-demographic items participants in each community sample were asked, “How old were you when you first came to live in the United States?” and “How old are you now?” Participants were lastly administered an adapted (five-item) Legal Stress Index (LSI)[10]. The LSI included exposure to legal questioning (i.e., “Have you been questioned about your documentation status [in North Carolina]?”) and indicators of social-institutional stress (e.g., “Do you avoid police and officials because of your documentation status?”). LSI response options included Yes, No, and Refuse-to-Answer.

Clinic Sample: selected covariate measures and HIV-prevention criteria

In the clinic survey, participants were first asked to report their age and, “About how long have you been taking HIV medicine?” Seven response options ranged from “less than 30 days” to “10 years or more.”

To measure antiretroviral regimen adherence clinic participants were asked, “which of the following best describes your general experience taking your HIV medications?” and rated their level of adherence on a 5-point scale ranging from “You take your pills exactly as prescribed, never missing a dose” to “You never take your pills.” Participants first rated their experience “in the past 30-days”; and again rated their experience “since being diagnosed with HIV.” Clinic participants were subsequently administered the WFUMTS, other psychometric scales, including a single legal stress

item, “How likely is it that you will encounter fear of detention by police or ICE-official?” Response options ranged from “Very Unlikely” to “Very Likely” on a 5-point scale.

Study Protocols, Participation, and Organization of Analyses

Assessment times ranged from about 40 minutes for the clinic survey to 60-90 minutes for community based studies. Protocols and primary data collection for each study were approved and overseen by the WFU Institutional Review Board. The clinic survey achieved an 80% cooperation rate (n=73). RDS procedures produced 10 recruitment waves and assessed 175 eligible participants. Purposive sampling exceeded its recruitment goal, and assessed 142 participants at baseline. In each study incentives were either $40 or $50. Additional methodological details and primary findings of each study are published elsewhere.[43, 107, 108] Study sampling and protocols are summarized in Figure 2.2.

Figure 2.2. Study Sampling and Protocols

Figure 2.2
About Here

During 2008-2009 studies recruited in aggregate 390 participants whose data were screened for inclusion in the following [secondary] analyses. Original [primary] analyses, and preliminary factor analyses of psychometric scales conducted for this study, confirmed Marin’s three-factor acculturation measure had good overall model fit. Factor correlations ($r \leq .81$) supported distinguishing between language-use, media-preference, and social-ethnic relations subscales. The social support index was analyzed according to Gilbert and colleagues [113], who recommend a reduced 11-item single-factor model for available social support. Legal stress items were analyzed individually and as index scores.

Because previous studies had not examined potential item response bias or the internal factor structure of the adapted WFUMTS (within or across groups) this was accomplished by pooling and analyzing data from all participants who responded to the measure during 2008-2009. Related methods, findings, and subsequent multi-group analyses are reported after participant characteristics in Aim 1. Further analyses examining socio-acculturative variables and study-specific criteria are reported under Aim 2.

AIM 1: CFA and Cross-validation of the WFUMTS

Non-U.S. birthplace and native Spanish speaker were inclusion criteria for this study. Preliminary data screening and analyses (using SAS 9.4 software) were conducted to assess data coverage across samples and missing at random assumptions for estimation procedures (using Mplus version 7.11). In preliminary analyses summated rating scales were computed according to published validation articles (therefore assuming equivalent incremental contribution of responses and excluding records with any values missing on particular scale items). Cross sample differences in demographics, health items, and summated scores were evaluated using chi-square and t-tests, and rank-sum tests.

Participant Characteristics and Results of Preliminary Data Screening and Analysis

Seven participants who reported a U.S. birthplace were removed from the aggregate three-sample dataset. Two participants with values 100% missing on the WFUMTS were also removed. This resulted in 71 participants from the clinic survey and a “community” sample of 310 participants (including both RDS and purposive samples). Participants in this reduced dataset were between 18 and 72 years of age and were born in either Mexico (75%) or Central America (23%) with few (<3%) reporting Cuba or other countries of origin.

Clinic-based participants were on average four years older than participants in the community sample, and reported higher scores for English language use and other acculturation subscales. For the primary criterion (clinic vs. community sample) summated trust scores for clinic participants were more than two standard deviations higher on summated subscales for *Provider Trust* and *Researcher Trust*. In samples that included women (clinic and RDS samples), summated WFUMTS scores for women were higher, but not significantly different from scores of men.

For health and demographic variables measured only in community studies (e.g., insurance status and SRHS) differences were explained in part by the exclusion of women from the purposive study sample. For example, men were equally less likely to be uninsured in comparing RDS and purposive samples after women were excluded from the analysis (71% and 67%; $X^2(1)$ 0.23, p=.63).

Data coverage was good or moderate (<10% refused/missing) for *Legal Stress* items. Therein 40% of participants in the community sample reported avoiding police or ICE-officials because of documentation status; and >50% of the clinic sample reported fear of detention (as “Somewhat likely” or “Very likely”). There was an overall cross-sample difference where RDS participants scored higher on the 5-item Legal Stress Index (LSI). Stratifying by sex did not reduce this difference. Within studies that included women sex did not account for significant differences on items constituting the LSI. Examining sex also revealed similar proportions of men and women anticipated fear of detention in the clinic sample (50% and 63%; $X^2(1)$ 0.968, p=.325). Further analyses of LSI measurement properties are published elsewhere [CH3]. Distributions of participant characteristics, data coverage, and difference test results are reported in Table 1.

Table 2.1. Participant Characteristics, Data Coverage and Summary Scores

Table 2.1
About Here

WFUMTS Item Response Distributions and Missingness

Data screening revealed considerable missingness on WFUMTS that was attributable to "Don't know" responses, and on negatively-worded items (vT1a and vT2c) in particular. Data coverage was good or moderate (<10% missing) for all other variables of interest in Aim 1. Records for two participants responding "Don't Know" to all WFUPTS items and nine additional records that were 100% missing on either WFUMTS subscale were removed from secondary analyses. Response distributions for the WFUMTS items before recoding "Don't Know" responses as missing and listwise deletion [of 11 records] are reported along with item translations in the Appendix (Table 2.1.A.).

Secondary Analysis: Modeling WFUMTS Latent Factor Variance with Ordinal Indicators

Latent variable analyses applied Mplus (version 7.11 software) and the limited information estimation approach suggested by Muthén for probit models with multivariate-normal responses. In these models, latent underlying variables for potential factors or dimensions are linked to observed categorical responses via threshold models, yielding probit measurement models. Each ordinal observed response y_{ij} is related to a latent continuous response y^*_{ij} through the equation,

$$\boldsymbol{y}*_{ij} = \boldsymbol{v} + \boldsymbol{\Lambda\eta}_j + \boldsymbol{K x}_{2j} + \boldsymbol{\epsilon}_j$$

Here $\boldsymbol{v}$ is a vector of thresholds, $\boldsymbol{\Lambda}$ a factor loading matrix, $\boldsymbol{K}$ a regression parameter matrix for the regression of $\mathbf{y}^*_j$ on observed explanatory variables x_{2j} and $\boldsymbol{\epsilon}_j$ a vector of unique measurement errors. This data analytic approach was selected based on

measurement design, data missingness, and literature suggesting “strong” endorsements of dis-/agreement may involve relatively discrete and non-incremental responses to judgments about harm or medical care. The limited information approach retains records with partial data missingness, contributing to modeling procedures that retain as many subjects and explain as much variance as possible.

CFA and MIMIC Modeling Procedures using Pooled Data

Assessing strong bi-dimensionality first involved comparisons of *graded response* models with items restricted to load only onto their theoretically designated factor, and models with items freed to cross-load on each factor. Comparisons considered modification indices, acceptable factor loadings (>0.30), and “DIFFTEST” results for evidence of strong, intermediate, or weak bidimensionality. The DIFFTEST option in Mplus is used to evaluate whether changes made to nested models are statistically distinguishable [100]. Multiple indicator multiple cause (MIMIC) models were then used to test whether clinic-sample, study-sample, or socio-demographic traits/characteristics explained differential item functioning (DIF).

Examining potential effects or biases related to sex, age, and education status is broadly supported by the empirical studies of latent social and medical trust. Examining differences according to sexual orientation, English-language fluency, national origin, and legal status is more narrowly supported by the HIV [49] and immigrant health literature [12]. Assessing DIF involved testing unique contributions of exogenous variables (‘causal’ traits and characteristics) on manifest variables (WFUMTS items) over and above effects on latent factor variance, and examining the corresponding factor loadings and factorial structure.

MGCFA: Measurement Invariance across Clinic and "Community" Samples

Cross-group validation applied assumptions of *strong factorial invariance* without which interpretation of differences in factor means, variances, and covariances between clinic and community groups is tenuous. This standard assumes that all indicator thresholds and factor loadings are equal across groups. Factorial structure assessment involves comparison of less with more restrictive standards using model fit indices. The model Chi-square, degrees of freedom (Df), Comparative Fit Index (CFI), (TLI), RMSEA and WRMR were used here to evaluate each model. When the sample size is <500 the CFI and TLI >=.90, RMSEA<=.10 WRMR<1.0, and the Chi-square/Df ratio (<3.0) can be used as indicators of acceptable model fit. These indices were also used in comparing models for dimensionality and DIF. In structural equation modeling, following Muthén's approach for probit models, we estimated first the polychoric correlations (pairwise, between latent responses); next the asymptotic covariance matrix of the correlations; and finally the parameters of each model, using *weighted least squares* (DWLS) fitting model implied to estimated polychoric correlations.[100]

Results (Aim 1)

Factor dimensionality and MIMIC Model Results using Pooled Data

Analyses were limited to n=370 including 71 Clinic participants, after listwise deletion described above. Using pooled data and factors identified using *global* trust items ordered last in each subscale (vT1e and vT2d) the strong bi-dimensionality model produced inadequate fit statistics. Fit indices were improved [to the level of interpretability] by including covariance estimates for negatively-worded item residuals. With this allowance the strong two-factor model (M0) had high Chi-square/Df ratio, but otherwise acceptable fit; with each latent factor accounting for very small variance in negatively worded items and the largest loadings for *global* indicators (vT1e and vT2d).

For other items (each positively worded) provider and researcher factors accounted for 49%-84% of per-item variance.

The null model (M0) had worse fit indices compared to an intermediate bidimensionality model (M1) which estimated cross-loadings on *global* indicators (vT1e and vT2d; DIFFTEST Chi-square [Df] 33 [2] p<.0001). Additionally estimating the negative effects of each factor on opposing provider and researcher *honesty* indicators (vT1d and vT2b) also resulted in a statistically distinguishable model (M2), but did not substantially improve fit statistics. This model (M2; including cross-loadings supported by MI>10) revealed that higher researcher trust was associated with significantly lower provider-*honesty* ratings (DIFFTEST X^2[Df] 11 [2] p<.0038). The absolute value of each cross-loading considered in intermediate bidimensionality models was relatively small ($\lambda < |0.30|$). Therefore MIMIC models examining DIF retained strong bi-dimensionality (M0) specifications with co-varying residuals for negatively-worded items.

Probing Latent Factors for Main Effects and Item Response Bias

The baseline *no-DIF* MIMIC model (M0.1) confirmed a significant positive effect of being a Clinic participant on provider and researcher trust factors (T1f and T2f) after latent variables were regressed on age, gender, sexuality, education, language use, and region of origin. For each factor there were very small (non-significant) effects of female-sex, higher-education, and age adjusting for study sample and other characteristic/trait effects. English language-use and homosexuality each had comparatively large negative effects on T1f and positive effects on T2f. However, aside from 'clinic-status', the only other statistically significant 'cause' in M0.1 was homosexuality, in its negative effect on T1f (provider trust; γ= -0.136).

Although M0.1 modification indices did not support item response bias (DIF), possible direct effects of all characteristics/trait effects on negatively worded indicators

were explored, over and above their effects on latent factor variance. This model (M0.2; evaluating item regressions) had worse fit statistics and was not statistically different from M0.1 (DIFFTEST X^2 [Df] 14.679 [14] p<.4004). However the direct effect of Clinic (β=.267) on vT2c ("Medical researchers treat people like 'guinea pigs'") was statistically significant. Comparing M0.1 to M0.3, which limited direct effects to only Clinic-status on negatively-worded indicators, produced nearly identical fit indices, leaving open the possibility of DIF, for vT2c in particular (DIFFTEST X^2 [Df] 7.816 [2] p<.0201).

After adjusting for study and clinic effects, there were generally negligible differences in thresholds and factorial structure from estimating additional characteristics/trait effects (DIFFTEST X^2 [Df] 12.393 [10] p=.2596). The largest structural change was a non-significant increase in factor correlation (*r*=0.020) from estimating variation in English language use. Fit indices for measurement models assessing bidimensionality (M0-M2) and MIMIC models examining DIF (M0.1-M0.3) are represented in Table 2.2. Estimates for these first-order two-factor models are included in the Appendix (Table 2.2.A).

Table 2.2. Model Fit Indices for Bi-dimensionality (n=370) and DIF (n=320)

Table 2.2
About Here

Threshold Estimates for WFUMTS Items

Examination of threshold estimates produced by MIMIC models (using pooled data) revealed marginal response probabilities across items were similar, and 'ranking' of response probabilities shifted slightly when adjusting for clinic effects. Here higher threshold values can be interpreted as more 'difficult' responses to endorse, or endorsements that required a higher degree of underlying/latent trust. Threshold values

from unadjusted and adjusted models (M0 and M0.4) are represented in Table 2.3. Due to insufficient data coverage (for the Clinic group) cross-group comparison of thresholds was limited; and "[Strongly-/]Disagree" responses for three manifest variables (vT1a vT1e vT2d) were collapsed for all participants in cross-group ([non-]/clinic) analysis. Thus a two (rather than three) threshold structure was applied to these three latent factor indicators for both groups in the following cross-group factorial structure assessment.

Table 2.3. Threshold Estimates for WFUTMS, adjusting for Study and Clinic effects

Table 2.3
About Here

Factorial Structure Assessment: Two-group (non-)Clinic CFA

Similar to the pooled results, allowing negatively worded items (vT1a and vT2c) to co-vary substantially improved model fit; and in both Clinic and Community groups latent factors accounted for very small variance (≤8%) in negatively worded item residuals. The standard of *strong factorial invariance* (MG0.1) produced acceptable fit indices and marginal improvements (MI>10) were not identified. Examining structural aspects of MG0.1 clinic-based participants had greater independence of factors (smaller factor correlation) and greater communalities compared to the Community group. As anticipated from data screening, factor means for medical provider and medical researcher trust were significantly lower in the Community group. The source of these differences can be observed in threshold (marginal probability) estimates, which were lower in the community group for each item.

As an example, the relatively large factor loading of vT1c compared to vT1d within each group corresponds with the higher threshold values for vT1c compared to vT1d within each group. Meaning that, in each group the expected value of T1f (Provider

Trust) was about 0.25 higher for participants who "Strongly Agree" with the statement, “A doctor would never mislead you about anything" (vT1d; Threshold 3). Considering factor loadings that ranked differently across groups (e.g., vT2a and vT2b) the difference may be attributed to particular thresholds that rank differently. For example, in the Clinic group the expected value for T2f (Researcher Trust) is 0.25 lower for vT2a on the Strongly-/Disagree threshold (Threshold 1). The same threshold was 0.08 higher in the Community group. Thus, it was relatively ‘difficult’ for Clinic participants to endorse “Strongly Disagree” in response to the statement, “Doctors tell their patients everything they need to know about being in a research study” and relatively ‘easy’ to endorse “Strongly Disagree” in response to the statement, “Doctors who do medical research care only about what is best for each patient.” The highest threshold value in both clinic and community groups was observed for (vT2c). Thus endorsing “Strongly Disagree” to the negatively-worded statement, "Medical researchers treat people like 'guinea pigs'” required the highest degree of latent trust (T2f).

Variance Explained by WFUMTS Items across Groups

Comparing communalities across groups the difference in magnitude is greatest for the statement, “You completely trust doctors’ decisions about which medical treatments are best” (vT1c) which had the largest overall factor loading within the Clinic group. Provider Trust accounted for 94% of vT1c variance in the Clinic group but only 54% in the Community group. For the Community group the largest factor loadings were for *global* indicators referencing “complete” trust (vT1e, vT2d; eg, “All in all, you trust doctors completely”). Latent factors captured about 79% of variance for each of these items. In neither group did T1f (provider trust) account for significant variance in the negatively-worded provider *fidelity* item (vT1a).

In partial-strong invariance models (e.g., MG0.1) freeing specific threshold and factor loadings with large (apparent) differences across groups (e.g., vT1b *competency* thresholds) did improve model fit statistics. However partial strong invariance models continued to include WRMR and RMSEA values in the unacceptable range. Only the partial-strong 7-item model (MG2.1; which excluded negatively worded indicators) produced estimates supporting invariance across Clinic and Community groups. Model Fit indices for 2-group (non-)Clinic CFA are reported in Table 2.4. Differences in standardized model estimates across groups for the 9 and 7-item WFUMTS can be observed in Table 2.5. These 9-item model estimates are represented in the Appendix, Figure 2.1.A.

Table 2.4. Factorial Structure Assessment: Fit indices for 2-group Non-/Clinic CFA

Table 2.4
About Here

Results Summary (Aim 1)

As anticipated, factors for provider trust and researcher trust were more internally consistent and less inter-correlated among clinic-based participants. While interpretation of steep differences in average trust scores remains tenuous due to differences in sample characteristics and differences in thresholds and factor loadings, tenuousness was reduced by eliminating negatively-worded items (as generally dysfunctional and potentially biased). There was no evidence from the pooled data analysis that latent factor scores or specific items varied significantly according to sex, age, language-use or region of origin. In models adjusted for age and other variables, greater English language use (relative to Spanish) was associated with marginally lower trust in providers; and was not associated with differential item functioning. Homosexuality was

more prevalent in the clinic sample, and was associated with significantly lower provider trust scores.

Across groups the positively-worded items in the adapted WFUMTS had acceptable factor loadings and communalities. Particular items may be of interest for future research. Specifically, in both groups provider *honesty* ratings (vT1d, “A doctor would never mislead you about anything”) were less than 40% accounted for by T1f (Provider Trust; $R^2 \leq .40$); and increased T2f (Researcher Trust) was related to significantly lower provider *honesty* ratings. In exploratory (post-hoc) models [examining each additional WFUMTS item for possible DIF] significant residual variance in vT1d was explained by increased Education (β=0.166); and Homosexuality (β=-0.144). In intermediate bidimensionality models (estimating the cross-loading of vT1d) DIF related to homosexuality was eliminated, but DIF related to education remained statistically significant.

Ultimately, analyses largely failed to account for variance from negatively worded items, which have measured common WFUMTS factor variance in prior U.S.-based research [11]. Exploratory analyses provided little evidence of item response bias, which may support treating these negatively worded items as indicators of a unique dimension of trust (an approach taken by Shoff and colleagues for distinguishing *values* and *competency* distrust) [3]. Limited evidence of DIF for *honesty* indicators supports further investigation. Sample sizes and primary study aims (i.e., exclusion of women from one sample and inconsistent application of covariate measures) limited our ability to model sex, health status, and other important traits using cross-group analyses and hold-out samples.

Table 2.5. Standardized Parameter Estimates for Strong Invariance Models

Table 2.5
About Here

AIM 2: Acculturative Influences and Known Groups Criteria

Like Aim 1 non-U.S. birthplace and native Spanish speaker were also inclusion criteria for Aim 2. Construct validity was further examined by specifying models to compare strength of associations with socio-acculturative influences and health criteria in clinic and community-based groups (using Mplus 7.11). First, the 7-item model specified above (MG2) was extended to include effects of available social support and social-ethnic relations, as possible mediators of age and English language use. For path models the Mplus "Model Indirect" commands allow tests of mediational effects (including results for direct, indirect and specific pathways). Using the DWLS estimator and model fit indices (described above) we compared the full (saturated) model with more restricted models.

Next, given the sparseness of data coverage for health insurance and other criteria measures, additional analyses were limited to independent bivariate analyses. In addition to age, insurance status, better health, and having a primary care provider, reporting relatively few barriers to health care, less personal stress, and more consistent patterns of antiretroviral treatment may also be considered '*known groups criteria'* for medical trust [104] [99] [3] [6]. Distribution of factor scores were examined according to these and other variables using independent bivariate plots and analysis of variance, including Tukey's studentized range test (using SAS 9.1).

Results (Aim 2)

Language use and Social Influences on WFUMTS Variance across Groups

Standardized path estimates revealed that within the Clinic group, where language use, social-ethnic relations and social support were more strongly interrelated, these factors explained a comparatively large amount of T1f variance and the effect of available social support on latent trust in providers was negative (T1f; γ= -0.218). In the community group social support was weakly associated with other factors and had significant positive effects on latent trust (T1f; γ= 0.218 and T2f; γ= 0.143). Social-ethnic relations appeared to regulate negative effects of English language use in this model (relations had positive effects on T1f in both groups). However, this indirect pathway was statistically significant only in the Community group. Small positive effects of age in the clinic group and negative effects of age in the community were restricted to zero in the final model estimating effects of English language use and social influences. Model fit indices, standardized path estimates, and significance tests for indirect pathways are represented in the Appendix (Table 2.3.A and Figure 2.2.A.).

Known Groups and Study-Specific Criteria

Examining bivariate distributions of WFUMTS factor scores and health criteria measured in the Clinic group revealed trends toward lower trust among those reporting less than perfect adherence and higher trust among those reporting more time in treatment. Anticipated fear of deportation had a potentially curvilinear association, where significantly lower medical-provider and medical-researcher factor scores were observed for those reporting fear was “Very Likely.” The highest trust scores were observed for those reporting fear was “Neither Likely nor Unlikely.”

Examining study specific regressions including the WFUMTS and measured criteria in Community-based studies revealed weak associations for trust and insurance

status, including a trend toward lower researcher trust among the insured. There were also weak associations for lower trust and relatively “Poor” health status; and weak associations between lower trust and greater numbers of reported healthcare barriers. These differences were not statistically significant. Among men in the purposive study, reporting affiliation with a primary care provider was not associated with significantly higher trust.

The largest differences were in considerably lower trust scores for RDS participants who reported being tested for HIV in the preceding 12 months; and also significantly lower scores among RDS participants who reported preferring doctors in their home country more than doctors in the U.S. Average trust scores tended to be higher for participants who lived in the U.S. for less than six years, and for participants who scored zero on the legal stress index. Examining distribution of factor scores across criteria revealed minor differences when comparing scores produced by the 9-item and 7-item WFUMTS. Table 2.6 includes only results from study specific regressions on the 9-item WFUMTS factor scores.

Results Summary (Aim 2)

Exploratory cross-group analysis produced evidence of qualitative differences in the effects of language use and social support in clinic and community based samples. The potential dependence of available social support on language use/availability should be addressed in future research among Latinos in care for HIV, and the potential interaction of these and other factors should be further examined in longitudinal studies.

Factor scores were not strongly related to ‘known groups’ criteria (self-rated health, insurance, having a PCP) in community samples. However, health insurance responses were nearly 30% missing for the purposive sample, indicating possible measurement problems for this item. The weak bivariate associations between trust

scores and self-rated health status, and possible language-use biases in community-based samples, are further examined in multivariable analyses reported elsewhere (Chapter 3).

GENERAL DISCUSSION

This study was designed to aggregate and analyze data from three immigrant health studies which administered the adapted Spanish-language WFUMTS during 2008 and 2009 to Mexicans and Central Americans living in North Carolina. Data were aggregated from participants in clinic and community-based samples and analyzed using a limited-information estimation approach. Results include detailed information about the distribution of adapted WFUMTS responses, latent factor structure for medical provider and medical researcher trust, and the relationships between latent trust and covariates measured across samples.

Comparing item communalities across non-/clinic groups the difference in magnitude was greatest for the WFUMTS item where participants judged doctors' medical treatment decisions (vT1c, "You completely trust doctors' decisions about what medical treatments are best"). Variance on this item was >90% accounted for by latent factor variance in the clinic based sample. In the community based sample latent trust in providers accounted for only 54% of variance produced by this item (vT1c). Results of pooled and cross-group factor analyses supported a standard of intermediate bi-dimensionality for medical provider and researcher constructs, and confirmed the hypothesis that more internally consistent and less inter-correlated factors would be discovered among individuals participating in HIV treatment. As demonstrated with previous versions of the WFUMTS, latent factor loadings for positively worded items were good or acceptable using the adapted WFUMTS. However, negatively-worded

items produced relatively high rates of “Don’t know” responses and they accounted for little variance in latent trust across subgroups in clinic and community based samples.

Differential functioning of negatively-worded items (compared to positively-worded items) has been reported in other WFUMTS validation studies [99] and in research employing alternative trust measures [3, 50, 51]. Further measurement and intervention research is necessary to understand how structural conditions, nativity, healthcare access and treatment related variables may affect responses to WFUMTS items over time.

Test-Retest Validity

Examining a small subset of WFUMTS responses available at three-month follow-up (among men in the H2 intervention) multivariate models indicated that test-retest correlations were low (T1f r=0.46 and T2f r=0.40). For negatively worded items the factor loading for vT2c improved substantially at follow-up (>0.30) while the factor loading for vT1a remained negative (<-0.20) and not statistically significant. Factors T1f and T2f were less inter-correlated at follow-up. Further details of the test-retest invariance model including estimates of intervention effects are reported elsewhere (Chapter 4). However additional research is needed to establish construct validity of Spanish language medical trust measures. In the near term, negatively worded items may be removed when using the Spanish-language WFUMTS, or scale estimates reported here may be used to weight responses.

In primary (original) studies that were conducted using this data, the adapted WFUMTS subscales were either excluded from analysis [43] or weakly associated with outcomes of interest. For example, lower scores on the 5-item provider trust scale did not significantly contribute to odds of using non-medical sources for prescription drugs in the RDS study sample (OR 1.08; 0.92–1.28) [107]. In primary analysis of WFU

infectious disease clinic data, summated (9-item, unit-weighted WFUMTS) scores were associated with more positive antiretroviral-adherence attitudes, but were not significantly associated with self-reported “100% adherence” in the past 30-days [108]. Results reported here demonstrate that using latent factor scores, in bivariate analyses, provider trust was significantly lower among clinic-based participants with the lowest level of self-reported antiretroviral adherence (<90%); and latent researcher trust was significantly lower for clinic-based participants with the highest level of legal stress. Latent provider and researcher trust scores were not strongly affected by differences in age, language use, and other socio-demographic variables. However, divergent effects on each construct may be examined in future research. Also, sexuality and level of education should each be examined in future research as possible correlates of medical distrust and vulnerability. These variables had mixed effects on latent variables and were associated with residual variance for *honesty* indicators in exploratory MIMIC models. As anticipated, much higher latent provider-trust scores and researcher-trust scores were discovered for men and women in the clinic sample compared to men and women in the community based samples. Inconsistent measurement of health-related variables and covariates in each study limited deeper investigation into group differences.

Associations between latent trust and several ‘known-groups’ criteria were not supported in this study, using a standard ($p<.05$) of statistical significance in bivariate analyses. In the community based samples latent WFUMTS scores were not significantly higher for participants who reported that they had a primary care provider, or among participants who reported that they had U.S. based health insurance. However, data missingness and other important methodological weaknesses limit conclusions that can be drawn from these statistically non-significant associations.

Exploratory path analyses were conducted to compare the effects of age, English language use, social support, and social-ethnic relations on latent medical trust in non-/clinic groups. Results reported in this study provide tentative evidence for developmental assumptions represented in Figure 2.2.A. In the clinic group participants were older and had greater English language use on average. Higher WFUMTS scores were significantly associated with available social support in the community-based sample. Whereas latent trust scores were inversely associated with available social support in the clinic sample. These effects should be further investigated within more robust statistical models using multi-level and longitudinal research designed to estimate effects of treatment relationships on patterns of health screening, adherence, health status and quality-of-life outcomes over time [7, 15].

Limitations

Original (primary) study designs and possible sampling and measurement biases limit the generalizability of these research findings. While original sampling procedures produced two groups with qualitatively different treatment relationships, prospective cohort studies and randomized experiments are necessary to draw causal inferences about how medical treatment relationships (including history of treatment and medical need) may affect underlying sense of trust in medical providers and sense of trust in medical researchers. Although response rates and cooperation rates were good in each study, it is possible that persons with the highest levels of legal stress and the lowest levels of antiretroviral adherence were excluded from this study. Future research with improved sampling and enrollment protocols may discover stronger associations than reported here, and may further evaluate recursive and nonlinear relationships.

In addition to significant differences in age and other participant characteristics (represented in Table 2.1) a range of unmeasured personal characteristics and

situational biases may also have contributed to differences reported in this study. For example, clinic based participants most likely have increased experience with psycho-social assessments, and their responses may have been differentially influenced by observer-expectancy effects and procedural bias (e.g., responding more quickly or in a more/less socially desirable manner). Potential biases related to item-priming also exist in this study because different health related questions preceded the WFUMTS items in each study's assessment. While self-rated health status was ordered first (unprimed) in the community based studies this CDC-recommended practice has come under scrutiny particularly within research that includes linguistically diverse subsamples [12].

Further research is needed to advance basic understanding of the relationships between language use, legal stress index items, expressions of health-status, other health-related quality of life items, and potentially confounding variables. Because legal stress was measured differently in clinic and community based studies, related measures were not included in non-/clinic factorial invariance models. Good internal consistency of the Legal Stress Index among community based participants and other measurement properties are reported elsewhere (Chapter 3) along with multivariate models exploring significant associations with HIV-screening and self-rated health status (Chapters 3 and 4).

Conclusion

The negative and positive wording of items in the WFUMTS and other psychometric scales can be helpful in reducing acquiescence bias. However, negatively worded items performed very poorly in this study and they have also performed poorly in a Mandarin-language WFUMTS validation study [99]. This distinction in item-wording is an important area for future cross-cultural research and may be conceptually important. For example, measures for "values distrust" (comprised entirely of negatively worded

items) and “competence distrust” (comprised entirely of positively worded items) were each associated with psychological stress among blacks and whites living in Philadelphia [3]. However, only “values distrust” was significantly associated with neighborhood instability, crime, and race/ethnicity in adjusted multi-level models; and only “competence distrust” was significantly associated with personal access to healthcare.

This is the first study to examine the latent factor structure of medical provider trust and researcher trust among Latino immigrants in the U.S. Additional multi-level epidemiological research and psychological research is needed to investigate environmental/structural conditions associated with “legal-stress”, health behavior, and changes in latent socio-medical trust over time. Future Latino population-based research in the U.S may incorporate clinically important biomarkers and theory-based interventions designed specifically for communities in the southeastern U.S. and other new growth areas with largely uninsured and Spanish-dominant immigrant populations.

Future epidemiological and psychological research may incorporate eco-social theories and theories of moral cognition, which investigate rule-recognition and structural conditions (including situational, semantic, and symbolic conditions) that may bias presumption of good intentions during interpretation of events (e.g., HIV-screening, participation in research, and regimen adherence) [7, 66]. Latino population-based research should be designed to investigate change in latent trust scores according to ‘known-groups’ criteria and exploratory socio-acculturative factors identified in this study. HIV-cascade-of-care research should be sufficiently powered to test latent variable interactions and non-linear effects of legal stress and medical distrust on behavioral correlates. This line of research should investigate clinic and community-based

interventions designed to reduce HIV-susceptibility in transnational populations disproportionately affected by HIV/AIDS [1, 7].

Figure 2.1. First Order Two Factor Model for Trust in Medical Providers and Researchers

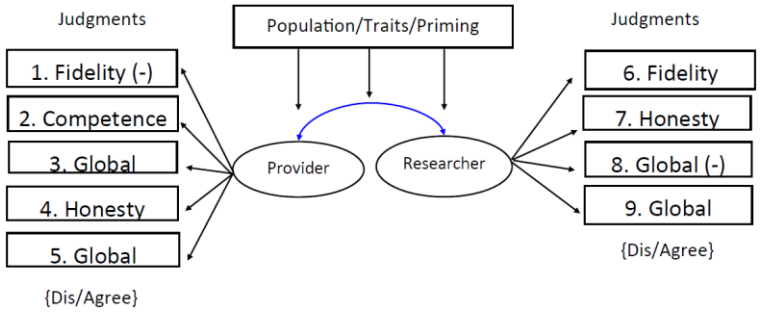


Figure 2.2. Study Sampling and Protocols

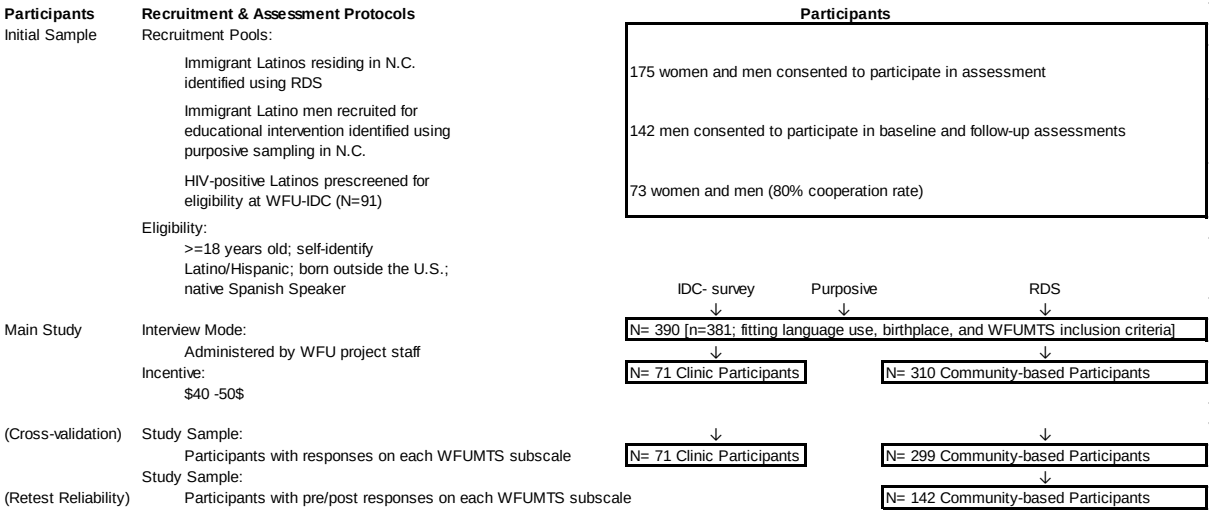


Table 2.1. Participant Characteristics, Data Coverage and Summary Scores

	Clinic Sample (N=71)		RDS (N=173)		Purposive (N=137)		Community Sample (N=310)	
Demographics & Health Criteria	*Missing %*	*n (%)*	*Missing %*	*n (%)*	*Missing %*	*n (%)*	*Missing %*	*n (%)*
Birth Country:								
Mexico		50 (70.4)		143 (82.7)		84 (61.3)		227 (73.2)
Central America		12 (16.9)		24 (13.9)		47 (34.3)		71 (22.9)
Other		9 (12.7)*		6 (3.5)		6 (4.4)		12 (3.9)
Male=0	0	52 (73.2)	8.1	59 (37.1)	0	137 (100)	4.5	196 (66.2)
Heterosexual=0	0	51 (71.8)*	5.8	157 (96.3)	3.7	128 (97.0)	4.8	285 (96.6)
Less than High School Degree=0	0	57 (80.3)*	0	121 (69.9)	13.9	77 (65.3)	6.1	198 (68.0)
Employed=0	0	34 (47.9)*	4.1	151 (91.0)	2.9	129 (97.0)	3.6	280 (93.7)
Income >$20k=0	0	3 (4.2)*	10.4	23 (14.8)	28.5	36 (36.7)	18.4	59 (23.3)
Health Insurance, (Uninsured=0)			2.9	137 (81.6)	29.2	65 (67.0)*	14.5	202 (76.2)
Health Status (Rated Excellent)			0.6	25 (14.5)	4.4	23 (17.6)*	2.3	48 (15.8)
Tested for HIV (past 12-months)			1.7	85 (50.0)	11	44 (36.1)*	5.8	129 (44.2)
Time in treatment for HIV (10 years or more)	0	10 (14.1)						
Acculturative Factors		*mean (SD)*		*mean (SD)*		*mean (SD)*		*mean (SD)*
Age	0	37.3 (10.1)*	3.5	34.3 (10.2)	5.1	31.9 (10.6)	4.2	33.2 (10.4)
Age first emigrated to the U.S.			5.2	22.2 (9.0)	5.1	20.9 (7.9)	5.2	21.7 (8.6)
Years lived in the U.S.			5.8	11.8 (7.0)	5.1	11.0 (7.6)	5.5	11.4 (7.3)
Marin Short Acculturation Scale								
Language Use (5-items)	1.4	8.3 (3.8)*	2.9	6.8 (2.5)	2.9	7.3 (2.4)	2.9	7.0 (2.5)
Media-preference (3-items)	4.2	7.6 (3.9)*	2.9	5.2 (2.7)*	1.4	6.3 (3.0)*	2.2	5.7 (2.9)
Social-Ethnic Relations (4-items)	7	9.8 (3.1)*	7.5	6.9 (2.1)	9.5	7.4 (2.2)	8.3	7.1 (2.1)
Sojourner Social Support (11-items)	1.4	16.2 (8.8)	5.2	16.5 (7.3)	11.7	18.5 (9.5)	8.1	17.4 (8.4)
WFU Medical Trust Scales								
Medical Provider (5 item)	0	17.9 (2.1)*	20.2	13.4 (2.1)	33.6	14.3 (2.3)	26.1	13.8 (2.2)
Medical Researcher (4 item)	0	13.1 (2.1)*	24.3	10.7 (1.7)	39.4	11.3 (2.0)	31	10.9 (1.8)
Legal Stress Index (5-item), median (IQR)			1.2	2 (2)	2.2	1 (2)*	2	1 (2)
Likely to encounter fear of police or ICE-officials, n (%)	0	38 (53.5)						

* Significant ($p<.05$) difference across the three independent samples using chi-square, t-test or Wilcoxon rank sum test. Note: Clinic (Infectious Disease Clinic at Wake Forest University); RDS (Respondent Driven Sample); Purposive (venue based and snowball sample of men for the *HoMBReS-2* HIV-prevention intervention. Responses on age items (and their computed difference) were used to approximate time lived in the U.S.

Table 2.2. Model Fit Indices for Bi-dimensionality (n=370) and DIF (n=320)

Model		Chi-sq	Df	p	CFI	TLI	RMSEA [90% CI]	WRMR
M2	Intermediate Bidimensionality with *global* and *honesty* cross-loadings	66	21	<.0001	0.990	0.983	0.076 [0.056 0.097]	0.737
M1	Intermediate Bidimensionality with *global* cross-loadings	74	23	<.0001	0.989	0.983	0.078 [0.058 0.098]	0.779
M0	Strong Bidimensionality [neg-item covariance]	102	25	<.0001	0.984	0.976	0.091 [0.073 0.110]	0.918
M0.4	MIMIC: clinic effect, and neg-item regressions on Clinic	173	93	<.0001	0.973	0.969	0.052 [0.040 0.064]	1.183
M0.3	MIMIC: study clinic and trait effects, and neg-item regressions on Clinic	190	79	<.0001	0.963	0.95	0.066 [0.054 0.078]	1.027
M0.2	MIMIC: study clinic and trait effects, and neg-item regressions on all exogenous variables	204	65	<.0001	0.954	0.923	0.082 [0.069 0.095]	0.997
M0.1	MIMIC: study clinic and trait effects	204	81	<.0001	0.959	0.945	0.069 [0.057 0.081]	1.084

Note: Multiple Indicator and Multiple Cause (MIMIC) models included Latent Factor (T1f and T2f) regressions on Study, Clinic, Sex, Age, Education, Sexuality, Language-Use (Marin's 5-item factor score), and native region

Table 2.3. Threshold Estimates for WFUTMS, adjusting for Study and Clinic effects

			Model 0 (CFA, N=370)			Model 0.4 (MIMIC, n=320)		
Parameter			Est	Est	Est	Est	Est	Est
Thresholds			T1	T2	T3	T1	T2	T3
	Provider							
v1.	Fidelity	[T1a]	-1.805	-0.037*	1.126	-1.476	0.409*	1.683
v2.	Competency	[T1b]	-1.905	-0.856	0.738	-1.683	-0.513*	1.355
v3.	Global	[T1c]	-2.061	-0.814	0.674	-1.432	-0.138*	1.659
v4.	Honesty	[T1d]	-1.571	-0.819	0.444	-0.969	0.187*	1.481
v5.	Global	[T1e]	-1.903	-0.690	0.709	-1.518	-0.216*	1.571
	Researcher							
v6.	Fidelity	[T2a]	-1.819	-0.991	0.922	-1.477	-0.652	1.421
v7.	Honesty	[T2b]	-1.854	-0.752	1.009	-1.551	-0.375*	1.568
v8.	Global	[T2c]	-1.674	-0.194	1.262	-1.756	-0.180*	1.324
v9.	Global	[T2d]	-1.815	-0.579	0.939	-1.849	0.465*	1.316

*Not significant p-values (>.05). Note: Exogenous variables in M0.4 include Clinic effects; including item regressions of Clinic on v1 and v8. Note: for positively worded items T3 is the Agree/Strongly-Agree threshold; and T3 is the Disagree-Strongly-Disagree threshold for v1 and v8.

Table 2.4. Factorial Structure Assessment: Fit indices for 2-group Non-/Clinic CFA

Model		Chi-sq	Df	p	CFI	TLI	RMSEA [90% CI]	WRMR
	Strict Invariance	213	71	<.0001	0.950	0.949	0.104 [0.088 0.120]	1.984
MG1	Strong Invariance (9-item)	180	70	<.0001	0.961	0.960	0.092 [0.076 0.109]	1.660
MG1.1	Partial Strong Invariance	166	69	<.0001	0.966	0.964	0.087 [0.070 0.104]	1.582
MG2	Strong Invariance (7-item)	93	41	<.0001	0.981	0.980	0.083 [0.061 0.106]	1.279
MG2.1	Partial Strong Invariance (7-item)	81	40	<.0001	0.985	0.984	0.074 [0.051 0.097]	1.168

Table 2.5. Standardized Parameter Estimates for Strong Invariance Models

	Strong Invariance MG1 (9-item)						Strong Invariance MG2 (7-item)					
		Clinic			Community			Clinic			Community	
Parameter	Est (SE)	Est (SE)	Est (SE)	Est (SE)	Est (SE)	Est (SE)	Est (SE)	Est (SE)	Est (SE)	Est (SE)	Est (SE)	Est (SE)
Thresholds	T1	T2	T3	T1	T2	T3	T1	T2	T3	T1	T2	T3
Provider												
v1 [T1a]	***	-0.333 (0.123)	0.743 (0.161)	***	-0.373 (0.131)	0.832 (0.144)	..	..	..	..	..	..
v2 [T1b]	-2.114 (0.303)	-1.634 (0.213)	-0.804 (0.138)	-4.953 (0.575)	-3.829 (0.567)	-1.884 (0.553)	-2.159 (0.313)	-1.634 (0.219)	-0.728 (0.135)	-4.618 (0.490)	-3.496 (0.469)	-1.558 (0.452)
v3 [T1c]	-2.408 (0.332)	-1.762 (0.215)	-0.852 (0.149)	-4.980 (0.559)	-3.646 (0.547)	-1.763 (0.531)	-2.483 (0.336)	-1.777 (0.220)	-0.781 (0.148)	-4.664 (0.483)	-3.337 (0.453)	-1.467 (0.435)
v4 [T1d]	-1.566 (0.238)	-1.229 (0.181)	-0.608 (0.124)	-3.882 (0.445)	-3.047 (0.437)	-1.509 (0.430)	-1.649 (0.235)	-1.272 (0.179)	-0.578 (0.124)	-3.633 (0.380)	-2.803 (0.367)	-1.274 (0.359)
v5 [T1e]	***	-1.557 (0.186)	-0.849 (0.152)	***	-4.117 (0.654)	-2.247 (0.642)	***	-1.555 (0.190)	-0.773 (0.152)	***	-3.696 (0.549)	-1.838 (0.534)
Researcher												
v6 [T2a]	-1.956 (0.237)	-1.419 (0.169)	-0.027 (0.136)*	-3.136 (0.270)	-2.275 (0.247)	-0.043 (0.220)*	-1.913 (0.246)	-1.388 (0.180)	-0.024 (0.130)*	-3.133 (0.260)	-2.274 (0.236)	-0.039 (0.215)*
v7 [T2b]	-2.207 (0.261)	-1.374 (0.161)	0.091 (0.152)*	-3.060 (0.249)	-1.905 (0.228)	0.126 (0.202)*	-2.141 (0.266)	-1.335 (0.171)	0.090 (0.144)*	-3.062 (0.242)	-1.909 (0.219)	0.129 (0.199)*
v8 [T2c]	-1.611 (0.178)	-0.379 (0.091)	0.830 (0.140)	-2.067 (0.153)	-0.486 (0.116)	1.065 (0.137)	..	..	..	..	..	..
v9 [T2d]	***	-1.157 (0.161)	0.050 (0.142)*	***	-1.946 (0.261)	-0.084 (0.243)*	***	-1.072 (0.163)	-0.032 (0.130)*	***	-1.921 (0.250)	-0.057 (0.235)*
Error Covariance												
T1a with T2c		0.427 (0.096)			0.267 (0.073)			..			..	
Factor Loadings												
Provider												
λ1 [T1a]		0.264 (0.081)			0.109 (0.032)			..			..	
λ2 [T1b]		0.895 (0.034)			0.768 (0.030)			0.892 (0.036)			0.772 (0.029)	
λ3 [T1c]		0.971 (0.023)			0.736 (0.031)			0.978 (0.023)			0.743 (0.031)	
λ4 [T1d]		0.637 (0.079)			0.579 (0.043)			0.655 (0.080)			0.584 (0.042)	
λ5 [T1e]		0.916 (0.050)			0.888 (0.028)			0.916 (0.049)			0.881 (0.029)	
Researcher												
λ6 [T2a]		0.829 (0.050)			0.811 (0.030)			0.845 (0.050)			0.815 (0.031)	
λ7 [T2b]		0.891 (0.036)			0.754 (0.033)			0.901 (0.036)			0.760 (0.032)	
λ8 [T2c]		0.282 (0.055)			0.221 (0.044)			..			..	
λ9 [T2d]		0.870 (0.060)			0.892 (0.023)			0.836 (0.060)			0.883 (0.024)	
Factor Correlation												
T1f with T2f		0.664 (0.076)			0.796 (0.034)			0.657 (0.076)			0.794 (0.035)	
Factor Means												
T1f		0.000 (0.000)			-4.030 (0.734)			0.000 (0.000)			-3.581 (0.615)	
T2f		0.000 (0.000)			-1.681 (0.290)			0.000 (0.000)			-1.665 (0.279)	
R-Square												
Provider												
v1 [T1a]]		0.070 (0.043)*			0.012 (0.007)*			..			..	
v2 [T1b]		0.801 (0.061)			0.591 (0.045)			0.796 (0.064)			0.596 (0.045)	
v3 [T1c]		0.943 (0.044)			0.542 (0.046)			0.956 (0.045)			0.552 (0.046)	
v4 [T1d]		0.406 (0.101)			0.335 (0.049)			0.429 (0.105)			0.341 (0.049)	
v5 [T1e]		0.839 (0.091)			0.788 (0.051)			0.840 (0.091)			0.776 (0.051)	
Researcher												
v6 [T2a]		0.687 (0.082)			0.657 (0.049)			0.713 (0.084)			0.665 (0.050)	
v7 [T2b]		0.795 (0.064)			0.569 (0.049)			0.811 (0.066)			0.577 (0.049)	
v8 [T2c]		0.080 (0.031)			0.049 (0.019)			..			..	
v9 [T2d]		0.756 (0.105)			0.796 (0.041)			0.699 (0.101)			0.780 (0.042)	
Pearson X2		136.316			43.799			72.235			21.33	
Unstandardized Scales												
Provider												
v1 [T1a]]					0.893 (0.160)						..	
v2 [T1b]					0.427 (0.093)						0.467 (0.097)	
v3 [T1c]					0.483 (0.102)						0.532 (0.105)	
v4 [T1d]					0.403 (0.084)						0.454 (0.086)	
v5 [T1e]					0.378 (0.074)						0.421 (0.078)	
Researcher												
v6 [T2a]					0.624 (0.091)						0.611 (0.087)	
v7 [T2b]					0.721 (0.099)						0.699 (0.094)	
v8 [T2c]					0.779 (0.092)						..	
v9 [T2d]					0.595 (0.083)						0.558 (0.079)	

*Not statistically significant (p-value >0.05)

Table 2.6 Study Specific Regressions of Selected Health Criteria on WFUMTS

	IDC					RDS					H2				
		Provider		Researcher			Provider		Researcher			Provider		Researcher	
Parameter	n	mean	SD	mean	SD	n	mean	SD	mean	SD	n	mean	SD	mean	SD
Adherence (30-day)															
Exactly as prescribed	49	1.05	(0.623)	0.89	(0.75)										
at least 90%	16	0.86	(0.767)	0.70	(0.81)										
between 50% and 90%	2	-0.21	(0.742)*	-0.10	(0.435)										
never take pills	1	1.50	n/a	1.34	n/a										
Non-adherence (lifetime)															
Exactly as prescribed	40	1.05	(0.657)	0.93	(0.765)										
at least 90%	16	0.86	(0.803)	0.75	(0.787)										
between 50% and 90%	10	0.82	(0.673)	0.50	(0.800)										
less than 50%	1	0.76	n/a	0.83	n/a										
Time in Treatment															
30 days but less than 3 months	4	0.932	(1.142)	1.058	(1.010)										
3 months to 1 year	4	0.978	(0.757)	0.717	(1.063)										
1 to 3 years	11	0.836	(0.869)	0.842	(0.873)										
3 to 6 years	20	0.851	(0.754)	0.611	(0.839)										
6 to 10 years	20	1.202	(0.447)	1.120	(0.526)										
10 years or more	10	1.032	(0.555)	0.711	(0.749)										
Fear Police Detention															
Very likely	33	0.803	(0.804)	0.549	(0.870)*										
Somewhat Likely	5	1.076	(0.407)	1.086	(0.257)										
Somewhat Unlikely	9	1.055	(0.557)	0.976	(0.618)										
Very Unlikely	16	1.098	(0.542)	0.987	(0.598)										
Neither	8	1.516	(0.304)	1.553	(0.274)										
Insured															
Yes						30	-0.389	(0.554)	-0.350	(0.584)	31	-0.123	(0.792)	-0.167	(0.811)
No						133	-0.390	(0.616)	-0.358	(0.636)	64	-0.213	(0.787)	-0.152	(0.804)
Self Rated Health															
Excellent						23	-0.229	(0.511)	-0.242	(0.469)	23	-0.243	(0.860)	-0.100	(0.905)
Very Good						17	-0.525	(0.657)	-0.451	(0.666)	36	0.035	(0.700)	0.019	(0.721)
Good						77	-0.369	(0.634)	-0.348	(0.661)	50	-0.079	(0.774)	-0.056	(0.757)
Fair						30	-0.462	(0.578)	-0.309	(0.589)	16	-0.073	(0.531)	-0.082	(0.553)
Poor						21	-0.420	(0.503)	-0.526	(0.605)	2	-0.248	(0.964)	-0.375	(0.820)
Tested for HIV															
Yes						84	-0.490	(0.465)*	-0.508	(0.491)*	42	-0.016	(0.778)	0.057	(0.768)
No						82	-0.285	(0.696)	-0.214	(0.701)	75	-0.127	(0.706)	-0.138	(0.713)
Primary Care Provider															
Yes											45	-0.034	(0.737)	0.001	(0.796)
No											75	-0.109	(0.747)	-0.090	(0.727)
Relative Distrust															
More						35	-0.685	(0.648)*	-0.701	(0.621)*					
About the same						54	-0.270	(0.715)	-0.246	(0.715)					
Less						66	-0.352	(0.422)	-0.311	(0.472)					
Healthcare Barriers Index															
0						11	-0.364	(0.636)	-0.302	(0.487)					
1						24	-0.352	(0.625)	-0.177	(0.641)					
>1						120	-0.408	(0.608)	-0.414	(0.638)					
Legal Status Index [5]															
0						26	-0.322	(0.763)	-0.252	(0.768)	43	-0.140	(0.727)	-0.144	(0.765)
1						45	-0.374	(0.546)	-0.393	(0.574)	34	0.093	(0.673)	0.190	(0.665)
>1						96	-0.417	(0.572)	-0.377	(0.597)	51	-0.185	(0.755)	-0.162	(0.774)
Time in U.S.															
Q1						39	-0.359	(0.508)	-0.316	(0.567)	42	-0.019	(0.671)	0.019	(0.680)
Q2						80	-0.390	(0.585)	-0.371	(0.595)	52	-0.167	(0.680)	-0.109	(0.737)
Q3						41	-0.455	(0.591)	-0.419	(0.600)	31	-0.077	(0.874)	-0.093	(0.843)

* p-value <.05 for the Tukey's Studentized Range (HSD) Test used in conjunction with analysis of variance (ANOVA).

CHAPTER 3

Health Status and HIV screening among U.S. Immigrants: Evaluating a dual-process model of language fluency and legal stress in North Carolina

Key Words: Acculturation; Self-rated Health Status; Legal Stress; HIV-screening; Eco-social Theory; Non-native English Speakers; Language bias; Social Desirability; Medical Trust

Abstract

Research has shown self-rated health measures may be biased according to priming effects and language use among Hispanics/Latinos in the United States. This study examined responses on an unprimed measure of self-rated health status (SRH) and associations with latent language-related factors. Data were drawn from two immigrant health studies conducted in North Carolina. Studies employed respondent driven sampling (RDS) and purposive sampling of immigrant Latino men and women. Preliminary analyses aggregated data from native Spanish speakers from Mexico and Central America (N=312) and examined distributions of responses on SRH, Alderete's Legal Stress Index (LSI), and other socio-demographic measures. Effects of language use, legal stress, and other variables on SRH and recent HIV-screening were estimated using multivariate eco-social path models.

SRH was "good" or better for 71% of men and 67% of women in the RDS sample, and for 86% of men sampled purposively. Approximately half of participants in each sample reported being questioned about documentation status in North Carolina. Forty-five percent of women and 29%-51% of men reported avoiding police because of documentation status. Analyses revealed LSI response rates did not differ significantly based on sex, or region of origin, but did vary according to approximated time in the U.S. (γ= -0.229) and HIV-screening (γ=-0.228). The significant graded association between English language use and SRH was observed for women and men in the RDS sample, but not among men in the purposive sample. In multivariate models negative effects of latent stress on medical trust, social-ethnic relations, and HIV-screening did not contribute significantly to SRH or moderate the language-SRH relationship.

Introduction

Ratings of relative health status and health related quality of life are part of the process by which information from a person is used in systems for prescribing care [44, 114]. In research designed to monitor population health and patient outcomes the single-item self-rated health status (SRH) metric is recommended as a predictor of mortality among the elderly [59]; and SRH is shown to have a graded relationship with white cell count and other important biomarkers [58]. In health disparities research SRH is one metric where Hispanics and Latinos in the U.S. have consistently fared much worse compared to other groups [12, 115]. However, Lee and Schwarz recently demonstrated how projections based on the CDC-recommended SRH metric may be based on false measurement assumptions, leading to steeply biased estimates for Latino subgroups [12].

Specifically, comparing studies that measured SRH and mortality rates of older adults (NHIS and HRS participants, ≥50 years old); when ordered first SRH performed much worse for Spanish speakers (including persons with limited English proficiency). Yet when primed with a range of disease-specific items SRH was just as strong and independent a predictor of mortality for Spanish speakers as it was for other groups. These findings are consistent with priming effects demonstrated in earlier work by Lee and Grant (2009); and these findings inform research designed to monitor disease specific mortality in U.S. populations [64]. The findings also raise questions to consider and investigate among native Spanish speakers living in the U.S. before wholly abandoning the unprimed SRH measure.

Investigating Self-rated Health Status from a Health Systems Perspective

If the meaning of health is indeed systematically different for Spanish-speaking Hispanics/Latinos in the U.S. [12] does marginal English language fluency then correlate with relatively "good" health status (and/or reduce context bias) among native-Spanish speakers? If marginal English language fluency, language availability, or choice of measures, can enhance ability to accurately estimate relative risk of death in the U.S., but does not correspond with differences in health service utilization, what are the implications for health systems? Lee and Schwarz note that, "We examined the relationship between SRH and the number of doctor visits but did not find the same type of support for the SRH question context" [12].

Assuming the unprimed SRH predicts subsequent utilization of services at least as well as primed SRH metrics and it also captures unique variance, possibly explained by language discordance and social stressors, then further research examining interrelationships of these latent variables should inform choice of measures and modeling procedures in health screening and disparities research [15, 16, 59, 116]. This study evaluated the focal language-SRH relationship among relatively young adult immigrant men and women; and examined additional socio-demographic and acculturative variables that may explain HIV screening behavior and expression of susceptibility, from an eco-social theoretical perspective [1, 7].

Specifying a Dual-process Model for Language Dis/fluency and Legal Stress

Given the host of unique structural inequalities, environmental exposures, and potential stressors theoretically linked to linguistic minority status and immigrant "legal status" in the U.S. this study was designed to evaluate first the internal consistency of immigrant Latinos' experiences using a legal stress index developed by Cervantes,

Alderete, and colleagues [10, 13]. Next, structural models were designed to estimate interrelationships of language use, legal stress and other socio-acculturative factors that may contribute to HIV-screening and SRH ratings. This combination of aims advances measurement and theoretical understanding by (1) evaluating a formative factor model for legal stress using an adapted version of Alderete's Legal Stress Index; and (2) decomposing the (in)direct effects of social and language-related factors that may influence SRH ratings.

Data were collected in the southeastern U.S. where largely uninsured Latino populations have experienced disproportionate HIV-risk and significant delays in HIV-screening [17] during a period of regionally unprecedented population growth and immigrant deportation efforts [22]. Figure 3.1 illustrates this study's conceptual model, including latent variables and structural hypotheses to be evaluated using a limited information estimation approach and nested hybrid models [100]. Directional hypotheses represented in Figure 1 were developed based on eco-social theory [7], policy research in North Carolina [21, 22]; and research evaluating multivariate effects of acculturation on subjective experiences of healthcare accessibility in other transnational Latino populations [71].

Figure 3.1. Eco-social Path Model for Dis/fluency and HIV screening

---

Figure 3.1
About Here

Linguistic minority status and immigrant status in the U.S.: predisposing factors for "poor" health

Considerable evidence has linked language use or language fluency to personal health status and morbidity/mortality outcomes in the U.S. [30, 31, 69]. Much of this research reveals Spanish speakers from Mexico and Central America experience unequal access to preventive health services, rate their personal health status as relatively "poor," and yet have better mortality rates than their age-adjusted U.S.-born counterparts. Some have written convincingly that the mortality advantage for Mexican Americans may depend on rates of return migration [68, 69]; and the mortality advantage may be driven by persons who migrated as older adults [95]. Thus, it is important to consider age at emigration and time spent in the U.S. when investigating effects of language and acculturation; as inconsistent periods of residence may affect exposures, health status ratings, and patterns of health screening [59]. Where possible future research should also examine intergenerational differences, family-level factors, and point-of-access differences in rates of study participation. However, this study was designed to evaluate first the simple focal relationship between English language fluency and the personal health status ratings of immigrant men and women living in the southeastern U.S.:

Hypothesis 1: Marginal use of English language has a graded association with SRH among native Spanish speakers, after including effects of age, gender, and time lived in the U.S.

Language Discordance: integrating dis/fluency, stress, and socio-medical affiliations

Eco-social theory may be sufficient to pose additional hypotheses that assume (a) features of the socio-political environment (e.g., law enforcement mandates) can

directly affect public health systems; (b) exposure to local structural inequalities can be monitored using Alderete's Legal Stress Index (LSI); and (c) latent stress can directly and indirectly affect health perceptions and health behavior [7, 14, 22].

In this study 'legal stress' is indicated by exposure to questioning by authorities, and experiences of mobility constraints, health services constraints, avoiding police, and difficulties with legal services –interrelated LSI variables that regulate health-screening and expression of health status from an eco-social theoretical perspective [1]. As a measure of "embodied" structural inequality, variance on the LSI is expected to directly limit rates of HIV-screening and indirectly affect disease susceptibility via social affiliations:

Hypothesis 2: Internally consistent measures of 'legal stress' account for significant differences in HIV screening, latent medical trust, and social-ethnic relations.

While language use and the LSI have each been linked to anxiety/somatization scores in prior research [10, 13, 71]; the effects of these variables on intermediary outcomes such as latent medical distrust are rarely examined. In research that did not measure immigrant status or legal stress among Latinas in the U.S. Northwest, the effects of "acculturation" (i.e., time, English-language use, and voting behavior) on depression/anxiety were mediated by "social capital" (i.e., trust in doctors and nurses). However social capital did not explain perceived access to healthcare [71]. Similar to Valencia-Garcia's research, this study assumed positive effects of English language fluency on health status will be partly mediated by social affiliations including medical trust. The effects of time in the U.S., insurance status, medical trust, social-support, and social-ethnic relations are each examined in this study. Marginal and cumulative effects are investigated according to the moderated mediation framework illustrated in Figure 1:

Hypothesis 3: Effects of time and language use on HIV-screening and SRH are (a) mediated by socio-affiliative relations; and (b) moderated by legal stress.

Methodological Overview

To accomplish these research aims data were drawn from two studies conducted at Wake Forest University (WFU) School of Medicine. Studies were designed to explore and address HIV-risk among immigrant Latinos (age ≥18) living in North Carolina. Data were collected during 2008-2009 when the *Secure Communities* immigration and customs law-enforcement (ICE) paradigm was first nationally implemented. According to the UNC-C Kenan Center, the Hispanic/Latino population in NC was primarily Mexican, disproportionately uninsured, and predominately "unauthorized" during the research timeframe [74].

Original (primary) study aims included (1) estimate prevalence of immigrants' use of *non-medical* sources for prescription drugs using respondent driven sampling methods [107]; and (2) test the efficacy of an HIV prevention intervention designed for heterosexually active immigrant men using purposive venue based sampling methods [43]. Assessments were administered by a team of WFU-trained project staff who were native Spanish speakers. Assessments were designed to include many of the same previously validated measures and health related items.

Original studies either excluded LSI items from analyses or reported particular LSI items that were associated with use of non-medical sources for prescription medicine [107]. Original studies did not evaluate LSI measurement properties or examine SRH as a health indicator that may be steeply biased according to language use or related factors. In this study distribution of responses on LSI and SRH ratings were examined and reported independently for women and men participating in each

study. Data from each study were then combined to examine LSI for internal consistency, reliability, and potential item-response bias. Analyses compared bivariate effects stratified by study and gender before investigating the overall model and hypothetical pathways illustrated in Figure 3.1.

Measures

Self-Reported Health Status, HIV-screening, and Socio-demographics

In each study questions were administered to participants in the same sequence with SRH ordered first and the LSI administered last. The SRH item was a single item ordered first in accordance with WHO/CDC recommendations for monitoring population health. Participants classified their personal health compared to "other persons your age" (*Comparado con otras personas de su misma edad, ¿cómo clasificaría usted su salud?*); using a 5-point Likert response scale ranging from "Excellent" to "Not very good" ("*Excelente*", "*Muy Buena*" "*Buena*", "*Aceptable*", "*No muy buena*", "*No sé*").

Participants were next asked to report (Yes/No) if they had any form of U.S.-based health insurance. Recent HIV counseling and or testing was assessed within a service utilization sequence (i.e."During the past year, have you been to a clinic, hospital, health department, or doctor's office for any of the following?").

Among income, education, and other socio-demographic items participants were asked, "How old were you when you first came to live in the United States?" and "How old are you now?" Responses on these items (and their computed difference) were used to approximate length of time lived in the U.S.

Language Use and Socio-Affiliative Relations

Marin's *Short Acculturation Scale for Hispanics* (SAS) was used to measure English language use, social-ethnic relations, and media use [109]. The SAS is designed

for bilingual (English/Spanish) populations and subscales generally have high internal consistency. By limiting our study sample to adult immigrants reporting Spanish as their native language this study is able to investigate English used as a second language. The SAS uses five-point Likert scales ranging from “Only Spanish” to “Only English,” for items measuring language and media use. Items measuring social-ethnic relations range from “Only Latinos” to “Only Americans.” The Language use scale includes 5-items (e.g., “In which language[s] do you usually think?” and “What language[s] do you usually speak with your friends?”). Social-ethnic relations includes 4-items (e.g., “You prefer going to social gatherings/parties at which people are…”). Media use (3-items) was excluded from analyses.

An adapted version of the *WFU Medical Trust Scale* (WFUMTS; validated in Chapter 2) was used to measure strength of dis/agreement on 9 items. Subscales evaluated trust in medical providers and trust in medical researchers. Items used in the WFUMTS ask participants to endorse judgments pertaining to features theoretically comprising trust (e.g., *competency,* “Doctors are extremely thorough and careful”) and explicit *global* judgments about “trust” (e.g., “All in all you trust doctors completely”). Negatively worded items were excluded on the basis of preliminary factor analyses (Chapter 2).

The 13-item (Short) *Marlowe Crowne Social Desirability Scale* (MCSDS) was included only in the purposively sampled HIV-prevention intervention study. The MCSDS is traditionally used to validate the independence of culturally sensitive measures. It has been described as an indicator of “self-deception” “other-deception” and “secrecy.” It also has been used as an outcome in disfluency experiments [53]. Participants responded “True” or “False” to 13 statements (e.g., “It is sometimes hard for me to go on

with my work if I am not encouraged"; and "I have never deliberately said something to hurt someone's feelings").

The Legal Stress Index

Items originally developed as part of Cervantes and colleagues' *Hispanic Stress Inventory* were used to measure exposure to legal questioning and experiences of legal stress. Specific items were derived from Alderete's *Legal Stress Index* and reworded to emphasize immigration policing exposures and expectations of public institutions. Participants were asked five questions, including exposure (e.g., "Have you been questioned about your documentation status?") and stress indicators (e.g., "Do you avoid police and officials because of your documentation status?"). Each item included a binary response option (Yes/No; including Refuse-to-Answer option). Item translations are reported in the Appendix, Table 3.1.A.

Sampling Protocols and Participation

Protocols and primary data collection for each study were approved and overseen by the WFU Institutional Review Board. RDS procedures produced 10 recruitment waves and assessed 175 eligible participants. Purposive sampling exceeded its recruitment goal, and assessed 142 participants at baseline. In each study incentives were $50. During 2008-2009 studies recruited 317 participants whose data were screened for inclusion in the following analyses (using SAS version 9.1 and Mplus 7.11).

Data Analysis

Modeling approach for Legal Stress and Population Health Criteria

The limited information estimation approach suggested by Muthén for probit models with binary and ordinal responses was used in this analysis. Here the underlying latent variable (stress) is linked to observed categorical responses via threshold models,

yielding probit measurement models. A threshold is defined as the expected value of the latent variable or factor at which an individual transitions from a value of 0 to a value of 1 on the categorical outcome variable when the continuous underlying latent variable score is zero [100, 102]. For the dichotomous case it is assumed that:

$$y_{ij} = \begin{cases} 0, if -\infty < y^*_{ij} \leq \kappa_{1i} \\ 1, if\ \kappa_{1i} < y^*_{ij} \leq \infty \end{cases}$$

However the underlying normal distribution is not assumed for the LSI, given the nature of sociopolitical stress, including non-random exposures according to status [117]. Revising the model for a nonsymmetrical distribution, Maximum Likelihood (ML) estimation with the probit link function was selected, including Gauss Hermite quadrature, to estimate tetrachoric correlations, covariance matrix and parameters of each model. With ML estimation, absolute fit statistics (e.g., RMSEA) are not available, and model comparisons are made using values for log-likelihood AIC and BIC. Time lived in the U.S. was presumed to affect probability of exposures and/or 'difficulty' of responding "yes" to items.

Exposure to questioning (LSI item two, vTSb) was expected to function as a relatively independent 'cause' of legal stress with greater residual variance than other LSI items. These psychometric assumptions were tested by evaluating thresholds and change in log-likelihood values using formative factor models. Multiple indicator multiple cause (MIMIC) models were used to examine effects of study (purposive sample=1), female sex=1, and age. Additional 'causes' of LSI variance included language use, region of origin (Mexico=0 vs. Central America=1), and recent HIV/STI screening.

Screening was conceptualized as a structural exposure in MIMIC models and as an outcome in dual-process path analysis.

Multivariate path analysis with Binary and Ordinal Indicators

The limited information data analytic approach was also used for multivariable path analyses. First probit models were used to screen for marginal contributions of English language use and legal stress on health criteria and intermediary socio-affiliative factors. These models were evaluated using the weighted least squares (WLSMV) estimator, fitting model implied to estimated polychoric correlations [100, 102].

To evaluate the path model illustrated in Figure 3.1 the Mplus “Model Indirect” commands allow tests of meditational effects (including results for direct, indirect and specific pathways). Interaction terms were included on the basis of observed change in main effects when theoretical moderators were estimated and constrained to zero. The “DIFFTEST” command tests whether nested models are statistically distinguishable. Model Chi-square, degrees of freedom (Df) Comparative Fit Index (CFI), (TLI), RMSEA and WRMR evaluate overall model fit. With samples <500 the CFI and TLI >=.90, RMSEA<=.10 WRMR<1.0, and the Chi-square/Df ratio (<3.0) suggest acceptable fit.

Participant Characteristics and Preliminary Data Analysis

Participants in the combined dataset were between 18 and 72 years of age and born in either Mexico or Central America, with few reporting other countries of origin. Data coverage was good or moderate (<10% refused/missing) for *Legal Stress* items. SRH was “fair” or “poor” for 29% of men and 33% of women in the RDS sample, and 14% for men in the purposive sample. RDS participants scored significantly higher on the 5-item LSI. Sex did not explain this cross-sample difference. Limiting analyses to the RDS sample only revealed that women and men in the RDS sample responded similarly

on constituent items. Distributions of age, time in the U.S., and differences in other participant characteristics are reported by study and sex in Table 3.1. The polychoric correlation matrix, including all variables from Table 3.1 considered for structural equation modeling, is included in the Appendix, Table 3.3.A.

Table 3.1. Characteristics, Data Coverage and Summary Scores by Study and Sex

---

Table 3.1
About Here

Results

AIM1: Legal Stress Index Factor Analysis

Of the 312 foreign-born participants who were administered the adapted 5-item LSI there were 308 who responded to at least one LSI item. Additional CFA inclusion criteria were having responded (Yes/No) to the exposure item, “Have you been questioned about your documentation status?” (vTSb), and having responded (Yes/No) to at least one additional LSI item. These criteria reduced the sample (n=294) used in confirmatory factor analysis. Item response distribution for the LSI, before recoding “Don’t Know” and “Refuse” responses as missing and listwise deletion of 14 records, is reported along with item translations in the Appendix, Table 3.1.A.

Using pooled data from community based participants (n=294) two measurement models were specified, including the 5-item LSI (LSI.M1), and a formative factor model distinguishing between the exposure-to-questioning item (vTSb) and other stress/vulnerability indicators (LSI.M1.1). These models revealed the legal stress construct accounted for 15%-69% of variance in its constituent LSI items, and supported use of the formative factor model.

For the initial measurement model (LSI.M1) the item, “Have you been questioned about your documentation status?” (vTSb) had the lowest threshold value (κ= -0.05 SE 0.07) and a relatively small factor loading (λ =0.39). In the formative factor model (LSI.M1.1) log –likelihood, AIC, and BIC were reduced considerably, and negligible differences were observed in threshold values and factor loadings for other items. In each model the stress/vulnerability item “Do you think you will be deported if you go to a social agency or health department?” (vTSc) had the greatest factor loading (standardized λ >0.83). Accordingly, this item also had the highest threshold (and “difficulty”) values.

Subsequent models included fewer subjects (n=253), with complete responses on sex, age, language use (factor score), approximate time in the U.S., country of origin, and self-reported HIV-screening. First, examining differences attributable to study-sample (LSI.M1.2), factor loadings and communality estimates remained stable, and the study effect on latent stress was not statistically significant (γk2= -0.087 SE=0.077). Estimating older age and female sex had small negative effects on latent stress and explained less than 1% of additional factor variance (LSI.M1.3). In the final model (LSI.M1.4) older age had a weak positive association with latent stress; and time lived in the U.S. had a negative and significant effect on legal stress (γk6= -0.229 SE=0.108) adjusting for effects of language use (γk7= -0.115 SE=0.092), Central American country of origin (γk9= -0.069 SE=0.087), and recent HIV screening (γk8= -0.228 SE=0.087).

The results of these models demonstrated that treating ICE-questioning as an independent exposure improved the internal consistency of the LSI. HIV-screening “caused” significantly lower legal stress scores, controlling for region of origin, time lived in the U.S., sex differences and other variables added to this formative factor model. Of

course, this imposes a directional assumption that could be reversed. Exposures to legal stressors may effectively reduce the likelihood of HIV-screening. Greater legal stress may also constrain theoretically health protective social relations, according to hypotheses represented in Figure 3.1. Adhering to these directional assumptions and theoretical hypotheses, data analyses were conducted in two additional stages to evaluate marginal and cumulative effects of English language fluency and legal stress on SRH and HIV-screening.

Aim 2: Examining Marginal and Cumulative Effects on Affiliations and Health Criteria

Before estimating the full model represented in Figure 3.1 the marginal effects of English language use and legal stress on health criteria (and intermediate outcomes) were estimated in multivariable models. As expected, English language use had a significant positive effect on social-ethnic relations and SRH after accounting for study differences, age, sex, and time in the U.S. English language use had negligible contributions to HIV-screening, social support, and trust in medical researchers. English language use was associated with significantly lower trust in medical providers (although stratified analysis revealed these negative effects were largely attributable to men). To fully address the first hypothesis, effects of English language use on SRH were stratified by sex and study. Analyses revealed significant effects for both men and women in the RDS study. However, a relatively flat non-significant association between language and SRH was discovered among men in the purposive study sample. These relationships, stratified by sample and gender, are illustrated in the Appendix (Figure 3.1.A).

Legal stress (modeled according to LSI.M1.1) had significant negative effects on HIV-screening, and social-ethnic relations after accounting for study differences, age,

sex, and time in the U.S. Negative effects of legal stress on SRH, social support, provider trust and researcher trust were not statistically significant. Standardized regression coefficients for models examining language and socio-acculturative effects are represented in Table 3.2. Significant study differences, sex differences, and effects of age are represented across models represented in Table 3.2. Therefore subsequent path models retained these effects (study, age, and sex). Factors for social support and trust in medical researcher were eliminated from subsequent models, which were designed to investigate overall effects of English language use, time in the U.S., and legal stress on SRH and HIV-screening.

Table 3.2. Standardized Regression Coefficients for Acculturative Influences on Affiliations and Health Criteria

---

Figure 3.2
About Here

Structural Models and Analyses of Moderated Mediation

In models adjusting for all other variables women were much more likely to report being screened for HIV in the past year. In saturated and subsequent (more restricted) models legal stress continued to have a significant negative effect on HIV-screening. The effect of marginal English language use on SRH also remained significant in saturated and restricted models that examined mediation and moderation hypotheses.

Comparing models where effects of time in the U.S. and legal stress were estimated and restricted to zero revealed limited evidence for moderating effects, and exploratory models produced interaction terms that were not statistically significant. Estimating effects of time reduced the ameliorative effect of English language use on

legal stress, and strengthened the limiting effect of legal stress on social-ethnic relations (as indicated by changes >.02 in unstandardized estimates).

The final model represented in Figure 3.2 was arrived at by first estimating the saturated model and comparing it with the more restricted models until reproducing the model illustrated in Figure 3.1. Model fit indices, path estimates, and DIFFTEST results provided support for restricting effects of sex on socio-affiliative relations to zero, restricting effects of socio-affiliative relations on HIV-screening to zero, and also restricting effects of time on HIV-screening and SRH to zero.

Although not represented in Figure 3.2 the effects of study-sample and age were included in each model. As represented in Figure 3.2 insurance status was retained as a theoretical indicator of latent medical trust. However, modification indices did not support independent associations between insurance status and other latent/manifest variables included in this study. Theoretically ameliorative effects of time in the U.S. on legal stress and negative effects of stress on social-ethnic relations were statistically significant in the full model. However, none of the indirect pathways were statistically significant. Estimates of indirect mediational effects are represented in Table 3.3.

Figure 3.2. Socio-acculturative Mediation Model for SRH and HIV (Standardized)

Figure 3.2
About Here

Table 3.3 Test of the Indirect Effects

Table 3.2
About Here

Discussion

This study applied an eco-social dual-process model to evaluate effects of language-related factors on health status of immigrant Latino men and women [7, 40, 53]. Significant graded associations between English language use and self-rated health were confirmed only among immigrant men and women in the respondent-driven sample. The association was much weaker among male participants who were enrolled using venue-based (purposive) sampling. Acceptable fit statistics supported the overall dual-process model represented in Figure 3.2. Using this model analyses confirmed hypothetical links between legal stress and likelihood of HIV-screening; and estimated mediating and moderating effects of latent variables. However the model provided limited evidence that the negative effects of legal stress directly or indirectly affected health status ratings. Results indicate immigrant Latino men and women in North Carolina experience similar levels of exposure to legal stress. Differences in strength of associations across samples and differences between men and women should be further investigated in multi-level longitudinal research designed to overcome major study limitations.

Limitations

The modeling techniques used in this research are applied when the nature of the relationship between a latent trait or factor and its indicators may be non-linear and the differences in item salience (or difficulty) should be captured using latent factor scores. This is particularly important when language or cultural differences may contribute to specific factor or item uniqueness that should not be conflated with error variance [100] [101]. Although results indicate that LSI items were not uniquely biased by variables included in this study, community-level and biological variables of interest

were not captured, and sample sizes were insufficient to test multi-group measurement and structural invariance models.

In addition to questions of LSI construct validity, primary sampling methodologies also limit overall generalizations that can be drawn from this research. Neither RDS nor purposive sampling methodologies are based on a standard population sampling frame. Furthermore, primary data collection included women in only one of the two samples examined in this study. This limited the possibility of stratified analyses that could have isolated sex differences and study-sample differences. Overall sample size limitations resulted in only main effects being reported here. Future analyses should carefully examine differences using multi-group analyses and structural invariance models for groups of men and women. Exploratory analyses suggest immigrant men and women may experience socio-acculturative influences differently.

For example analysis revealed somewhat divergent effects of English language fluency on latent medical trust, with negative correlation largely attributable to men. Improved sampling procedures could illuminate differences experienced by men and women, and differences experienced by groups from different regions/jurisdictions. For example, compared to men enrolled using purposive (venue-based) sampling SRH scores were significantly lower and LSI scores were significantly higher in the RDS sample. These group differences could be related to workplace, healthcare, insurance-related variables. These differences may also be explained by sampling bias, where venue-based sampling is less likely than RDS to enroll participants with poor health and high levels of legal stress.

Test-retest Reliability and Social Desirability

Further examination of responses among men in the venue-based sample indicated that the LSI measure was reliable, and latent stress was unaffected by group assignment in a small-group HIV-prevention intervention. Test-retest correlation (>0.60) and tests of measurement invariance supported internal consistency and reliability. Both the standard measurement model and the formative factor model produced acceptable (>0.50) factor loadings at baseline and 3-month follow-up. Interactions between latent stress and group-membership did not moderate likelihood of HIV-screening. Projections of social desirability could not be examined as an explanatory variable due to the very weak association between English language use and SRH among men in the H2 intervention sample. Details related to change in LSI scores are reported elsewhere (Chapter4).

Overall, findings indicate larger scale longitudinal research must be conducted among men and women to investigate the relationships between experiences of medical-screening, legal stress, and socio-medical distrust. Future research should evaluate SRH in health-promotion experiments designed to improve medical feedback while accounting for differences in legal status, stress, family history, health behavior, and social-psychological resources [59]. Observational studies may also consider using the LSI in propensity scores to investigate channeling bias (also referred to as confounding by indication).

Conclusion

Fluency in communications with local healthcare systems may directly affect health status ratings and dis-fluency may bias the predictive validity of these ratings when mortality is the criterion of interest. Multi-level longitudinal research is needed to

understand how SRH performs in adherence research and whether conditions that promote legal stress [13, 22] also contribute to HIV-treatment delays and treatment failures observed North Carolina [17, 38] and elsewhere in the U.S. [15, 16, 38]. Particularly for immigrant Latinos in the U.S. southeast and other “new growth” areas, the lack of Spanish-language services and exposures to immigrant detention and deportation initiatives may contribute to significant population-attributable risks. Future studies examining structural determinants of health should incorporate more direct measures of language availability, language proficiency, personal health conditions and treatment histories, along with additional health related quality of life measures and biomarkers for stress. In addition to large scale eco-social research [7] small-scale experiments may investigate comprehensive disclosure of HIV-risk and structural risk factors. Limited disclosure of risk has long been described as a serious barrier to HIV-prevention [49]. As structural risk factors emerge that are related to nativity, researchers may investigate new models for translation services and legal services that are designed to reduce measurement error during primary clinical screening and presentation in subsequent visits throughout the cascade of prevention and treatment.

Figure 3.1. Eco-social Path Model

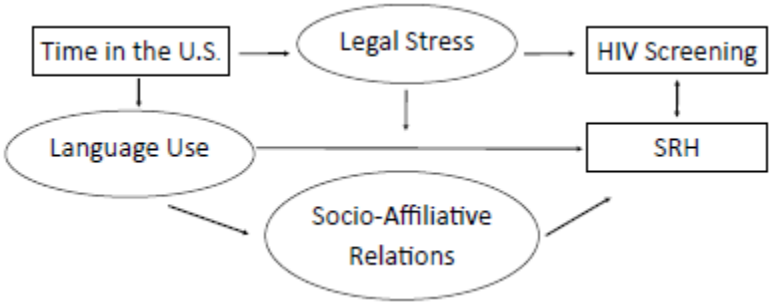


Table 3.1. Characteristics, Data Coverage and Summary Scores by Study and Sex

	RDS men (n=59)		RDS women (n=101)		Purposive men (N=137)	
Demographics, Health Criteria, & Legal Stress	*Missing %*	*n (%)*	*Missing %*	*n (%)*	*Missing %*	*n (%)*
Birth Country:	2		2		4	
Mexico		47 (81)		85 (86)		84 (64)
Central America		11 (19)		14 (14)		47 (36)
Less than High School Degree=0	0	38 (64)	0	72 (71)	14	77 (65)
Employed=0	0	58 (98)	4	83 (86)	3	129 (97)
Income >$20k=0	7	15 (25)	13	4 (5)	28	36 (37)
Health Insurance, (Uninsured=0)	2	17 (29)	4	10 (10)	29	32 (33)
Tested for HIV (past 12-months)	2	15 (26)	1	64 (64)	11	44 (36)
Tested for STI (past 12-months)	5	13 (23)	5	60 (63)	13	39 (33)
Self-Rated Health Status	0		2		4	
Excellent		8 (14)		15 (15)		23 (18)
Very Good		9 (15)		8 (8)		39 (30)
Good		25 (42)		44 (44)		50 (38)
Fair		12 (20)		17 (17)		17 (13)
Poor		5 (8)		15 (15)		2 (2)
Legal Stress Index						
Questioned about documentation status in N.C.	*3*	34 (60)	*2*	*57 (58)*	8	57 (42)
Status has limited your contact with family or friends	*0*	23 (39)	*1*	*43 (43)*	5	43 (33)
Expect to be deported at health department	*3*	4 (7)	*6*	*7 (7)*	9	19 (15)
Avoid police/officials because of status	*0*	30 (51)	*1*	*45 (45)*	5	38 (29)
Experienced difficulty finding legal services	*3*	20 (35)	*3*	*23 (23)*	6	40 (31)
Index score [5-item], Median IQR	0	2 (2)	0	2 (1)	2	1 (2)
Socio-acculturative Factors	*Missing %*	*mean (SD)*	*Missing %*	*mean (SD)*	*Missing %*	*mean (SD)*
Age	3	35 (11)	2	34 (10)	5	32 (11)
Age first emigrated to the U.S.	2	23 (10)	6	22 (9)	5	21 (8)
Years lived in the U.S.	3	12 (8)	6	11 (6)	5	11 (8)
Marin Language Use Scale [5-item]	2	8 (3)	3	6 (2)	3	7 (2)
Marin Social Ethnic Relations Scale [4-item]	12	7 (2)	5	7 (2)	9	7 (2)
WFU Physician Trust Scale [5-item]	22	13 (2)	21	14 (2)	34	14 (2)
WFU Medical Researcher Trust Scale [4-item]	24	11 (2)	26	11 (2)	39	11 (2)
M.C. Social Desirability					28	4 (2)

Note: RDS (Respondent Driven Sample); Purposive (venue based and snowball sample of men for the "HoMBReS-2" HIV-prevention intervention.

Table 3.2. Standardized Regression Coefficients for Acculturative Influences on Affiliations and Health Criteria

	Health Criteria		Social-Affiliative Relations			
Variables	SRH	HIV	Ethnic Relations	Social Support	Trust Provider	Trust Researcher
Study	0.170*	0.079	0.073	0.030	0.211*	0.198*
Age	-0.147*	-0.148	-0.138	-0.112	0.070	0.048
Sex	-0.079	0.443*	-0.164	-0.112	-0.036	-0.018
Years lived in the U.S.	0.030	0.035	0.213*	0.026	-0.071	-0.104
English Language use	0.237*	-0.017	0.720*	0.029	-0.197*	-0.012
Legal Stress	-0.078	-0.257*	-0.228*	-0.119	-0.065	-0.020
Marginal Change in R2 (Language)	0.056	0.001	0.522	0.001	0.042	0
Marginal Change in R2 (LSI)	0.008	0.063	0.051	0.015	0.004	0
Model R2	R2=0.139	R2=0.228	R2=0.652	R2=0.045	R2=0.104	R2=0.052
RMSEA	0.081 [0.068 0.094]	0.082 [0.070 0.095]	0.070 [0.059 0.080]	0.050 [0.042 0.058]	0.073 [0.063 0.084]	0.074 [0.063 0.084]
Chisq(df)	220 (79)	223 (79)	285 (123)	445 (263)	301 (123)	303 (123)

n=271

* p<.05

Figure 3.2. Socio-acculturative Mediation Model for SRH and HIV (Standardized)

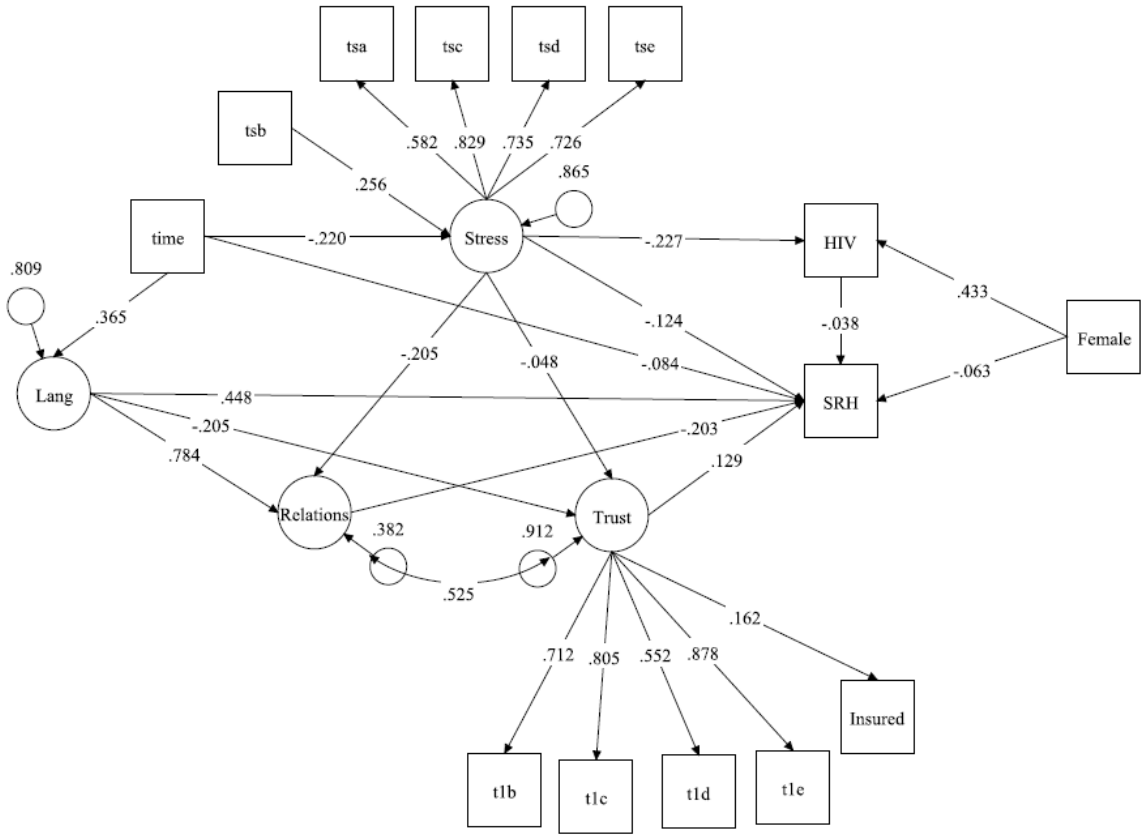
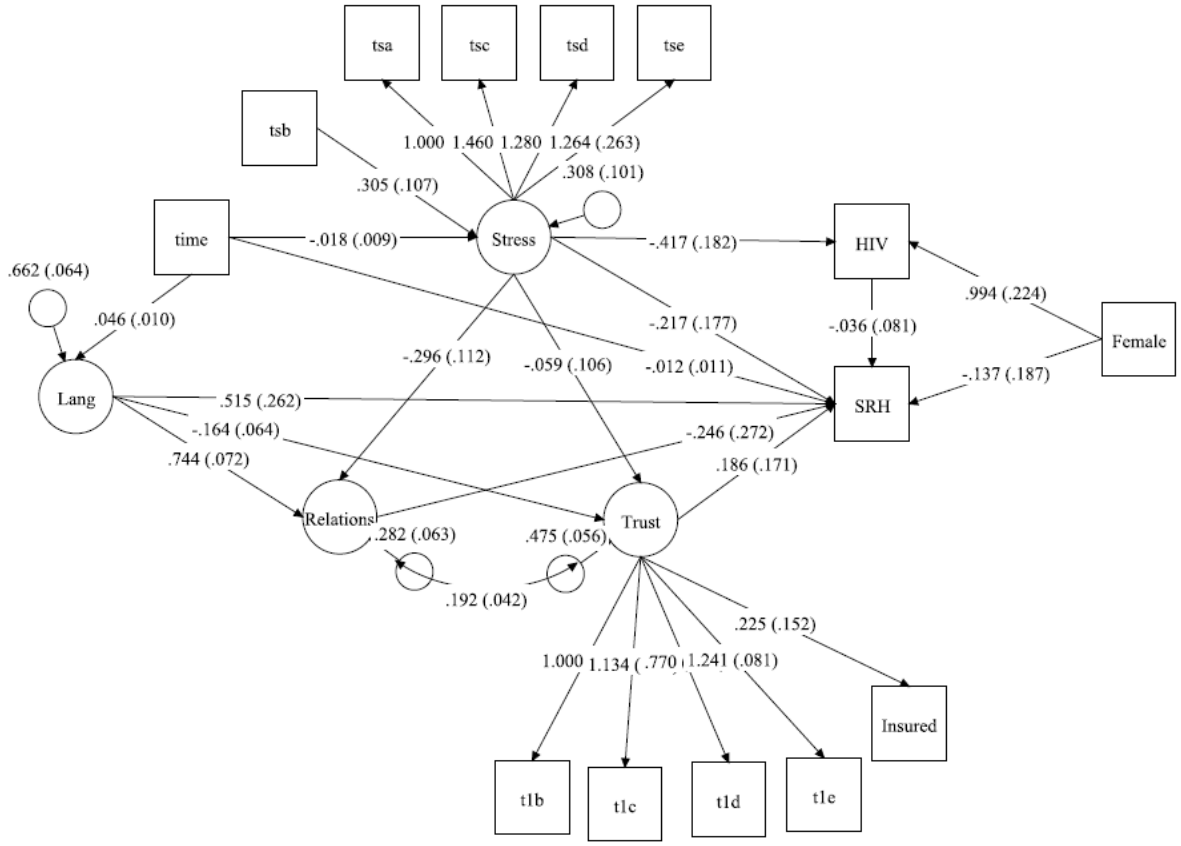


Table 3.3 Test of the indirect effects.

Specific Indirect Pathways

Path	Mediator	Est (SE)	STDYX
Language on SRH via Affiliations			
	Social-ethnic Relations	-0.183 (0.206)	-0.159
	Medical Trust	-0.031 (0.032)	-0.027
Stress on SRH via Affiliations			
	Social-ethnic Relations	0.073 (0.087)	0.042
	Medical Trust	-0.011 (0.021)	-0.006
Time on HIV via Stress			
	LSI	0.008 (0.004)	0.050
Stress on SRH via HIV			
	HIV	-0.015 (0.035)	0.009

Figure 3.2. Socio-acculturative Mediation Model for SRH and HIV (Unstandardized)



Model	Estimator	Chi-sq	Df	p	CFI	TLI	RMSEA [90% CI]	WRMR
Figure 3.2. M1	WLSMV	348	244	<0.0000	0.95	0.94	0.040 [0.030 0.049]	1.011

Although not represented in the figure, all variables were controlled for age and study effects

CHAPTER 4

Developing socio-medical trust among HoMBReS intervention participants

Key Words: HIV prevention; Freirean Pedagogy; HIV screening; immigration; men; legal stress; medical trust

Abstract

The *HoMBReS-2* randomized control trial was the first study in the United States to demonstrate efficacy of a small-group intervention designed to increase HIV-prevention behaviors among immigrant Latino men. This secondary data analysis investigated participants' responses on legal stress and medical trust measures administered at baseline and 3-month follow-up. Using a limited information estimation approach random intercept models were used to estimate construct reliability and theoretically moderating effects of latent socio-medical trust variables on primary HIV-screening outcomes.

Participants included heterosexually active men from Mexico and Central America (N=142). Nearly 40% of participants reported two or more experiences of legal stress (e.g., avoiding police because of documentation status) at baseline and follow-up. Legal stress items had invariant response thresholds and factor loadings across measurement occasions. Medical trust items had invariant thresholds and non-invariant factor loadings. Factor loadings improved but remained low (<.60) for negatively-worded medical trust items. Results indicated that significant intervention effects on HIV-screening were not attenuated by interactions with latent variables.

Introduction

A person-level randomized control trial of the *HoMBReS-2* curriculum (H2-RCT) was the first study to demonstrate efficacy of a community-based small-group intervention designed to increase condom-use and HIV-screening rates among heterosexually active Latino immigrant men [43]. This secondary study was designed to investigate H2-RCT variables that were excluded from the primary data analysis. Specifically this study was designed to investigate participants' self-reported experiences of legal stress and medical trust at baseline and 3-month follow-up. Analyses were designed to evaluate construct reliability and possible regulatory effects of underlying latent variables on personal health status and HIV-screening outcomes. This research was conducted to address intervention potency and advance structural and developmental hypotheses that are important for diffusion of HIV-prevention interventions in communities where Latino immigrant men experience complex sets of barriers to care and significant HIV/AIDS treatment disparities [15-17, 38].

Background

Intervention Development and Learning Components

The H2-RCT was developed by a community-based participatory research (CBPR) partnership that included immigrant men and women, HIV/AIDS service organizations, local health department representatives, and members of other groups in North Carolina. Through the intervention development process, partnership members worked together to collect and incorporate local epidemiological information and ethnographic data [106, 118-122]. The H2 intervention curriculum was designed to represent local themes and knowledge about men's interactions with the health-services environment and built upon lessons learned from past experiences developing and

implementing interactive HIV-behavioral risk reduction interventions in marginalized communities.

The H2-RCT was designed to reduce sexual risk behaviors and increase rates of HIV-screening by incorporating empowerment education, well-trained peer leaders (known as *companeros de salud*) and theoretical elements from other efficacious and effective HIV-prevention interventions [122]. The development of gender specific small-group intervention activities was guided by social-cognitive theory and evidence that supported a natural-helper-led approach to HIV-prevention and health promotion. Small-group interactive components were designed to include rapport and trust building activities; didactic teaching; and DVD segments that served as role modeling and triggers for discussion.

For example, one DVD segment followed a Spanish speaking Latino man as he went through the process for HIV-screening at a local health department. It showed the difficulties of getting an interpreter, the embarrassment of having a female interpreter and nurse, and types of questions one is asked and the rationale behind the data that health department testing sites collect. Additional DVD segments addressed social, epidemiological, and biological aspects of HIV transmission. Small-group activities addressed social-cognitive elements of sexual risk-reduction behavior.

Overall the H2 intervention contained four interactive modules (each 2-hour sessions) that peer-educators delivered on Saturday and Sunday mornings in the offices of CBPR partner organizations. Components of learning activities: (a) stimulated discussion of barriers to and facilitators of condom use and HIV screening; (b) explored gender norms and expectations; (c) promoted awareness, knowledge, and positive attitudes and beliefs about behavioral risk reduction; (d) promoted risk reduction norms

and social support for protection; (e) provided positive reinforcement for healthy behavior change; (f) incorporated skills building through role play and practice; and (g) provided guidance on how to utilize available services.

A cancer education comparison intervention was delivered in one 2-hour session. It included didactic teaching, and did not include DVD components. Learning activities promoted knowledge about prostate, lung and colorectal cancers, and offered practical cancer screening information. Three peer-educators were selected and trained to administer the H2 intervention. A fourth peer-educator was selected and trained to administer the cancer comparison intervention. Each of the four peer-educators spoke primarily Spanish, and spoke only Spanish during intervention or control group activities. Peer educators received assistance from the project coordinator during intervention or control group activities. All sessions were observed by an additional project staff member to document fidelity.

Primary H2-RCT Outcomes and Hypothetical Mediators

Due to the experiment's small scale and limited statistical power, primary analysis of the H2-RCT was designed to estimate only main self-reported behavioral effects of the H2 intervention, using complete-case analysis and imputed data analysis (statistical bootstrapping). Primary findings demonstrated significant main effects (HIV testing, AOR=9.5, 95% CI= 3.5 - 25.6; Condom use, AOR=3.9, 95% CI= 1.3 - 11.5) adjusting for differences in socio-demographics, acculturation variables, and social-cognitive mediators targeted by the H2 intervention. Hypothetical mediators assessed in primary analyses included: knowledge of HIV transmission and prevention, AIDS related stigma, condom-use self-efficacy and condom-use expectancies, male-role attitude, and mastery of personal circumstances. These theoretically intermediary variables are well-

established in the HIV prevention literature. Much less is known about how to account for relatively routine experiences of immigrant “legal status”, associated institutional discrimination, and socio-medical distrust –latent constructs that may attenuate intervention effects in vulnerable subgroups.

Experiences of Social and Medical Distrust

In this study self-reported exposures to legal-stressors and experiences of medical distrust are investigated as theoretically independent (manifest) variables and as interdependent underlying constructs linked to rates of HIV-screening. In other U.S.-based research the effects of legal stress and medical distrust measures have been independently and inconsistently associated with anxiety, depression, somatization, self-rated health status, insurance status, medical adherence, and neighborhood-level risk factors [2, 3, 6, 10, 71]. The primary hypothesis of this study was that experiences of legal stress and medical distrust would reduce likelihood of HIV-screening among men participating in the H2-RCT. Exploratory analyses also examined effects of latent variables on personal health status ratings, and hypothetical biases attributable to projections of social desirability.

Methods

Study Design, Recruitment, and Participation

The H2-RCT was a two-arm experiment designed to test main effects the HoMBReS intervention curriculum on men by randomly assigning participants to an intervention or active control group. Data were collected from participants at baseline and at a single follow-up assessment three months after the intervention was delivered. The Institutional Review Board of Wake Forest University Health Sciences provided human subjects oversight.

Inclusion criteria were: self-identifying as male; Hispanic or Latino; being ≥18 years of age; being native Spanish speaking; and providing informed consent. Exclusion criterion was having participated in the original HoMBReS intervention. Purposive sampling was conducted by study team members who distributed recruitment materials and screened potential participants at apartment complexes, businesses, and other locations in rural central North Carolina.

After initial screening, study team members scheduled a meeting to complete informed consent, baseline assessment, and randomization procedures. To limit delays between recruitment, enrollment, and intervention delivery participants were entered into the study in waves that averaged 20 participants per-wave. Recruitment and enrollment methods accomplished a 98% participation rate, as reported in the primary efficacy study [43].

Data Collection and Retention

All data were collected in the offices of CBPR partners, and in homes of participants, by native Spanish-speaking male study team members. Assessments were interviewer-administered and contained 262 items, which required about 60 minute to complete, depending on skip patterns of each participant. Participants were paid $35 for the baseline and $55 for the follow-up assessment. Among randomized participants attendance to all four H2 intervention sessions was 80% and attendance among those assigned to the cancer control intervention was 91%. The retention rate was 98% for the H2-RCT, with three lost to follow-up.

Measures

Dependent variables, socio-demographic items, and psychometric scales included in the assessment were based on previously validated Spanish language

scales, or questionnaires used previously with immigrant Latinos in North Carolina. Birth country, insurance status, and most other items included binary or categorical response options. “Refuse-to-Answer” and/or “Don’t Know” options were also included for most items, including index and scale items which evaluated discrete exposures and endorsement of personal judgments.

The first item administered to participants was self-rated health status (SRHS), which was measured using a 5-point ordinal scale ranging from “Excellent” to “Poor”. Recent HIV counseling and or testing was assessed within a service utilization sequence (i.e.”During the past year, have you been to a clinic, hospital, health department, or doctor’s office for any of the following?”). Participants were asked to report their frequency of condom use for anal sex and vaginal sex during the past 3-months using 4-point scales that ranged from “always” to “never.” These items were combined for a single binary indicator of inconsistent condom use.

Acculturation was measured using Marin’s Short Acculturation Scale for Hispanics. [109]. Only results from the 4-item language use subscale are included in this study (e.g., “What language(s) do you usually speak at home?”). Five-point response options ranged from “Only Spanish” to “Only English” with a midpoint indicating respondents used “Both Equally”.

An adapted 9-item two-factor version of the Wake Forest University Medical Trust Scale (WFUMTS) was used to evaluate trust in medical providers and trust in medical researchers [11, 98]. Legal stress was evaluated using an adapted 5-item version of Alderete’s Legal Stress Index (LSI)[10]. Psychometric properties of these stress and trust measures are reported elsewhere, in a broader multi-sample study (CHs 2-3). Specific items for the WFUMTS and LSI are included in the Appendix.

The 13-item Short-*Marlowe Crowne Social Desirability Scale* (MCSDS) was also included in the assessment. The MCSDS is traditionally used to validate the independence of culturally sensitive measures, and has been used more recently in linguistic disfluency experiments [40]. Participants were prompted to respond "True" or "False" to 13 MCSDS statements (e.g., "It is sometimes hard for me to go on with my work if I am not encouraged"; and "I have never deliberately said something to hurt someone's feelings").

Prior to multivariable analysis all WFUMTS and MCSDS responses were recoded according to instructions within original validation studies. Additional details of study recruitment, allocation, intervention methods, internal consistency of measures, quality-assurance, and attrition can be found in the primary efficacy study [43].

Data Analysis

Analyses were conducted using an intent-to-treat protocol consistent with the primary efficacy study. Preliminary data screening was conducted using SAS (version 9.1 software) to evaluate distribution of responses at baseline and follow-up as well as bivariate relationships. Next, latent variable analyses incorporated the limited information estimation approach suggested by Muthén for models with multivariate-normal responses. In these models latent underlying variables are linked to observed categorical responses via threshold models yielding probit measurement models using Mplus (version 7.11). Multivariate models were tested using the weighted least squares (WLSMV) estimator, fitting model implied to estimated polychoric correlations. Model comparisons considered modification indices, factor loadings, and "DIFFTEST" results. The DIFFTEST option in Mplus is used to evaluate whether changes made to nested models are statistically distinguishable [100]. Model Chi-square, degrees of freedom

(Df) Comparative Fit Index (CFI/TLI), RMSEA and WRMR evaluate overall model fit. With samples <500 the CFI and TLI >=.90, RMSEA<=.10 WRMR<1.0, and the Chi-square/Df ratio (<3.0) suggest acceptable fit.

Measurement invariance was tested by constraining manifest variable latent variable relationships to equivalence across measurement occasions. Multiple indicator multiple cause (MIMIC) models were used to test whether social desirability scores or H2-group assignment contributed to differential item functioning within socio-medical trust indices. To test moderation hypotheses that included latent variable interactions at each measurement occasion, random intercept models were specified using the Type=Random command and the "XWITH" option. The XWITH option in Mplus is used to estimate effects of latent variable interactions with other latent variables or with manifest variables that are discrete or continuous. Moderation models were also specified to explore significance of interactions between degree of English language use and social desirability scores.

Results

Participant Characteristics and Pre-Post Distributions of Scores

Participant demographics measured at baseline reveal that the intervention and control groups were comprised of men who were on average about 30 years of age (range:18-66). Similar proportions born in Mexico (>50%) and Central America (>30%). Although five participants (7%) randomized to the intervention group reported a U.S. birthplace. Nearly all participants (>94%) reported using only Spanish as a child. Distribution of Marin's 5-item language-use score was skewed for each group, indicating that most participants used only Spanish and few reported equal use of both languages (English and Spanish). Groups were mostly uninsured (>60%) and employed year-round

(>60%). Groups had similar distributions of health status ratings, similar distributions of legal stress and similar distributions of summated medical trust scores. Most rated their personal health status as “Good” or better (>85%). Most participants in each group reported at least one category of exposure to legal stress. Medical trust subscales were each positively skewed –indicating general agreement with positively-worded statements about provider and researcher attributes. Distribution of selected socio-demographic characteristics, summary scores, and HIV-prevention criteria measured at baseline are represented in Table 4.1. Due to patterns of missing data trust scores reported in Table 4.1 exclude negatively-worded items.

Table 4.1. Participant Characteristics and HIV-prevention Criteria measured at Baseline

Figure 4.1
About Here

Given the substantial level of missing data item response distributions were closely examined for each measure of interest. For LSI items, rates of missing data and rates of “Refused” responses were similar across items and rates changed little from baseline to follow-up. For “Don’t Know” responses the third LSI item (vTSc) had the highest rate of “Don’t Know” responses (6%) at baseline. This item asked participants to report stress regarding health departments. For this item “Don’t Know” response rate reduced to 1% at follow-up. For medical trust subscales, patterns of missing data were similar across items and measurement occasions. “Don’t Know” response rates were high (>10%) for the majority of trust items at baseline. Rates for three of nine trust items remained high at follow-up. Negatively-worded trust items (vT1a and vT2c) produced the

highest “Don’t Know” response rates at each measurement occasion. Item response distributions at baseline and follow-up are reported in the Appendix.

Large numbers of records that were excluded from complete-case analyses were attributable to “Don’t Know” responses –as opposed to missing data. Using cases with no missing/Refused/Don’t-Know data reported at baseline or follow-up on a given measure, complete-case analysis of the LSI excluded 22% of participants, 44% of participants for the medical provider trust scale, and 51% of participants for the medical researcher trust scale. Using these limited sets, comparison of distributions revealed a mixed but overall increase in the expression of legal stress at follow-up. Slightly fewer men reported they expect to be deported at health departments or social agencies at follow-up, and at follow-up more men reported that they avoid police because of immigrant status. For medical trust subscales distributions revealed a general trend toward more positive endorsements of medical providers and more positive endorsements of researchers at follow-up. Differences based on participants with complete data at baseline and follow-up are also included in the Appendix.

Subsequent multivariate analyses were designed to include all participants with partially missing data. Models were designed to evaluate reliability of underlying latent constructs by estimating latent factor correlations and factor loadings at baseline and 3-month follow-up.

Measurement Invariance Models

Beginning with a standard of configural invariance independent models were estimated for the LSI and the WFUMTS. Results of these models indicated that latent factor means were slightly higher at follow-up for legal stress, trust in medical provider, and trust in medical researcher. The correlation between latent stress variables at

baseline and follow-up (*r*=0.70) was greater than correlations for medical trust (*r*=<0.50). Subsequent models constraining latent-variable manifest-variable relationships supported measurement invariance across measurement occasions for the 5-item LSI but not for the 9-item two-factor medical trust scale.

LSI measurement invariance was supported by DIFFTEST results after constraining LSI thresholds to equivalence across measurement occasions (Chisq=9.749 [5] p-value=0.083) and constraining LSI factor loadings to equivalence (Chisq=8.386 [5] p-value=0.1326). Factor loadings remained lowest for the second item (vTSb) which produced non-significant threshold values at each measurement occasion, indicating that individuals could be expected to report exposure to legal status questioning when the underlying latent stress score was zero. Other LSI items had significant threshold values at each measurement occasion and acceptable factor loadings. Factor loading and correlation estimates for the LSI are reported in Table 4.2.

Measurement invariance was partly supported by constraining medical provider and medical researcher thresholds to equivalence across measurement occasions (DIFFTEST Chisq=7.921 [9] p-value=0.524). Additional equivalence constraints on factor loadings did not support measurement invariance (Chisq=51.791 [9] p-value=0.000). Factor loadings improved but remained low (<.60) for negatively-worded items in each subscale. Estimates for latent factor loadings and correlations for WFUMTS are represented in Table 4.2.

Table 4.2. Measurement Models and H2-Group Effects on Latent Factors

---

Table 4.2
About Here

Structural Models Examining Effects of the H2 Intervention and Social Desirability

To examine intervention group assignment and social desirability (MCSDS) as potential causes of differential item functioning these variables were regressed on latent stress and medical trust factors in independent MIMIC models. Initial MIMIC models provided no evidence that the poor performance of negatively-worded items (vT1a and vT2c) was explained by H2-group membership or MCSDS score. To improve the internal consistency of latent factors, subsequent models excluded negatively-worded items. Subsequent models also treated the LSI documentation-questioning item (vTSb) as an independent exposure variable.

Model estimates indicated the HoMBReS intervention group effect on legal stress at follow up was not statistically significant (γ= -0.021). Models indicated a statistically significant H2-group effect on latent provider-trust at follow-up (γ= 0.200). The group effect was not statistically significant for researcher-trust at follow up (γ= 0.170). Exploratory models indicated very weak non-significant direct effects of health insurance and MCSDS on latent factors at both measurement occasions. Estimates of main effects of the H2 intervention on latent factors are reported in Table 4.2 along with WLSMV model fit indices.

Moderation Models with Latent Variable Interactions on HIV-screening

Self-reported HIV-screening at baseline and follow-up were included in latent variable moderation models. These models estimated independent effects of legal stress using the formative factor model described above and the independent effects of medical factors with no negatively-worded indicators. Results confirmed the main intervention effect on HIV-screening (as reported previously) and produced no statistically significant interaction terms. The same models were used to explore self-

reported health status as an outcome of the H2 intervention (replacing the variables for HIV-screening). These models demonstrated no significant effect on self-rated health and also produced no statistically significant interaction terms. Results of HIV-screening models are reported in Table 4.3. Models for self-rated health are in the Appendix.

As demonstrated in Table 4.3 participants randomized to the H2 intervention group experienced significantly increased odds of reporting HIV-screening at 3-months post-intervention. Estimates related to main hypotheses are represented in the bottom rows of Table 4.3 columns. Accounting for main effects, higher degree of legal stress among men in the H2 group was linked to reduced odds of HIV screening (AOR=0.641). However this negative effect (-0.199, SE=0.823) was far from significant. For medical trust factors the interaction terms represented in Table 4.3 were also far from significant.

Table 4.3. Effects on HIV-screening and H2 latent variable interactions (n=126)

Table 4.3
About Here

Discussion

The *HoMBReS* (Hombres Manteniendo Bienestar y Relaciones Saludables; Men Maintaining Wellbeing and Healthy Relationships) curriculum is central to a community-based HIV-prevention approach supported and disseminated by the Centers for Disease Control and Prevention [67]. Components of the curriculum have been developed over time by a community-based participatory research (CBPR) partnership, through an iterative and systematic intervention development process [123]. This study investigated the reliability and predictive validity of adapted Spanish-language measures including the Legal Stress Index and the Wake Forest University Medical Trust Scale. The primary

moderation hypothesis of this study was not supported. Results indicated that among H2-RCT participants' latent socio-medical distrust did not significantly moderate HIV-screening outcomes. However, item response distributions and subsequent tests of measurement invariance provide evidence for future longitudinal research that may support directional hypotheses about effects of legal stress and distrust in HIV-prevention research.

The CBPR partnership's development of the WFUMTS for Spanish speakers was driven by an absence of provider trust measures appropriate for HIV-prevention research in the study population. In adapting the WFUMTS we anticipated that participants would be able to make intuitive judgments about the trustworthiness of medical providers and medical researchers regardless of treatment relationships or recent personal experience with physicians. Results demonstrated high rates of "Don't Know" responses in a largely uninsured predominantly Spanish-speaking study sample. "Don't-Know" response rates remained relatively high for negatively-worded trust items at follow-up suggesting these items may be intrinsically problematic. Future research applying standard test theory may consider including relatively simple negatively-worded items to investigate learning or developmental hypotheses. Compared to the first negatively worded item (vT1a), judging physician fidelity, the second negatively-worded item did produce an acceptable factor loading at follow-up. This item (vT2c) is a relatively unambiguous moral judgment about treating humans like "guinea pigs." Overall results may be interpreted as evidence that the underlying construct measured by the WFUMTS changed from baseline to follow-up. However conclusions cannot be drawn about causes of this change. Furthermore, analyses discovered weak correlations between latent variables and "known-groups criteria" (e.g., health insurance status, self-

rated health status and legal stressors) at each measurement occasion and in prior research. These results do not support construct validity among immigrant Latino men.

The CBPR partnership's inclusion of the LSI was driven by research describing "legal status" as a reason for delayed HIV-testing and treatment disparities in the southeastern U.S. [17, 38]. Results demonstrate that few participants reported "Don't Know" or refused to respond to LSI items. Complete case analysis and subsequent measurement invariance models indicated that reported exposure to legal-questioning increased slightly, and men reported consistent rates of exposure to legal stressors at each measurement occasion. The multivariate formative-factor model suggested that H2-group assignment did not account for variation in the underlying legal stress construct. These findings provide further insight into the context for delayed HIV diagnoses and suboptimal outcomes among immigrant Latinos living in North Carolina. Findings provide evidence of construct reliability but offer no evidence that LSI scores predicted HIV-screening reported by men in this sample. Extreme missingness for items on the social desirability scale and for health insurance status limited this study's ability to investigate these variables in multivariate models. The questions of social desirability bias and the validity of self-reported HIV-screening remain important areas of consideration for health promotion interventions, particularly for cross-cultural migrants in situations where medical screening is a component of the naturalization process.

Conclusion

Recently "linking trust" has been identified as a significant empirical target among African American women exposed to the SISTA/P4 interventions [124]. Trust building has also been identified as a prerequisite for successfully adapting and implementing the *HoMBReS* intervention approach [55]. This was the first study to investigate change in

latent socio-medical trust among immigrant Latinos participating in a randomized HIV-prevention intervention. More rigorous multi-group and multi-level research should be designed specifically to evaluate the effects of legal stress on Latino population health and the theoretically moderating effects of immigration and customs enforcement policies on HIV epidemiology in the U.S., Mexico and Central America [15].

Table 4.1. Socio-demographics and HIV-prevention Criteria measured at Baseline

	Intervention Group (N=78)		Control Group (N=64)	
	Missing %	n (%)	Missing %	n (%)
Birth Country	4		5	
Mexico		42 (56)		42 (69)
Central America		28 (37)		19 (31)
U.S.		5 (7)		0 (0)
Age, mean (SD)	5	29.7 (9.9)	6	33.9 (11.3)
Employed year round	6	46 (63)	8	43 (73)
Language used as a child	1		3	
Only Spanish		72 (94)		61 (98)
More Spanish than English		4 (5)		1 (2)
More English than Spanish		1 (1)		0 (0)
Only English		0 (0)		0 (0)
Language Use (5-item average)	0	1.5 (0.6)	0	1.5 (0.5)
Health Insurance	23	18 (30)	34	17 (40)
Self-Rated Health Status	5		3	
Excellent		16 (22)		8 (13)
Very Good		24 (32)		18 (29)
Good		24 (32)		27 (43)
Fair		9 (12)		8 (13)
Poor		1 (1)		1 (2)
Legal Stress Index	18		11	
0		23 (36)		17 (30)
1		16 (25)		18 (31)
2-3		18 (28)		13 (23)
4-5		7 (11)		9 (16)
Medical Trust Subscales				
Provider Trust, possible range: 4-16	27	11.8 (2.2)	22	12.2 (2.4)
Researcher Trust, possible range: 3-12	29	8.7 (1.8)	25	8.5 (1.8)
Social Desirability Scale, possible range: 0-13	20	3.9 (2.1)	9	3.9 (2.3)
HIV-prevention Criteria				
HIV-tested (past 12-mo)	15	20 (30)	6	24 (40)
Consistent Condom Use (past 3-mo)	28	25 (45)	22	12 (24)

Table 4.2. Measurement Models and H2-Group Effects on Latent Factors

	M1 (Legal Stress Index)				M2 (Medical Trust Scale)								M1.1 (Legal Stress Index, ffm)		M2.1 (Medical Trust Scale, 7-items)			
	BL		FU		BL				FU				BL	FU	BL		FU	
	LSI		LSI		Provider		Researcher		Provider		Researcher		LSI	LSI	Provider	Researcher	Provider	Researcher
Parameter	Est	(SE)	Est	(SE)	Est	(SE)	Est	(SE)	Est	(SE)	Est	(SE)	Stdyx	Stdyx	Stdyx	Stdyx	Stdyx	Stdyx
Structural Model																		
Factor Regressions																		
γk1 Group: H2													-0.027	-0.021	-0.065	0.078	0.200*	0.170
γk2 TSb													0.374*	0.463*				
Factor Means/Intercepts	-0.268	(0.207)	0.196	(0.179)	-1.272	(0.196)	-1.389	(0.204)	-1.074	(0.162)	-1.609	(0.241)	-0.981	-1.022	-1.028	-1.638	-1.345	-1.587
Factor (Co)variances																		
Ψkk	1	0	1	0	1	0	1	0	1	0	1	0	0.858	0.788	0.996	0.994	0.960	0.971
Ψ12						0.904	(0.039)			0.892	(0.035)					0.909		0.885
Ψ11_		0.700	(0.094)					0.458	(0.075)					0.686			0.481	
Ψ22_								0.403	(0.108)								0.416	
Ψ12_								0.422	(0.084)								0.447	
Ψ21_								0.337	(0.094)								0.332	
Measurement Model																		
Factor Loadings																		
λ1 [TSa]	0.567	(0.103)	0.868	(0.070)									0.684	0.716				
λ2 [TSb]	0.537	(0.098)	0.617	(0.101)									0.751	0.783				
λ3 [TSc]	0.801	(0.098)	0.803	(0.101)									0.774	0.806				
λ4 [TSd]	0.804	(0.069)	0.780	(0.074)									0.887	0.915				
λ5 [TSe]	0.925	(0.062)	0.815	(0.072)														
λ1 [T1a]					-0.187	(0.081)			-0.159	(0.090)								
λ2 [T1b]					0.862	(0.041)			0.814	(0.044)					0.865		0.826	
λ3 [T1c]					0.659	(0.047)			0.789	(0.036)					0.652		0.777	
λ4 [T1d]					0.341	(0.079)			0.425	(0.083)					0.368		0.447	
λ5 [T1e]					0.796	(0.042)			0.900	(0.038)					0.803		0.895	
λ6 [T2a]							0.740	(0.056)			0.883	(0.033)				0.754		0.903
λ7 [T2b]							0.698	(0.053)			0.915	(0.034)				0.714		0.908
λ8 [T2c]							0.042	(0.093)			0.532	(0.082)						
λ9 [T2d]							0.893	(0.041)			0.756	(0.049)				0.882		0.762
Model Fit Statistics																		
Model Chi-square (Df)		37.170 (34)						254.209 (129)*						50.083 (45)			171.528 (86)*	
RMSEA		0.026 (0.000, 0.068)						0.083 (0.068, 0.098)						0.030 (0.000, 0.068)			0.084 (0.065, 0.102)	
CFI/TLI		0.993 / 0.991						0.930 / 0.917						0.984 / 0.981			0.954 / 0.944	

*p>.05

Table 4.3. Intervention Effects and Latent Variable Interactions (n=126)

	M1.1 Legal Stress Interactions			M2.1 Provider Trust Interactions			M2.1 Researcher Trust Interactions		
	HIV screening			HIV screening			HIV screening		
Parameter	Est	(SE)	Odds Ratio	Est	(SE)	Odds Ratio	Est	(SE)	Odds Ratio
Structural Model									
Regressions									
Group: H2	1.750	(0.716)*	5.752	1.573	(0.932)	4.823	1.876	(0.536)*	6.526
HIV baseline	1.252	(0.558)*	3.497	1.107	(0.530)*	3.024	0.917	(0.519)	2.501
LSI baseline	0.098	(0.537)	1.103						
LSI follow-up	0.140	(0.633)	1.150						
T1f baseline				0.138	(0.162)	1.148			
T1f follow-up				0.196	(0.196)	1.216			
T2f baseline							0.558	(0.401)	1.747
T2f follow-up							0.074	(0.204)	1.077
Interaction Terms									
Group*LSI_baseline	0.329	(1.367)	1.389						
Group*LSI_follow-up	-0.445	(1.451)	0.641						
Group*T1f_baseline				0.338	(0.300)	1.402			
Group*T1f_follow-up				-0.465	(0.307)	0.628			
Group*T2f_baseline							-0.555	(0.543)	0.574
Group*T2f_follow-up							-0.139	(0.324)	0.870

*p>.05

CHAPTER 5

Conclusion

Summary

Some epidemiologists now characterize state dissolution, rural-urban migration, imbalanced sex ratios, and district policing strategies as causal factors in HIV transmission [33, 125, 126]. According to Glass and colleagues these factors may affect population distribution of HIV and rates of disease in subpopulations via relatively stable features of the built and social environment [1, 7]. Few studies have investigated racial/ethnic discrimination or other features of the environment that may regulate not only risk behaviors but also expression of susceptibility among Latinos living in the U.S. [6, 16, 79, 96, 127]. Studies of "embodied" experiences of discrimination (EOD) demonstrate racial/ethnic discrimination is less likely to be reported among foreign-born Latinos (25%) compared to U.S.-born Latinos (47%); and EOD is not associated with drug abuse disorders among foreign-born-Latinos the way it is for other groups [96].

This dissertation developed relatively unique Spanish-language measures of legal stress and medical dis/trust designed specifically to evaluate immigrants' social exposures and treatment experiences in transnational Latino populations and communities. This dissertation presented an eco-social framework for immigrant health services and investigated whether latent socio-medical trust constructs regulated HIV - screening rates and expressions of health status among immigrant men and women from Mexico and Central America. Analyses were designed to investigate use of English as a second language and other nativity-related factors that are often overlooked in structural-determinants research [7].

Chapters 2-4 advanced measurement and structural models for understanding how adults learn to judge the trustworthiness of medical providers, and how individuals express personal-health status within contexts of immigration, criminalization, and language discordant healthcare systems. Knowledge was advanced in each chapter by

limiting analyses to Mexican and Central American immigrants in North Carolina and investigating differential item functioning across HIV-clinic and community based groups. Knowledge was advanced in Chapter 3 by focusing on the language-use SRHS “bias” [12]. This bias was investigated according to potentially mediating and moderating socio-acculturative influences using latent-variable path analysis.

Legal stress was evaluated using a set of participant experiences with and expectations of discriminatory community policing. Medical trust was evaluated using participant endorsements of medical provider attributes and medical researcher attributes. Analyses investigated common underlying variance associated with these sets of experiences, expectations, and judgments. Covariance analyses and structural equation modeling primarily investigated associations between latent socio-medical trust constructs and health criteria while accounting for Marin’s language-related socio-acculturative influences [109, 128].

In Chapter 2 patterns of self-reported antiretroviral adherence were associated with lower levels of legal stress among clinic based participants. Chapter 3 included only community based participants and demonstrated that legal stressors had small negative effects on medical trust, social-ethnic relations, and likelihood of HIV-screening. However, medical trust, legal stress, and other variables did not explain the relationship between greater English language-use and “better” self-rated health status.

Combination of analyses represented in Chapter 3 and Chapter 4 indicate that improvements in measures, study design, and stratification by sex and level of health status may result in more robust models. Future small-scale research should consider using gender-specific power analyses. Larger-scale studies may compare independent theoretical models that explain differences in the ways language discordance, legal

stress, and other socio-acculturative influences affect health ratings, screening behavior, and health profiles of men and women across developmental life stages.

As demonstrated in Chapters 3-4 extreme levels of missingness were attributable to “Don’t Know” responses for health insurance items, and for medical trust items. Although “Don’t Know” responses were anticipated for the adapted WFUMTS and for health insurance, differential levels of missingness across items and across study samples compromised integrity of statistical models designed to estimate these structural determinants. For example, models designed to estimate independent effects of insurance status on trust and HIV-screening produced poor fit statistics and these models were not reported in Chapter 3. Instead models retained health insurance as a non-significant indicator of latent medical trust. Future research designed to improve quality of medical treatment relationships may evaluate knowledge about health insurance status and health insurance availability along with eco-social stressors that prevent access to care.

Based on Chapter 3-4 findings the relationship between English language use and SRHS stands as an important area for further investigation and may explain trends in the “Latino health paradox” literature [12, 64]. If marginal increase in English language proficiency has a “real” graded relationship with personal health status and utilization of preventive services then language availability/proficiency experiments could demonstrate very clear health system recommendations. If it is ultimately concluded that the language-SRHS relationship is a form of error or “bias” then expression of SRHS in clinical encounters could routinely result in overprescribing, other forms of malpractice, and biased clinical research findings. This dissertation provided limited evidence that legal stress and social affiliations explain the language-SRHS bias. Differences in SRHS, legal stress, and insurance status reported in RDS and purposive-venue-based

sampling introduce more questions for methodologists to address in larger scale surveillance research. Future clinical experiments and life-course research investigating trust, stress and health should be designed to overcome major limitations of analyses reported in Chapters 2-3.

Limitations

As described above, original sampling procedures produced two groups with qualitatively different HIV-treatment relationships. However, it should not be concluded that all community based participants were free from medical need or matched with HIV-clinic-based participants on trust or health related measures (in Chapter 2). Future studies may consider matching approaches. Prospective cohort studies and randomized experiments are necessary to draw inferences about how underlying sense of trust in medical providers, sense of trust in medical researchers, and experience of “legal status” affects enrollment in treatment, medical adherence, and HIV/AIDS outcomes. Propensity scores are another alternative method that may be used in observational studies.

For evaluating adherence as an outcome of subjective medical relationships, propensity scores could include treatment history and regimen related variables. For evaluating HIV-screening and treatment outcomes in observational studies independent propensity scores could include known HIV-risk variables and the Legal Stress Index variables. These propensity scoring methods could be used to investigate possible confounding by indication (also referred to as channeling bias). These analyses may be important in moving toward legal/policy reforms. Particularly in clinics/regions where there is discretion over when and where to initiate HIV-screening protocols and HAART protocols, immigrant status and perceived “legal status” and “health status” may influence choice of one protocol over another; and these differential treatment decisions would influence the likelihood of outcomes under investigation. For example, if choice of

treatment protocol is based on perceived legal status or “biased” SRHS, then subgroups could appear in research to be more or less susceptible to treatment failure.

One can imagine these phenomena at work in the small body of research that has evaluated medical trust and adherence among Latinos in HIV clinics [6, 20, 108]. Therein immigrant Latinos have reported the highest levels of medical trust and also have demonstrated the highest levels of antiretroviral adherence. However, it is unlikely that immigrant status and “undocumented status” are health protective factors ultimately associated with HIV/AIDS survival for most individuals [20]. It is more likely that confounding by indication and a combination of situational factors and sampling biases select for a subset of treatment profiles represented in research findings. To facilitate this future research, brief screeners for medical trust, language proficiency, health status, and legal stress could be included in standard preventive care visits and re-administered to persons ultimately enrolled in HIV cascade of care studies.

Future research should improve sampling methods and design enrollment protocols that enhance participation rates among persons with the highest levels of legal stress and the lowest levels of antiretroviral adherence. Future research should also include verifiable measures of insurance status and relatively direct measures of access-to-care and language-use, including language proficiency and/or availability of preferred language during health care interactions. Where possible studies may stratify by insurance status, legal status and language proficiency.

Regarding potential measurement biases, HIV-clinic based participants typically have increased experience with psycho-social assessments (based on treatment history). Future research should consider different forms of test bias, observer bias, and hindsight bias that may account for differences in subjective experiences of participants. Studies evaluating trust should exclude or plan for “Don’t Know” responses at each

stage of research. Future prospective studies investigating adherence throughout the HIV treatment cascade may consider measuring latent trust in conjunction with medical knowledge and apply standard test theory to evaluate learning outcomes over time. Multi-group studies may extend the dual-process model to include biological outcomes and also community-/group-level conditions.

Ultimately Chapter 4 demonstrated problems with the adapted WFUMTS in longitudinal research using only two measurement occasions. Future research should compare assessment methodologies, computer-assisted technologies, interviewer effects, and alternative measures administered over at least 3 measurement occasions. Future research should use at least 3 negatively-worded items if negative wording linked to a dimensional hypothesis.

Conclusion

Although culturally and developmentally comparative studies of risk re/cognition, fiduciary affiliations, and disclosure of personal health-status is scant [129], Pan-American epidemiology and agent-based HIV-prevention interventions call for additional Spanish-language measures and models that account for variation in language fluency, trustworthiness detection, and other bio-social expressions [14]. Improved measurement and structural models developed in Chapters 2-4 may be used in future multi-level research to evaluate efforts to stem per-person/per-year costs of HIV prevention, possibly by incorporating regional, jurisdictional, and/or clinic-level variables [23]. Further unpacking language-use biases and situational effects within theory-driven public health research is important given the percentage of Latino, Asian, and other U.S. populations that qualify as “linguistically isolated” [30]. Understanding effects within an immigration and HIV-risk reduction framework is important, given the increasing burden of U.S. HIV incidence attributable to foreign born residents [15]. Moving forward, an intergenerational

framework may consider latent socio-medical trust in conjunction with childhood vaccination rates, insurance enrollment rates, and patient referral networks.

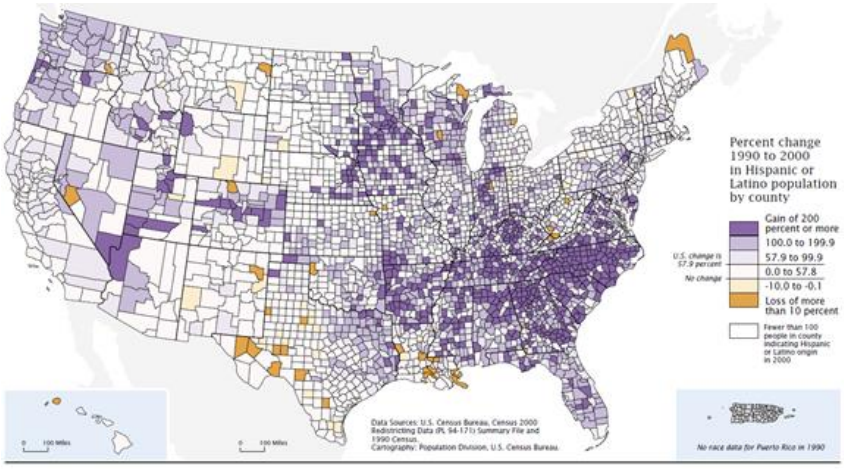
Appendix and References

Appendix A

Chapter 1 Appendix

Figure 1.1.A. U.S. Census Maps of Hispanic/Latino Growth and Distribution

Map 1. Hispanic/Latino population growth (1990-2000) by U.S. County



Map 2. Percent of population Hispanic/Latino (2010) by U.S. County

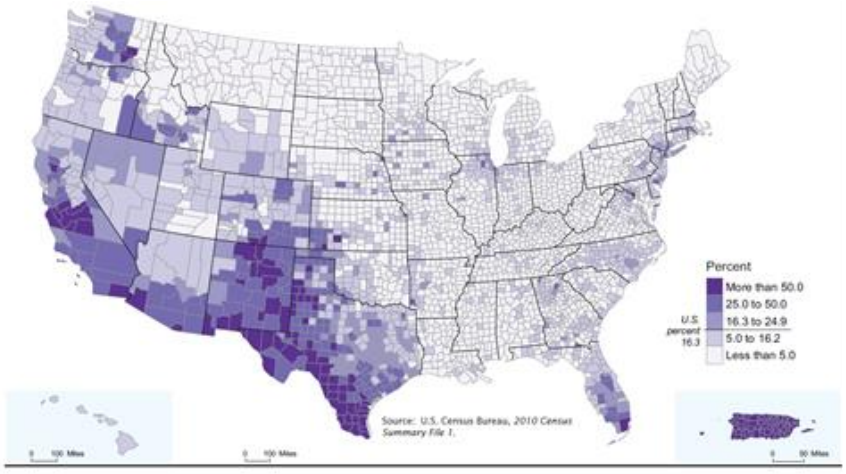


Figure 1.2.A. Language and Informational Deficits impacting North Carolina Latinos

NC-IOM Conclusions and Priorities (2003)

> According to the US Census, approximately half of North Carolina Latinos have Limited English Proficiency (LEP) or are unable to speak English very well. These language barriers can impair a Latino's ability to access needed programs and services. Title VI of the Civil Rights Act prohibits public and private providers who accept federal funds (including Medicaid, NC Health Choice or Medicare reimbursement), from discriminating on the basis of race, color or national origin. The failure to make services and programs linguistically accessible has been interpreted to violate Title VI provisions. In October and November of 2001, the Office of Civil Rights (OCR) of the US Department of Health and Human Services conducted a review of the NC Department of Health and Human Services and five of the local public health and DSS agencies. **OCR found North Carolina to be out of compliance with Title VI by failing to provide adequate language assistance to groups who speak a primary language other than English.** According to OCR, individuals with limited English proficiency were sometimes turned away because no interpreters were available, or were required to use their family members, including minor children, as interpreters. Not only does this violate the provisions of Title VI, it compromises the confidentiality and accuracy of communication between the clients and the agency personnel. The best way to ensure that services are linguistically and culturally accessible is to hire bilingual, bicultural staff, but in the absence of sufficient bilingual personnel, agencies and health care providers must ensure the availability of trained interpreters. (p127)

NC Latino Health, 2003
North Carolina Institute of Medicine

Dennis et.al. (2011)

> We lack specific migration history on our Latino patients, preventing direct assessment of the effect of immigration on HIV clinical characteristics and entry to care. Gathering these data, as well as information on acculturation markers, such as language …, insurance, and legal status, may offer further insight into reasons for delayed entry to care. This knowledge would be instrumental in informing targeted intervention programs not only in North Carolina but also potentially in other nontraditional Latino settlement areas.

Late Entry to HIV Care Among Latinos Compared With Non-Latinos in a Southeastern US Cohort:
Clinical and Infectious Disease

Figure 1.3.A. Concepts and Definitions

Thomas A. Glass (2006)

We propose an alternative class of variable, one that shapes health outcomes in populations, but in a more indirect way. For this purpose, we propose the concept of a **risk regulator** as a class for variables that capture aspects of social structure that influence individual action. We define a risk regulator as a relatively stable feature of a particular patch of the social and built environments, residing at levels of organization above the individual (uphill), but below larger-scale macro-social levels.

Risk regulators are … determinants of disease rates, as opposed to risk factors, which are measures of the specific proximate causes of cases (Schwartz & Diez-Roux, 2001). They function as control parameters that operate at a system level to up- or down-regulate the likelihood of key risk factors (including health behaviors like smoking, inactivity, high-risk sex, and overeating). In contrast to a causal risk factor, a risk regulator operates through multiple pathways and through complex (and potentially non-linear) causal sequences over time and place.

Behavioral science at the crossroads in public health: Extending horizons, envisioning the future
Social Science and Medicine

Russel Caterinicchio (1979)

As cognitive state or 'orientation' interpersonal **trust** fits nicely into Beecher's concept of the 'secondary-reactive pain component', because interpersonal trust may be viewed as an important determinant of the total experience of anxiety and pain during unpleasant occurrences. Moreover, this proposition is especially appealing because the relationship between anxiety states and pain thresholds and pain tolerances has been found to be highly significant according to the literature of the psychophysiology of pain.

Testing plausible path models of interpersonal trust in patient-physician treatment relationships
Social Science and Medicine

Mark Hall, et al. (2001)

Trust can be seen as a global attribute of treatment relationships, one that encompasses subsidiary features such as *satisfaction, communication, competence,* and privacy –each of which has considerable importance in its own right. …The majority stress the *optimistic* acceptance of a *vulnerable* situation in which the truster believes the trustee will *care* for the truster's interests.

Trust in physicians and medical institutions: what is it, can it be measured, and does it matter?
Milbank Quarterly

Kathryn Whetten, et al. (2006)

When we controlled for poverty, education, age, and gender, the **interaction terms for minority and distrust** were not significant, indicating that, regardless of race, individuals with similar socio-demographic characteristics who do not trust their providers or the government are less likely to visit clinics, more likely to use the emergency room, less likely to use antiretrovirals, and more likely to report poor physical and mental health. These findings suggest the need for further causal research, including studies ascertaining level of trust before treatment initiation and following patients longitudinally to determine whether trust precedes patterns of use.

Exploring Lack of Trust in Care Providers & the Government as a Barrier to Health Service Use
American Journal of Public Health

Marja Jylhä (2009)

Self-rated health differs from most indicators of health in that its origins lie in an active cognitive process that is not guided by formal, agreed rules or definitions. It can be understood as '…a summary statement about the way in which numerous aspects of health, both subjective and objective, are combined within the perceptual framework of the individual respondent'

What is self-rated health and why does it predict mortality? Towards a unified conceptual model
Social Science and Medicine

Adam Alter (2009)

We sought to identify a domain-general cue that predicts self-disclosure patterns. We found that metacognitive ease, or **fluency**, promoted greater disclosure, both in tightly controlled lab studies and in an ecologically valid on-line field study. Disfluency tended to prime thoughts and emotions associated with risk, which might be one reason why people who experience disfluency are less comfortable with self-disclosure

Suppressing Secrecy through Metacognitive Ease
Psychological Science

Katrina Armstrong, et al. (2013)

Higher ***Health Care System Distrust*** among African Americans is explained by a greater burden of experiences of racial discrimination than whites. Reasons for higher distrust among whites after adjusting for experiences of racial discrimination are not known. Efforts to eliminate racial discrimination and restore trust given prior discrimination are needed.

Prior Experiences of Racial Discrimination & Racial Differences in Health Care System Distrust
Medical Care

Nancy Kreiger (2012)

If, indeed, "race" is a social construct—then it follows that people born and raised outside of the United States have to learn how race is produced here and what US racial discrimination is like. Tellingly, research indicates that recent US immigrants of color are the least likely to report having experienced racial discrimination, despite their greater likelihood of encountering discrimination based on language. The robust body of work on the **healthy immigrant effect** further indicates that, at least for the first generation, immigrants typically have better health than their US-born counterparts. Yet, to date, few US investigations take nativity into account in their analyses.

Methods for the Scientific Study of Discrimination and Health: An Ecosocial Approach
American Journal of Public Health

Adam Alter (2013)

Thompson et al. define ''answer fluency'' as the ease with which a response is generated—a concept that we and many other researchers in the field simply call **''fluency''**. As we noted in our review, answers come to mind more easily for numerous reasons: because the answer to the question was discovered very recently (retrieval fluency); because the respondent happened to be pondering a related topic (priming fluency); because the question was phrased simply (linguistic fluency); or because the question was printed in a clearer font (perceptual fluency). Each of these forms of fluency corresponds to a particular cognitive operation.

For example, we decomposed memory-based fluency into encoding fluency and retrieval fluency, which correspond to the cognitive operations of encoding and later retrieving information from memory. We similarly divided perceptual fluency into visual perceptual fluency and auditory perceptual fluency, which parallel the processes of vision and audition. Along with numerous other instantiations of fluency, the combined ease with which people accomplish these cognitive tasks forms a global sense of whether the question was answered with ease (fluently) or with difficulty (disfluently). One classic illustration is a study by Reber and Schwarz (1999), in which participants believed that trivia responses were more likely to be true when they were presented more clearly.

Perceptual fluency—the sense of ease associated with perceiving the trivia questions and responses –imbued those responses with a sense of truth, familiarity, or rightness. [for reviews see Alter & Oppenheimer, 2009; Schwarz, 2004].

Disfluency prompts analytic thinking—But not always greater accuracy: Response to Thompson
Cognition

U.S. Supreme Court (1875)

Citizenship connotes membership in a political society to which a duty of permanent allegiance is implied. The United States Supreme Court in *United States v. Cruikshank* (Sup.Ct 1875) stated*:* 'Citizens are the members of the members of the political community to which they belong. They are the people who compose the community, and who, in their associated capacity, have established or submitted themselves to the dominion of a government for the promotion of their individual as well as collective rights.' Alienage has the opposite meaning of citizenship and has a condition of not belonging to the nation. The allegiance required of non-citizens is temporary and consists of willingness to comply with the nations laws while residing in its territory. The status of citizens in the United States carries with it all rights and privileges embodied in the Constitution. Although non-citizens also enjoy certain constitutional protections, some provisions protect only "citizens," such as the Privileges and Immunities Clause of Article IV and the Fourteenth Amendment. Lawful permanent residents are entitled to some protection under the Equal Protection guarantees of the Fifth and Fourteen Amendments.

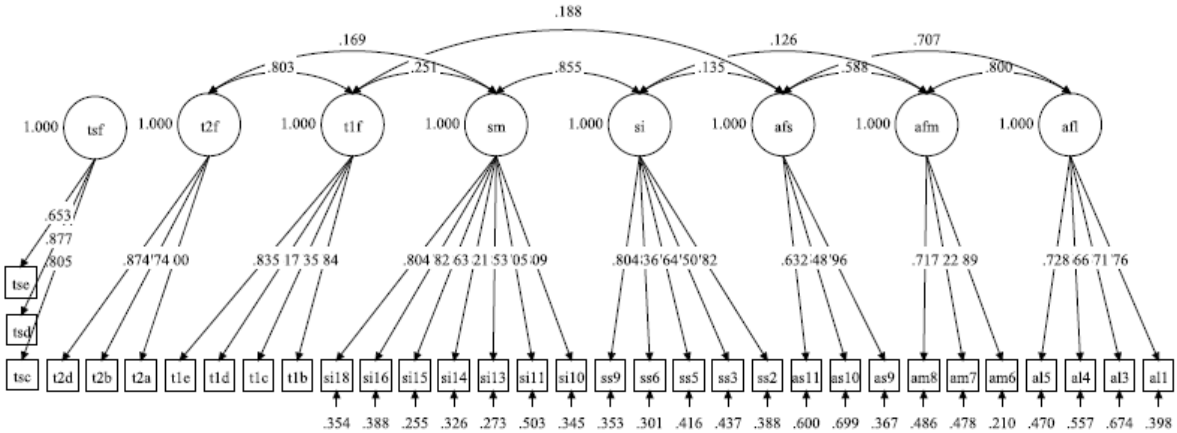
Chapter 12: Citizenship
Immigration Law and Procedure by Weissbrodt & Danielson (2005)

Table 1.2.A Preliminary Data Screening: Birthplace

	ID Clinic (N=73)	Chain Referral (N=175)	Purposive Snowball (N=142)	Total Sample (N=390)
	n (%)	*n (%)*	*n (%)*	n (%)
Birth Country:				
Mexico	50 (68.5)	143 (81.7)	84 (59.2)	277 (71.0)
Guatemala	4 (5.5)	12 (6.9)	19 (13.4)	35 (9.0)
El Salvador	3 (4.1)	9 (5.4)	19 (13.4)	31 (8.0)
Honduras	4 (5.5)	0 (0.0)	7 (4.9)	11 (2.8)
*USA**	2 (2.7)	0 (0.0)	5 (3.5)	7 (1.8)
*Puerto Rico**	5 (6.9)	0 (0.0)	0 (0.0)	5 (1.3)
Nicaragua	1 (1.4)	2 (1.1)	2 (1.5)	5 (1.3)
Panama	0 (0.0)	2 (1.1)	0 (0.0)	2 (0.5)
*Cuba**	2 (2.7)	0 (0.0)	0 (0.0)	2 (0.5)
*Bolivia**	1 (1.4)	0 (0.0)	0 (0.0)	1 (0.3)
*Dominican Republic**	1 (1.4)	0 (0.0)	0 (0.0)	1 (0.3)
*Missing**	0 (0.0)	7 (4.0)	6 (4.2)	13 (3.3)

Note: Data Collected in North Carolina by WFU School of Medicine (2007-2009; PI: Rhodes)

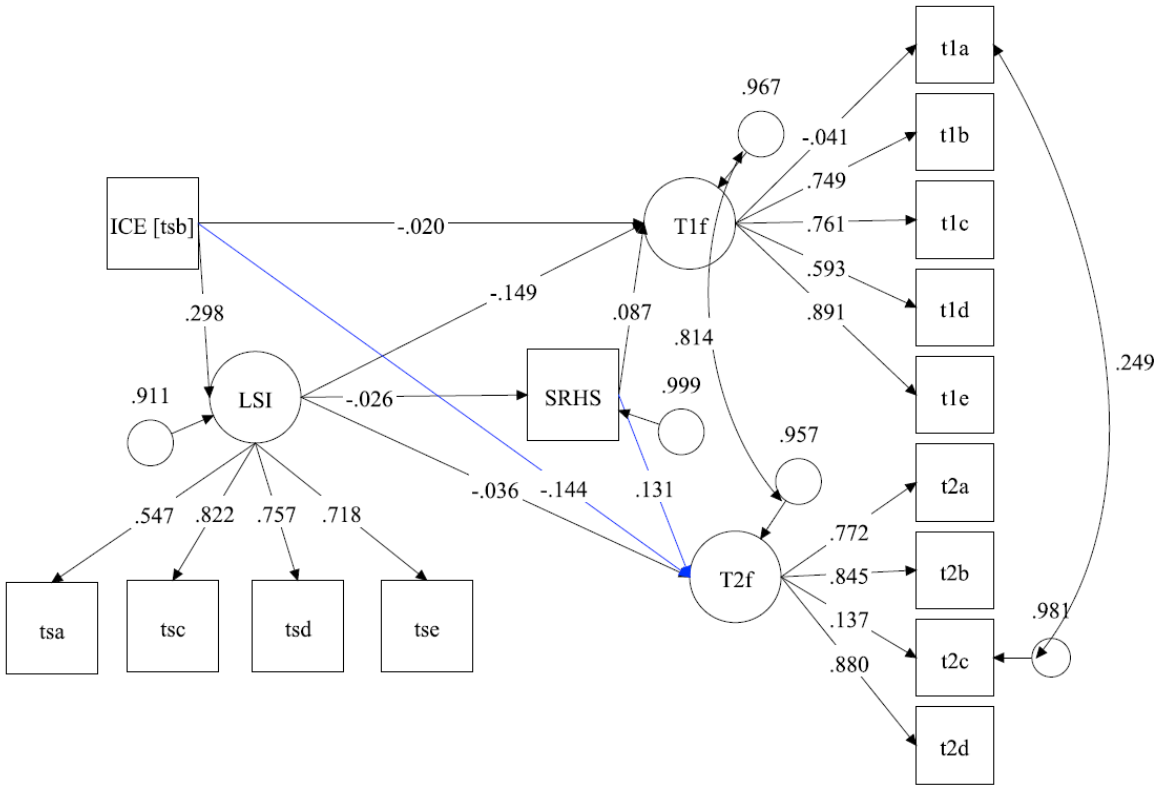
Figure 1.4.A Preliminary Factor Analysis: Measurement Model: CFA (n=308)



Note: Measures include: Marin's SAS; Ong & Ward's ISSS; Hall's WFUTS; Alderete's LSI

Model Chi-square	Df	p-value	CFI	TLI	RMSEA [90% CI]	WRMR
527.84	436	0.002	0.97	0.96	0.026 [0.017, 0.034]	0.76

Figure 1.5.A Preliminary SEM: MIMIC model for Socio-medical Distrust and SRH



Note: Hall's WFUMTS (T1f; T2f); Alderete's Legal Stress Index (LSI); Self-Rated Health Status (SRHS)

Appendix B

Chapter 2 Appendix

Table 2.1.A. Translated items and response distributions for the adapted WFUTS (N=381)

Prompt (CF1) Thinking about doctors in general, please tell me how strongly you agree or disagree with the following statements.

Pensando en forma general sobre los doctores, por favor, dígame, ¿cuán de acuerdo o en desacuerdo está usted con las siguientes aseveraciones?

Prompt (CF2) The next 4 statements refer to those doctors who conduct research with human participants. Again, please tell me how strongly you agree or disagree with the following statements.

Las próximas 4 aseveraciones están relacionadas con aquellos doctores que llevan a cabo un estudio de investigación con pacientes. Un vez más, por favor, dígame, ¿cuán de acuerdo o en desacuerdo está usted con las siguientes aseveraciones?

Construct Factor 1: Thinking about doctors in general, please tell me how strongly you agree or disagree with the following statements.		**Indicator**	**Missing**	**D/K**	**S.Disagree**	**Disagree**	**Agree**	**S.Agree**
#	*Doctors as Medical Providers*	Trust	%	%	%	%	%	%
1 vT1a	Sometimes doctors care more about what is convenient for them than about their patients medical needs.							
	A veces los doctores se preocupan más por lo que es más conveniente para ellos que sobre las necesidades médicas de sus pacientes.	*Fidelity*	1	10	12	34	40	3
2 vT1b	Doctors are extremely thorough and careful.							
	Los doctores son muy consientes de lo que hacen y son muy cuidadosos.	*Competency*	2	5	3	15	54	21
3 vT1c	You completely trust doctors' decisions about which medical treatments are best.							
	Confío plenamente en las decisiones de los doctores sobre cuál tratamiento médico es mejor.	*Global*	2	4	2	18	51	24
4 vT1d	A doctor would never mislead you about anything.							
	Un doctor nunca me engaña sobre cualquier asunto.	*Honesty*	3	6	5	13	43	30
5 vT1e	All in all, you trust doctors completely.							
	En conclusión, confío plenamente en los doctores.	*Global*	1	6	3	20	48	22
Construct Factor 2: The next 4 statements refer to those doctors who conduct research with human participants. Again, please tell me how strongly you agree or disagree		**Indicator**	**Missing**	**D/K**	**S.Disagree**	**Disagree**	**Agree**	**S.Agree**
#	*Doctors as Medical Researchers*	Trust	%	%	%	%	%	%
6 vT2a	Doctors who do medical research care only about what is best for each patient.							
	Los doctores que llevan a cabo investigaciones médicas se preocupan solamente por lo que es mejor para cada paciente.	*Fidelity*	1	7	3	11	61	17
7 vT2b	Doctors tell their patients everything they need to know about being in a research study.							
	Los doctores le informan a sus pacientes todo lo que necesitan saber sobre su participación en un estudio de investigación.	*Honesty*	1	7	3	18	57	14
8 vT2c	Medical researchers treat people like "guinea pigs."							
	Los investigadores médicos tratan a las personas como "conejillos de India".	*Global*	1	15	9	40	32	4
9 vT2d	I completely trust doctors who do medical research.							
	Confío plenamente en los doctores que llevan acabo investigaciones médicas.	*Global*	2	7	3	33	50	16

Table 2.2.A. Unstandardized Estimates for 1st Order 2-Factor CFA (n=370) and MIMIC Models: exploring Study and Participant Characteristics' effects on item response (n=320)

	M0				M1				M2				M0.1				M0.2				M0.3				M0.4				M0.Exploratory			
	Provider		Researcher		Provider		Researcher		Provider		Researcher		Provider		Researcher		Provider		Researcher		Provider		Researcher		Provider		Researcher		Provider		Researcher	
Parameter	Est	(SE)	Est	(SE)	Est	(SE)	Est	(SE)	Est	(SE)	Est	(SE)	Est	(SE)	Est	(SE)	Est	(SE)	Est	(SE)	Est	(SE)	Est	(SE)	Est	(SE)	Est	(SE)	Est	(SE)	Est	(SE)
Structural Model																																
Factor Regressions																																
γk1 Study: Clinic													2.328	(0.205)	1.266	(0.180)	2.309	(0.205)	1.231	(0.177)	2.309	(0.205)	1.231	(0.177)	2.316	(0.206)	1.233	(0.177)	2.162	(0.208)	1.230	(0.177)
γk3 Study: HZ_purposive													0.349	(0.193)*	0.343	(0.175)*	0.352	(0.193)*	0.327	(0.175)*	0.351	(0.193)*	0.342	(0.175)*	0		0		0.257	(0.197)*	0.327	(0.175)*
γk4 Sex: female													-0.049	(0.191)*	-0.005	(0.166)*	-0.049	(0.191)*	-0.002	(0.164)*	-0.049	(0.191)*	-0.005	(0.166)*	0		0		-0.032	(0.193)*	-0.002	(0.164)*
γk5 Age													0.010	(0.007)*	0.001	(0.006)*	0.010	(0.007)*	0.002	(0.006)*	0.010	(0.007)*	0.001	(0.006)*	0		0		0.009	(0.007)*	0.002	(0.006)*
γk6 Education: ≥HSD													0.029	(0.145)*	-0.174	(0.142)*	0.028	(0.144)*	-0.171	(0.142)*	0.029	(0.144)*	-0.173	(0.142)*	0		0		-0.044	(0.144)*	-0.171	(0.142)*
γk7 Homosexuality													-0.614	(0.238)	0.210	(0.227)*	-0.611	(0.238)	0.195	(0.229)*	-0.613	(0.238)	0.209	(0.228)*	0		0		-0.487	(0.239)	0.195	(0.229)*
γk8 Language Use													-0.060	(0.130)*	0.054	(0.119)*	-0.060	(0.130)*	0.060	(0.120)*	-0.060	(0.130)*	0.055	(0.119)*	0		0		-0.039	(0.131)*	0.060	(0.120)*
γk9 Central America													-0.111	(0.154)*	-0.196	(0.151)*	-0.118	(0.154)*	-0.206	(0.153)*	-0.114	(0.154)*	-0.196	(0.152)*	0		0		-0.038	(0.159)*	-0.206	(0.153)*
Factor (Co)variances																																
Ψkk	0.833	(0.030)	0.835	(0.033)	0.529	(0.077)	0.447	(0.066)	0.60	(0.101)	0.478	(0.074)	0.834	(0.045)	0.762	(0.042)	0.835	(0.045)	0.762	(0.042)	0.835	(0.045)	0.762	(0.042)	0.842	(0.045)	0.764	(0.042)	0.847	(0.046)	0.761	(0.042)
Ψ12		0.694	(0.028)			0.364	(0.038)			0.435	(0.050)			0.585	(0.034)			0.585	(0.034)			0.585	(0.034)			0.589	(0.034)			0.590	(0.034)	
Measurement Model																																
Factor Loadings																																
λ1 [T1a]	0.237	(0.047)			0.300	(0.063)			0.279	(0.060)			0.074	(0.049)*			0.043	(0.054)*			0.044	(0.054)*			0.042	(0.054)*			0.043	(0.054)*		
λ2 [T1b]	0.912	(0.024)			1.162	(0.054)			1.08	(0.100)			0.850	(0.031)			0.850	(0.031)			0.850	(0.031)			0.947	(0.031)			0.849	(0.032)		
λ3 [T1c]	0.924	(0.027)			1.181	(0.091)			1.096	(0.096)			0.870	(0.036)			0.870	(0.036)			0.870	(0.036)			0.865	(0.035)			0.866	(0.036)		
λ4 [T1d]	0.763	(0.032)			0.973	(0.081)			1.125	(0.101)	-0.259	(0.119)	0.602	(0.038)			0.603	(0.038)			0.603	(0.038)			0.593	(0.038)			0.568	(0.040)		
λ5 [T1e]	1				1		0.309	(0.083)	1		0.209	(0.099)	1				1				1				1				1			
λ6 [T2a]			0.896	(0.028)			1.264	(0.102)			1.188	(0.022)			0.926	(0.037)			0.927	(0.038)			0.927	(0.038)			0.926	(0.037)			0.928	(0.038)
λ7 [T2b]			0.877	(0.028)			1.240	(0.097)	-0.264	(0.141)*	1.48	(0.099)			0.938	(0.038)			0.939	(0.038)			0.939	(0.038)			0.936	(0.038)			0.940	(0.038)
λ8 [T2c]			0.318	(0.047)			0.446	(0.076)			0.422	(0.073)			0.206	(0.051)			0.190	(0.053)			0.191	(0.052)			0.190	(0.052)			0.191	(0.053)
λ9 [T2d]			1		0.309	(0.083)	1		0.277	(0.071)	1				1				1				1				1				1	
Item Covariance																																
[T1a] with [T2c]		0.288	(0.048)			0.292	(0.047)			0.289	(0.048)			0.340	(0.056)			0.344	(0.056)			0.344	(0.056)			0.344	(0.056)			0.344	(0.056)	
Item Regression																																
[T1a] X [Clinic]														0				0.733	(0.251)			0.730	(0.248)			0.733	(0.251)			0.739	(0.246)	
[T1a] X [Study]														0				-0.105	(0.228)*			0				0				-0.101	(0.228)*	
[T1a] X [Sex]														0				-0.024	(0.208)*			0				0				-0.025	(0.208)*	
[T1a] X [Age]														0				0.009	(0.007)*			0				0				0.009	(0.007)*	
[T1a] X [Ed]														0				0.027	(0.163)*			0				0				0.030	(0.163)*	
[T1a] X [Sexuality]														0				-0.137	(0.285)*			0				0				-0.142	(0.284)*	
[T1a] X [Language]														0				0.021	(0.156)*			0				0				0.020	(0.156)*	
[T1a] X [CA_region]														0				0.275	(0.185)*			0				0				0.272	(0.184)*	
[T1d] X [Clinic]														0				0				0				0				1.034	(0.267)	
[T1d] X [Study]														0				0				0				0				0.571	(0.244)	
[T1d] X [Sex]														0				0				0				0				-0.107	(0.232)*	
[T1d] X [Age]														0				0				0				0				0.004	(0.006)*	
[T1d] X [Ed]														0				0				0				0				0.372	(0.150)	
[T1d] X [Sexuality]														0				0				0				0				-0.606	(0.239)	
[T1d] X [Language]														0				0				0				0				-0.080	(0.105)*	
[T1d] X [CA_region]														0				0				0				0				-0.332	(0.155)	
[T2c] X [Clinic]														0				0.486	(0.199)			0.484	(0.199)			0.485	(0.199)			0.485	(0.199)	
[T2c] X [Study]														0				0.176	(0.183)*			0				0				0.176	(0.183)*	
[T2c] X [Sex]														0				-0.042	(0.167)*			0				0				-0.042	(0.167)*	
[T2c] X [Age]														0				-0.008	(0.007)*			0				0				-0.008	(0.007)*	
[T2c] X [Ed]														0				-0.030	(0.171)*			0				0				-0.030	(0.171)*	
[T2c] X [Sexuality]														0				0.207	(0.269)*			0				0				0.207	(0.269)*	
[T2c] X [Language]														0				-0.076	(0.136)*			0				0				-0.076	(0.136)*	
[T2c] X [CA_region]														0				0.118	(0.163)*			0				0				0.118	(0.163)*	
Model Chi-square (Df)		102	(25)			74.4	(23)			66	(21)			204	(81)			204	(65)			190	(79)			173	(93)			170	(57)	
DIFFTEST				M2-M0	45.519 (4)			M2-M1	11.155 (2)						M0.2-M0.1	23.141 (16)				M0.3-M0.1	15.048 (2)			M0.4-M0.3	19.785 (14)							
					p<.0001				p<.004						p=.1100						p=.0005				p=.1371							

*p>.05

Figure 2.1.A Strong Invariance Model (MG1): means, loadings, R-square estimates

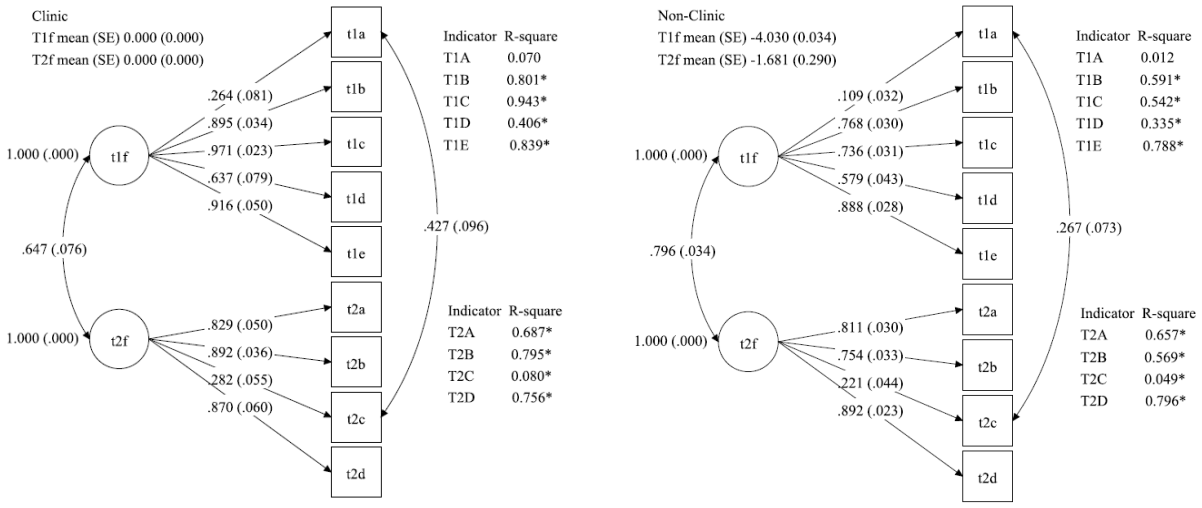


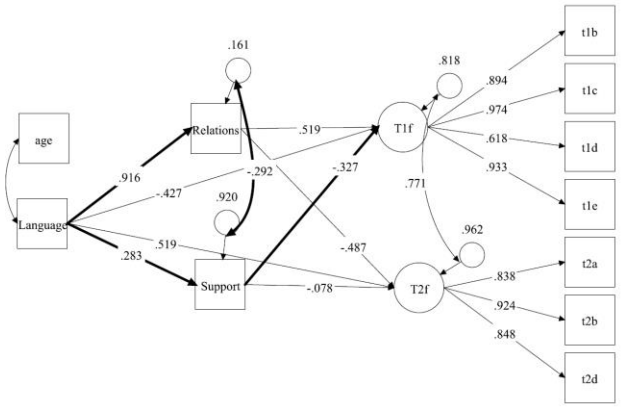
Table 2.3.A. Fit Indices for Social Influences Path Models (7-item WFUMTS)

Model		Chi-sq	Df	p	CFI	TLI	RMSEA [90% CI]	WRMR
MG.2.p1	Social Influences Mediation Model with Restricted Age Effects	140	89	<.001	0.983	0.979	0.056 [0.038 0.074]	1.158
MG.2.psat	Social Influences Mediation Model	143	81	<.0001	0.979	0.972	0.065 [0.047 0.082]	1.055

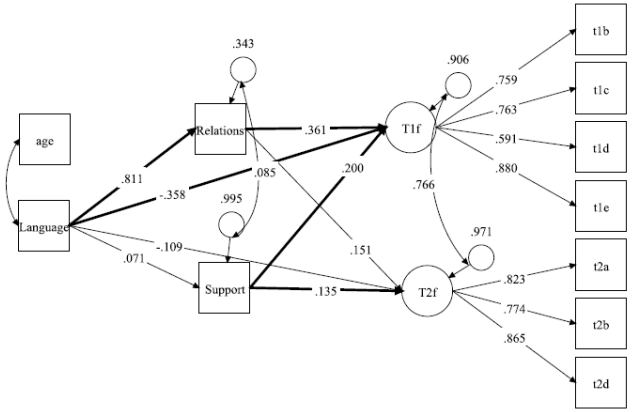
Note: Multiple Indicator Multi Group and Multiple Cause (MG-MIMIC) models included Latent Factor (T1f and T2f) regressions on Age, Language-Use (Marin's 5-item factor score), Social-ethnic Relations (Marin's 4-item factor score); and Social Support (Gilbert's 11-ite Factor Score); Difftest for restricting effects of age to zero: Chi-sq(df) 9.905 (8) p-value=0.272

Figure 2.2.A Standardized Path Estimates for Language and Social Influences (7-item WFUMTS)

Clinic



Community



		Clinic		Community	
Specific Indirect Provider (T1f)	via	Est (SE)	STDXY	Est (SE)	STDXY
	Social-Ethnic Relations	1.413 (0.171)	0.476	0.528 (0.159)	0.293*
	Social Support	-0.275 (0.186)	-0.093	0.025 (0.022)	0.014
Researcher (T2f)					
	Social-Ethnic Relations	-0.898 (0.598)	-0.446	0.217 (0.155)	0.122
	Social Support	0.044 (0.055)	-0.022	0.017 (0.016)	0.010

*p-value<.05. Note: Medical Provider Trust (T1f); Medical Researcher Trust (T2f)

Appendix C

Chapter 3 Appendix

Table 3.1.A. Adapted Legal Stress Index Items and Response Distributions

Translations and Distributions of Responses to Legal Stress items (N=308) (Question only included in H2 and RDS studies)

			Indicator	Missing	Don't Know=88	No=0	Yes=1	Refused=99
#	Formative Factor Indicator		Exposure	%	%	%	%	%
2	vTSb	Have you been questioned about your documentation status?	*Political*					
		¿Le han cuestionado sobre su estatus?		2	3	46	50	<1
#	Effect Indicators		Stress	%	%	%	%	%
1	vTSa	Do you feel your documentation status has limited your contact with family or friends?	*Social*					
		¿Siente usted que su estatus lo ha limitado a contactar a su familia y amigos?		2	1	59	38	<1
3	vTSc	Do you think you will be deported if you go to a social agency or health department?	*Institutional*					
		¿Piensa usted que va a ser deportado si va a una agencia social o departamento de salud?		1	5	82	11	<1
4	vTSd	Do you avoid police and officials because of your documentation status?	*Institutional*					
		¿Evita usted la policía u otros oficiales por su estatus?		1	1	59	39	<1
5	vTSe	Have you had difficulties finding legal services?	*Institutional*					
		¿Tiene usted dificultad en encontrar servicios legales?		1	2	67	30	1

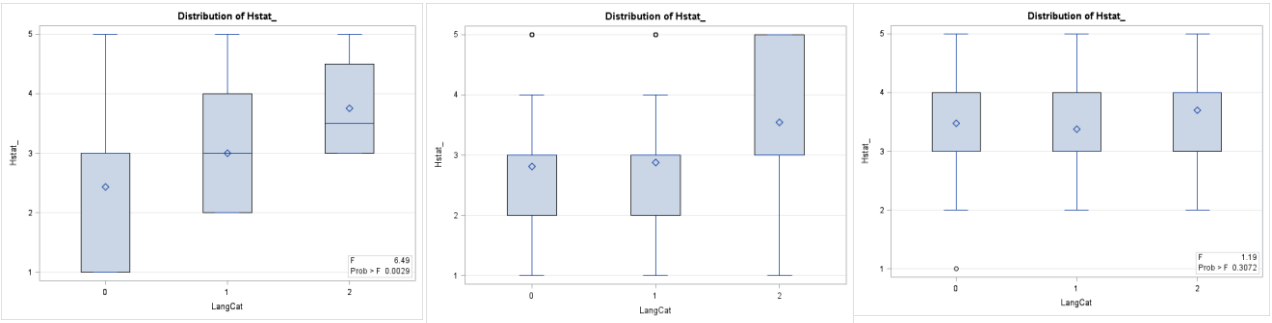
Table 3.2.A. Standardized Parameter Estimates for Legal Stress Probit Models (ML)

	LSI.M1 (N=294)		LSI.M1.1		LSI.M1.2		LSI.M1.3 (n=275)		LSI.M1.4 (n=253)	
	Legal Stress		Legal Stress		Legal Stress		Legal Stress		Legal Stress	
Parameter	Est	(SE)	Est	(SE)	Est	(SE)	Est	(SE)	Est	(SE)
Thresholds										
κ 1 [TSa]	0.279	(0.074)*	0.460	(0.088)*	0.415	(0.096)*	0.142	(0.201)	0.017	(0.227)
κ 2 [TSb]	-0.051	(0.073)								
κ 3 [TSc]	1.160	(0.097)*	1.428	(0.111)*	1.356	(0.128)*	1.025	(0.267)*	0.800	(0.350)*
κ 4 [TSd]	0.247	(0.074)*	0.488	(0.093)*	0.431	(0.107)*	0.056	(0.249)	-0.135	(0.278)
κ 5 [TSe]	0.529	(0.078)*	0.756	(0.093)*	0.695	(0.107)*	0.393	(0.225)	0.187	(0.296)
Structural Model										
Factor Regressions										
γ_{k1} [vTSb] Exposure			0.309	(0.071)*	0.301	(0.071)*	0.284	(0.077)*	0.304	(0.080)*
γ_{k2} Study					-0.087	(0.077)	-0.147	(0.107)	-0.071	(0.114)
γ_{k3} Sex							-0.105	(0.102)	-0.058	(0.112)
γ_{k4} Age							-0.121	(0.079)	0.001	(0.110)
γ_{k5} Language Use									-0.115	(0.092)
γ_{k6} Time in U.S.									-0.229	(0.108)*
γ_{k7} Central America									-0.069	(0.087)
HIV tested									-0.228	(0.087)*
Factor variance/Residual										
Ψ_{kk}	1		0.905	(0.044)	0.896	(0.046)*	0.891	(0.050)*	0.801	(0.068)*
Measurement Model										
Factor Loadings										
λ1 [TSa]	0.562	(0.081)*	0.562	(0.081)*	0.565	(0.081)*	0.579	(0.088)*	0.507	(0.095)*
λ2 [TSb]	0.388	(0.088)*								
λ3 [TSc]	0.828	(0.082)*	0.829	(0.082)*	0.814	(0.084)*	0.773	(0.104)*	0.839	(0.107)*
λ4 [TSd]	0.749	(0.076)*	0.750	(0.076)*	0.766	(0.077)*	0.735	(0.089)*	0.646	(0.096)*
λ5 [TSe]	0.706	(0.076)*	0.706	(0.076)*	0.696	(0.077)*	0.659	(0.088)*	0.698	(0.088)*
R-square										
v1 [TSa]	0.316	(0.091)*	0.316	(0.091)*	0.319	(0.092)*	0.336	(0.102)*	0.257	(0.096)*
v2 [TSb]	0.151	(0.068)*								
v3 [TSc]	0.685	(0.135)*	0.687	(0.134)*	0.663	(0.136)*	0.597	(0.160)*	0.704	(0.180)*
v4 [TSd]	0.561	(0.113)*	0.562	(0.113)*	0.587	(0.118)*	0.540	(0.131)*	0.418	(0.124)*
v5 [TSe]	0.499	(0.108)*	0.498	(0.108)*	0.484	(0.108)*	0.435	(0.116)*	0.487	(0.122)*
Factor Variance			0.095	(0.044)*	0.104	(0.046)*	0.109	(0.050)*	0.199	(0.068)*
Item Difficulties *[Unstandardized]*										
v1 [TSa]	0.497	(0.151)*								
v2 [TSb]	-0.131	(0.191)								
v3 [TSc]	1.402	(0.192)*								
v4 [TSd]	0.329	(0.105)*								
v5 [TSe]	0.748	(0.139)*								
Model Chi-square (Df)	38.168	(21)*								
Model Chi-square (Df,[MCAR]	135.381	(77)*								
Model LR Chi-square (Df)	27.679	(21)								
LogLikelihood_value	-809.9		-606.377		-605.754		-559.095		-513.37	
AIC	1639.84		1230.754		1231.507		1142.190		1058.74	
BIC	1676.67		1263.906		1268.343		1185.591		1115.28	

*p-value <0.05

Figure 3.1.A. Association between Health Status and Language use by Study and Sex

RDS Men RDS Women Purposive Men



NOTE: Self-rated Health Status (1=poor, 2=fair, 3=good, 4=very good, 5=excellent); Marin Language-use factor score by quartile (0=low, 1=med, 2=high)

Table 3.3.A. Correlation matrix (with variances on the diagonal)

	STUDY	CNT	TIME	SEX	AGE	SEX_P	_ICU	INS	T1B	T1C	T1D	T1E	T2A	T2B	T2C	T2D	TSA	TSB	TSC	TSD	TSE	AL1	AL2	AL3	AL4	AL5	ASE9	ASE10	ASE11	ASE12	HIV	SRH
STUDY	..																															
CNT	0.405	..																														
TIME	-0.067	0.043	52.987																													
SEX	-0.954	-0.330	0.011	..																												
AGE	-0.149	0.199	0.567	0.066	109.500																											
SEX_P	0.114	0.043	-0.134	-0.302	-0.174	0.654																										
_ICU	0.130	0.163	-0.107	-0.347	-0.103	0.015	..																									
INS	0.273	0.151	0.338	-0.438	0.174	0.102	-0.019	..																								
T1B	0.195	0.030	-0.031	-0.072	-0.035	-0.056	-0.172	0.024	..																							
T1C	0.285	-0.056	0.018	-0.159	-0.015	-0.028	-0.125	0.021	0.619	..																						
T1D	0.414	-0.123	-0.037	-0.277	0.008	-0.002	-0.252	0.068	0.458	0.464	..																					
T1E	0.167	0.031	-0.071	-0.082	0.005	-0.060	-0.100	0.118	0.595	0.624	0.528	..																				
T2A	0.248	-0.061	-0.177	-0.058	-0.080	0.144	-0.219	-0.067	0.501	0.444	0.356	0.548	..																			
T2B	0.230	-0.086	-0.001	-0.154	0.037	0.130	-0.239	0.122	0.471	0.415	0.372	0.491	0.664	..																		
T2C	0.178	0.074	-0.043	-0.171	-0.096	-0.011	-0.033	0.042	0.109	0.114	0.049	0.226	0.128	0.101	..																	
T2D	0.186	0.002	-0.047	-0.098	-0.050	0.068	-0.080	-0.023	0.571	0.480	0.366	0.703	0.670	0.665	0.213	..																
TSA	-0.175	-0.073	-0.145	0.129	-0.098	0.117	-0.058	0.002	-0.030	0.048	-0.058	-0.053	-0.032	0.074	-0.053	-0.022	..															
TSB	-0.185	0.077	0.069	0.121	0.048	-0.006	0.032	-0.047	-0.054	-0.029	-0.077	-0.103	-0.138	-0.147	-0.185	-0.200	0.310	..														
TSC	0.169	-0.092	-0.216	-0.188	0.050	0.102	0.197	0.057	-0.195	-0.153	0.040	-0.006	0.111	-0.175	0.095	-0.029	0.386	0.276	..													
TSD	-0.301	-0.094	-0.059	0.142	-0.096	0.062	0.038	-0.189	-0.090	-0.091	-0.131	-0.110	0.113	-0.095	0.003	0.011	0.383	0.313	0.660	..												
TSE	0.008	-0.039	-0.143	-0.161	-0.041	0.003	0.071	-0.068	-0.103	-0.017	0.018	-0.159	-0.009	-0.091	0.108	-0.203	0.436	0.189	0.613	0.537	..											
AL1	0.138	-0.222	0.136	-0.198	-0.255	0.008	-0.081	0.143	-0.114	-0.025	0.101	-0.073	0.020	-0.059	0.060	-0.022	-0.031	0.085	-0.157	-0.131	-0.098	..										
AL2	-0.241	-0.125	-0.072	-0.066	-0.225	0.317	-0.021	0.144	-0.245	-0.332	-0.289	-0.297	-0.045	-0.167	0.021	-0.157	-0.032	0.247	0.080	0.378	-0.207	0.597	..									
AL3	0.094	0.020	0.143	-0.165	-0.046	0.046	-0.186	0.139	-0.073	-0.038	0.056	-0.031	0.173	-0.012	0.117	0.009	-0.150	0.038	-0.201	0.002	-0.102	0.608	0.428	..								
AL4	0.390	-0.038	-0.008	-0.459	-0.222	0.022	-0.080	0.006	-0.070	0.061	0.099	-0.069	0.095	-0.056	0.165	0.039	-0.188	-0.062	0.017	-0.111	-0.023	0.608	0.325	0.589	..							
AL5	0.036	-0.145	0.103	-0.243	-0.244	0.045	0.021	0.179	0.022	-0.041	0.064	-0.067	0.195	0.089	0.067	0.189	-0.135	0.010	-0.093	-0.056	-0.120	0.704	0.558	0.556	0.633	..						
ASE9	0.213	-0.012	0.087	-0.215	-0.101	-0.005	0.019	0.195	0.082	0.192	0.210	0.088	0.165	0.046	-0.017	0.074	-0.151	-0.023	0.143	-0.047	0.077	0.504	0.093	0.550	0.466	0.531	..					
ASE10	0.183	-0.013	0.066	-0.272	-0.035	-0.165	-0.108	0.076	0.035	0.062	0.156	0.021	0.023	0.044	-0.023	0.046	-0.232	-0.047	0.028	-0.207	-0.220	0.315	0.208	0.307	0.473	0.417	0.532	..				
ASE11	0.067	0.046	0.087	-0.190	0.009	-0.081	-0.184	0.188	0.046	0.237	0.120	0.133	0.222	0.071	0.085	0.061	-0.171	-0.025	-0.071	-0.119	-0.063	0.399	0.170	0.489	0.435	0.443	0.653	0.511	..			
ASE12	0.023	-0.241	0.069	0.033	-0.014	-0.047	-0.167	0.133	0.178	0.038	0.238	0.132	0.257	0.232	0.096	0.208	-0.127	-0.184	-0.217	-0.054	-0.270	0.215	-0.080	0.232	0.247	0.214	0.342	0.384	0.293	..		
HIV	-0.215	-0.295	-0.064	0.462	-0.124	-0.005	-0.122	-0.331	-0.004	-0.096	-0.122	-0.124	-0.124	-0.167	-0.219	-0.101	-0.014	0.039	-0.171	-0.173	-0.293	0.008	0.054	-0.125	-0.130	-0.107	-0.194	-0.017	-0.064	-0.035	..	
SRH	0.308	-0.001	-0.059	-0.251	-0.161	-0.007	0.034	0.014	0.048	0.064	0.200	0.035	0.101	0.207	0.009	0.097	-0.022	-0.024	0.014	-0.039	-0.033	0.181	0.028	0.187	0.321	0.275	0.212	0.151	0.164	0.047	-0.019	..

Appendix D

Chapter 4 Appendix

Table 4.1.A. Legal Stress and Medical Trust at Baseline and Follow-up

		Baseline (%)				Follow-up (%)				Difference (%)
		Missing	Yes/Agree	DK	Refused	Missing	Yes/Agree	DK	Refused	FU-BL
Legal Stress Index										
b	Been questioned about documentation status in N.C.	4	41	4	1	3	52	1	1	
a	Status has limited your contact with family or friends	1	32	2	2	2	35	3	1	
c	Expect to be deported at health or social agency	3	14	6	1	3	13	1	1	
d	Avoid police/officials because of status	4	27	1	1	2	37	0	3	
e	Experienced difficulty finding legal services	2	28	3	1	2	24	4	1	
Legal Stress Index*		22				22				
b	Been questioned about documentation status in N.C.		42				56			14
a	Status has limited your contact with family or friends		31				37			6
c	Expect to be deported at health or social agency		14				14			-1
d	Avoid police/officials because of status		27				37			10
e	Experienced difficulty finding legal services		27				23			-5
Medical Trust Subscales										
Medical Provider										
vT1a	*Sometimes doctors care more about what is convenient for them than about their patients' medical needs*	1	52	14		3	49	13		
vT1b	Doctors are extremely thorough and careful	4	72	9		3	82	5		
vT1c	You completely trust doctors' decisions about which medical treatments are best	4	73	7		2	77	4		
vT1d	A doctor would never mislead you about anything	5	79	4		4	85	4		
vT1e	All in all, you trust doctors completely	2	65	12		3	73	8		
Medical Researcher										
vT2a	Doctors who do medical research care only about what is best for each patient	1	77	11		3	77	8		
vT2b	Doctors tell their patients everything they need to know about being in a research study	2	71	11		3	74	11		
vT2c	*Medical researchers treat people like 'guinea pigs'*	1	28	26		3	23	18		
vT2d	I completely trust doctors who do medical research	4	65	11		4	73	8		
Medical Trust Subscales										
Medical Provider*		44				44				
vT1a	*Sometimes doctors care more about what is convenient for them than about their patients' medical needs*		60				51			-9
vT1b	Doctors are extremely thorough and careful		81				86			5
vT1c	You completely trust doctors' decisions about which medical treatments are best		78				80			3
vT1d	A doctor would never mislead you about anything		85				90			5
vT1e	All in all, you trust doctors completely		76				81			5
Medical Researcher*		51				51				
vT2a	Doctors who do medical research care only about what is best for each patient		86				80			-6
vT2b	Doctors tell their patients everything they need to know about being in a research study		79				84			6
vT2c	*Medical researchers treat people like 'guinea pigs'*		39				29			-10
vT2d	I completely trust doctors who do medical research		76				77			1

*Values are based on participants with no missing, don't-know (DK), or refused data at baseline or follow-up.

Table 4.2.A. Effects of Latent Variables on Health Status at Follow-up (n=126)

	M1.1 Legal Stress Interactions			M2.1 Provider Trust Interactions			M2.1 Researcher Trust Interactions		
	HSTAT			HSTAT			HSTAT		
Parameter	Est	(SE)	Odds Ratio	Est	(SE)	Odds Ratio	Est	(SE)	Odds Ratio
Structural Model									
Regressions									
Group: H2	-0.782	(0.467)	0.457	0.006	(0.640)	1.006	-0.507	(0.930)	0.602
Health Status baseline	0.556	(0.262)*	1.745	0.542	(0.252)*	1.719	0.604	(0.248)*	1.829
LSI baseline	0.344	(0.175)*	1.411						
LSI follow-up	-0.122	(0.146)	0.855						
T1f baseline				-0.155	(0.154)	0.856			
T1f follow-up				0.095	(0.123)	1.099			
T2f baseline							0.072	(0.318)	1.075
T2f follow-up							0.006	(0.180)	1.006
Interaction Terms									
Group*LSI_baseline	-0.362	(0.220)	0.696						
Group*LSI_follow-up	0.133	(0.207)	1.142						
Group*T1f_baseline				0.310	(0.225)	1.363			
Group*T1f_follow-up				-0.244	(0.179)	0.783			
Group*T2f_baseline							0.238	(0.419)	1.269
Group*T2f_follow-up							-0.344	(0.282)	0.709

*p>.05

References

1. Glass, T.A. and M.J. McAtee, *Behavioral science at the crossroads in public health: extending horizons, envisioning the future.* Soc Sci Med, 2006. **62**(7): p. 1650-71.
2. Whetten, K., et al., *Exploring Lack of Trust in Care Providers and the Government as a Barrier to Health Service Use.* American Journal of Public Health, 2006. **96**(4): p. 716-721.
3. Shoff, C. and T.-C. Yang, *Untangling the associations among distrust, race, and neighborhood social environment: A social disorganization perspective.* Social Science & Medicine, 2012. **74**(9): p. 1342-1352.
4. Saha, S., et al., *Trust in physicians and racial disparities in HIV care.* AIDS Patient Care And Stds, 2010. **24**(7): p. 415-420.
5. Altice, F.L., F. Mostashari, and G.H. Friedland, *Trust and the acceptance of and adherence to antiretroviral therapy.* Journal Of Acquired Immune Deficiency Syndromes (1999), 2001. **28**(1): p. 47-58.
6. Graham, J.L., et al., *The Role of Trust in Delayed HIV Diagnosis in a Diverse, Urban Population.* Aids and Behavior, 2013. **17**(1): p. 266-273.
7. Krieger, N., *Methods for the scientific study of discrimination and health: an ecosocial approach.* Am J Public Health, 2012. **102**(5): p. 936-44.
8. Petrova, P., N. Schwarz, and H. Song, *Fluency and social influence: Lessons from judgment and decision-making*, in *Six degrees of social influence: Science, application, and the psychology of Robert Cialdini.*, D.T. Kenrick, N.J. Goldstein, and S.L. Braver, Editors. 2012, Oxford University Press: New York, NY, US. p. 39-48.
9. Hall, M.A., et al., *Trust in physicians and medical institutions: what is it, can it be measured, and does it matter?* Milbank Q, 2001. **79**(4): p. 613-39, v.
10. Alderete, E., et al., *Depressive symptomatology: Prevalence and psychosocial risk factors among Mexican migrant farmworkers in California.* Journal of Community Psychology, 1999. **27**(4): p. 457-471.

11. Hall, M.A., et al., *Measuring patients' trust in their primary care providers.* Medical Care Research & Review, 2002. **59**(3): p. 293-318.

12. Lee, S. and N. Schwarz, *Question context and priming meaning of health: effect on differences in self-rated health between Hispanics and non-Hispanic Whites.* Am J Public Health, 2014. **104**(1): p. 179-85.

13. Cervantes, R.C., A.M. Padilla, and N. Salgado de Snyder, *The Hispanic Stress Inventory: A culturally relevant approach to psychosocial assessment.* Psychological Assessment: A Journal of Consulting and Clinical Psychology, 1991. **3**(3): p. 438-447.

14. Glass, T.A., et al., *Causal inference in public health.* Annu Rev Public Health, 2013. **34**: p. 61-75.

15. Prosser A, T.T.H.H., *HIv in persons born outside the united states, 2007-2010.* JAMA: The Journal of the American Medical Association, 2012. **308**(6): p. 601-607.

16. Chen, N., J. Gallant, and K. Page, *A Systematic Review of HIV/AIDS Survival and Delayed Diagnosis Among Hispanics in the United States.* Journal of Immigrant and Minority Health, 2012. **14**(1): p. 65-81.

17. Dennis, A.M., et al., *Late Entry to HIV Care Among Latinos Compared With Non-Latinos in a Southeastern US Cohort.* Clinical Infectious Diseases, 2011. **53**(5): p. 480-487.

18. Van Wyke, V.D., *RETROACTIVITY AND IMMIGRANT CRIMES SINCE ST. CYR: EMERGING SIGNS OF JUDICIAL RESTRAINT.* University of Pennsylvania Law Review, 2006. **154**(3): p. 741-787.

19. Weissbrodt, D.S., *Immigration law and procedure in a nutshell*. 5th edition. ed, ed. L. Danielson. 2005, St. Paul, Minn.]: St. Paul, Minn. : Thomson/West.

20. Poon, K.K., et al., *Treatment outcomes in undocumented Hispanic immigrants with HIV infection.* PLoS One, 2013. **8**(3): p. e60022.

21. Martinez, O., et al., *Evaluating the Impact of Immigration Policies on Health Status Among Undocumented Immigrants: A Systematic Review.* Journal Of Immigrant And Minority Health / Center For Minority Public Health, 2013.

22. Rhodes, S.D., et al., *The Impact of Local Immigration Enforcement Policies on the Health of Immigrant Hispanics/Latinos in the United States.* American Journal of Public Health, 2014. **105**(2): p. 329-337.

23. Sheehan, D.M., M.J. Trepka, and F.R. Dillon, *Latinos in the United States on the HIV/AIDS care continuum by birth country/region: a systematic review of the literature.* International Journal of Std & Aids, 2015. **26**(1): p. 1-12.

24. Berry, J.W., et al., *Immigration, acculturation, and adaptation. Commentaries (English).* Applied psychology (Print), 1997. **46**(1): p. 5-68.

25. DuBard, C.A. and M.W. Massing, *Trends in emergency Medicaid expenditures for recent and undocumented immigrants.* JAMA, 2007. **297**(10): p. 1085-92.

26. Fennelly, K., *Prejudice toward Immigrants in the Midwest*, in *New Faces in New Places: The Changing Geography of American Immigration*, D.S. Massey, Editor. 2008, New York: Russell Sage Foundation. p. 151-178.

27. Bronfman, M.N., et al., *Mobile populations and HIV/AIDS in Central America and Mexico: Research for action.* AIDS, 2002. **16**(Suppl3): p. S42-S49.

28. Magis-Rodríguez, C., et al., *Going North: Mexican Migrants and Their Vulnerability to HIV.* JAIDS Journal of Acquired Immune Deficiency Syndromes, 2009. **51**: p. S21-S25 10.1097/QAI.0b013e3181a26433.

29. Krieger, N., *A century of census tracts: health & the body politic (1906-2006).* J Urban Health, 2006. **83**(3): p. 355-61.

30. Smedley, B.D., A.Y. Stith, and A.R. Nelson, *Unequal Treatment: Confronting Racial and Ethnic Disparities in Health Care.* 2003.

31. Abraído-Lanza, A.F., et al., *Toward a theory-driven model of acculturation in public health research.* American Journal of Public Health, 2006. **96**(8): p. 1342-1346.

32. Krieger, N., *Epidemiology and the web of causation: has anyone seen the spider?* Soc Sci Med, 1994. **39**(7): p. 887-903.

33. Espinoza, L., H.I. Hall, and X. Hu, *Increases in HIV diagnoses at the U.S.-Mexico border, 2003-2006.* AIDS Educ Prev, 2009. **21**(5 Suppl): p. 19-33.

34. Wohl, A.R., J. Tejero, and D.M. Frye, *Factors associated with late HIV testing for Latinos diagnosed with AIDS in Los Angeles.* AIDS Care, 2009. **21**(9): p. 1203-10.

35. Espinoza, L., H.I. Hall, and X. Hu, *Diagnoses of HIV Infection Among Hispanics/Latinos in 40 States and Puerto Rico, 2006–2009.* JAIDS Journal of Acquired Immune Deficiency Syndromes, 2012. **60**(2): p. 205-213 10.1097/QAI.0b013e31824d9a29.

36. Espinoza, L., et al., *Characteristics of HIV Infection Among Hispanics, United States 2003-2006.* JAIDS Journal of Acquired Immune Deficiency Syndromes, 2008. **49**(1): p. 94-101 10.1097/QAI.0b013e3181820129.

37. Harrison, K.M., R. Song, and X. Zhang, *Life expectancy after HIV diagnosis based on national HIV surveillance data from 25 states, United States.* J Acquir Immune Defic Syndr, 2010. **53**(1): p. 124-30.

38. Kelley, C.F., et al., *Clinical, epidemiologic characteristics of foreign-born Latinos with HIV/AIDS at an urban HIV clinic.* AIDS Read, 2007. **17**(2): p. 73-4, 78-80, 85-8.

39. North Carolina Institute of Medicine, *NC Latino Health 2003.* 2003, Durham, NC.

40. Alter, A.L., et al., *Overcoming intuition: metacognitive difficulty activates analytic reasoning.* J Exp Psychol Gen, 2007. **136**(4): p. 569-76.

41. Greifeneder, R. and N. Schwarz, *Metacognitive processes and subjective experiences*, in *Dual-process theories of the social mind.*, J.W. Sherman, B. Gawronski, and Y. Trope, Editors. 2014, Guilford Press: New York, NY, US. p. 314-327.

42. Jylhä, M., *What is self-rated health and why does it predict mortality? Towards a unified conceptual model.* Social Science & Medicine, 2009. **69**(3): p. 307-316.

43. Rhodes, S., et al., *A Randomized Controlled Trial of a Culturally Congruent Intervention to Increase Condom Use and HIV Testing Among Heterosexually Active Immigrant Latino Men.* AIDS and Behavior, 2011: p. 1-12.

44. Andersen, R.M., *Revisiting the Behavioral Model and Access to Medical Care: Does it Matter?* Journal of Health and Social Behavior, 1995. **36**(1): p. 1-10.

45. *Proposed 'World Health Organization staging system for HIV infection and disease': preliminary testing by an international collaborative cross-sectional study. The WHO*

International Collaborating Group for the Study of the WHO Staging System. AIDS (London, England), 1993. **7**(5): p. 711-718.

46. Caterinicchio, R.P., *Testing plausible path models of interpersonal trust in patient–physician treatment relationships.* Social Science & Medicine, 1979. **13A**(1): p. 81-99.
47. van Servellen, G., et al., *Effects of a Treatment Adherence Enhancement Program on Health Literacy, Patient-Provider Relationships, and Adherence to HAART among Low-Income HIV-Positive Spanish-Speaking Latinos.* AIDS Patient Care and STDs, 2005. **19**(11): p. 745-759.
48. Mainous, A.G., III, V.A. Diaz, and M. Carnemolla, *A Community Intervention to Decrease Antibiotics Used for Self-Medication Among Latino Adults.* Ann Fam Med, 2009. **7**(6): p. 520-526.
49. Epstein, R.M., et al., *Awkward moments in patient-physician communication about HIV risk.* Ann Intern Med, 1998. **128**(6): p. 435-42.
50. Armstrong, K., et al., *Prior experiences of racial discrimination and racial differences in health care system distrust.* Medical Care, 2013. **51**(2): p. 144-150.
51. Armstrong, K., et al., *Distrust of the health care system and self-reported health in the United States.* Journal of General Internal Medicine, 2006. **21**(4): p. 292-297.
52. Ozawa, S. and P. Sripad, *How do you measure trust in the health system? A systematic review of the literature.* Social Science & Medicine, 2013. **91**: p. 10-14.
53. Oppenheimer, D.M. and A.L. Alter, *The search for moderators in disfluency research.* Applied Cognitive Psychology, 2014. **28**(4): p. 502-504.
54. Parsons, T., *The social system*. 1951, New York, NY, US: Free Press.
55. Rhodes, S.D., et al., *A Snapshot of How Latino Heterosexual Men Promote Sexual Health Within Their Social Networks: Process Evaluation Findings from an Efficacious Community-Level Intervention.* AIDS Education and Prevention, 2012. **24**(6): p. 514-526.
56. Knack, S. and P.J. Zak, *Building Trust: Public Policy, Interpersonal Trust, and Economic Development.* Supreme Court Economic Review, 2002. **10**(1): p. 91.

57. Zheng, B., et al., *Trust in Health Insurer Scale.* Development of a measure to assess patient trust in medical researchers, 2006. **4**(3): p. 247-252.

58. Jylha, M., S. Volpato, and J.M. Guralnik, *Self-rated health showed a graded association with frequently used biomarkers in a large population sample.* J Clin Epidemiol, 2006. **59**(5): p. 465-71.

59. Idler, E.L. and Y. Benyamini, *Self-rated health and mortality: a review of twenty-seven community studies.* J Health Soc Behav, 1997. **38**(1): p. 21-37.

60. Pot, A.M., et al., *Utilization of acute and long-term care in the last year of life: comparison with survivors in a population-based study.* BMC Health Serv Res, 2009. **9**: p. 139.

61. Bonnefon, J.F., A. Hopfensitz, and W. De Neys, *The modular nature of trustworthiness detection.* J Exp Psychol Gen, 2013. **142**(1): p. 143-50.

62. Moll, J., et al., *Opinion: the neural basis of human moral cognition.* Nat Rev Neurosci, 2005. **6**(10): p. 799-809.

63. Dellit, T.H., et al., *Infectious Diseases Society of America and the Society for Healthcare Epidemiology of America Guidelines for Developing an Institutional Program to Enhance Antimicrobial Stewardship.* Clinical Infectious Diseases, 2007. **44**(2): p. 159-177.

64. Lee, S. and D. Grant, *The effect of question order on self-rated general health status in a multilingual survey context.* Am J Epidemiol, 2009. **169**(12): p. 1525-30.

65. Massey, D.S., *American Apartheid: Segregation and the Making of the Underclass*, in *Social Planning*, J.P.H. Poon, K. Button, and P. Nijkamp, Editors. 2006, Classics in Planning, vol. 1. Cheltenham, U.K. and Northampton, Mass.: Elgar. p. 328-356.

66. Mikhail, J., *Elements of Moral Cognition*. 2011: Cambridge University Press.

67. Centers for Disease Control and Prevention. *Compendium of Evidence-Based Interventions and Best Practices for HIV Prevention*. 2015 11/27/2012]; Available from: http://www.cdc.gov/hiv/prevention/research/compendium/rr/hombres.html.

68. Cabassa, L.J., *Measuring Acculturation: Where We Are and Where We Need to Go.* Hispanic Journal of Behavioral Sciences, 2003. **25**(2): p. 127-146.

69. Lara, M., et al., *Acculturation and Latino health in the United States: a review of the literature and its sociopolitical context.* Annual Review Of Public Health, 2005. **26**: p. 367-397.

70. Sunghee, L. and N. Schwarz, *Question Context and Priming Meaning of Health: Effect on Differences in Self-Rated Health Between Hispanics and Non-Hispanic Whites.* American Journal of Public Health, 2014. **104**(1): p. 179-185.

71. Valencia-Garcia, D., et al., *Social capital, acculturation, mental health, and perceived access to services among Mexican American women.* Journal of Consulting and Clinical Psychology, 2012. **80**(2): p. 177-185.

72. AG, W., *Southern (Dis)comfort?: Latino population growth, economic integration and spatial assimilation in North Carolina micropolitan areas.* Sociation Today, 2007. **5**(2): p. 1-27.

73. Passel JS, C., D *Unauthorized Immigrant Population: National and State Trends, 2010* 2011; Available from: http://www.pewhispanic.org/2011/02/01/unauthorized-immigrant-population-brnational-and-state-trends-2010/.

74. Kasarda, J., and Johnson, JH, *The Economic Impact of the Hispanic Population on the State of North Carolina*. 2006, University of North Carolina at Chapel Hill: Frank Hawkins Kenan Institute of Private Enterprise.

75. Torrone, E.A., et al., *Late diagnosis of HIV in young men in North Carolina.* Sex Transm Dis, 2007. **34**(11): p. 846-8.

76. Painter, T., *Connecting The Dots: When the Risks of HIV/STD Infection Appear High But the Burden of Infection Is Not Known—The Case of Male Latino Migrants in the Southern United States.* AIDS and Behavior, 2008. **12**(2): p. 213-226.

77. Rhodes, S.D., et al., *Characteristics of immigrant Latino men who utilize formal healthcare services in rural North Carolina: Baseline findings from the HoMBReS Study.* Journal of the National Medical Association, 2008. **100**(10): p. 1177-1185.

78. Rhodes, S.D., et al., *Prevalence Estimates of Health Risk Behaviors of Immigrant Latino Men Who Have Sex With Men.* Journal of Rural Health, 2012. **28**(1): p. 73-83.

79. Organista, K.C., H. Carrillo, and G. Ayala, *HIV Prevention With Mexican Migrants Review, Critique, and Recommendations.* JAIDS: Journal of Acquired Immune Deficiency Syndromes, 2004. **37**: p. S227-S239.

80. Herrick, H. and Z. Gizlice, *Spanish-speaking Hispanics in North Carolina: Health status, access to health care, and quality of life.* North Carolina Center for Health Statistics, 2004. **143**.

81. Cuadra, A.M., *Intention to test for HIV in a national sample of Latinos in the United States: The role of acculturation and attitude*. 2004, ProQuest Information & Learning: US.

82. Vu, L., K.-H. Choi, and T. Do, *Correlates of Sexual, Ethnic, and Dual Identity: A Study of Young Asian and Pacific Islander Men who Have Sex with Men.* AIDS Education & Prevention, 2011. **23**(5): p. 423-436.

83. Glasman, L., L. Weinhardt, and K. Hackl, *Disparities in Access to HIV Prevention Among Men of Mexican Descent Living in the Midwestern United States.* Journal of Immigrant & Minority Health, 2011. **13**(6): p. 1125-1133.

84. Kinsler, J.J., et al., *The impact of acculturation on utilization of HIV prevention services and access to care among an at-risk Hispanic population.* Journal of Health Care for the Poor and Underserved, 2009. **20**(4): p. 996-1011.

85. Lopez-Quintero, C., R. Shtarkshall, and Y.D. Neumark, *Barriers to HIV-Testing Among Hispanics in the United States: Analysis of the National Health Interview Survey, 2000.* AIDS Patient Care & STDs, 2005. **19**(10): p. 672-683.

86. Simons-Morton B.G., H.D., Noelcke E., *Social influences: The effects of socialization, selection, and social normative processes on health behavior*, in *Emerging theories in health promotion practice and research*, C.R.J. DiClemente C. R., Kegler M.C., Editor. 2009, Jossey-Bass: San Francisco. p. 66-95.

87. Schwarz, N., et al., *Metacognitive experiences and the intricacies of setting people straight: Implications for debiasing and public information campaigns*, in *Advances in*

experimental social psychology, Vol 39., M.P. Zanna, Editor. 2007, Elsevier Academic Press: San Diego, CA, US. p. 127-161.

88. Ahern, M.M. and M.S. Hendryx, *Social capital and trust in providers.* Social Science and Medicine, 2003. **57**(7): p. 1195-1203.
89. Thom, D.H., A.H. Mark, and L.G. Pawlson, *Measuring Patients' Trust In Physicians When Assessing Quality Of Care.* Health Affairs, 2004. **23**(4): p. 124-132.
90. LaVeist, T.A., L.A. Isaac, and K.P. Williams, *Mistrust of Health Care Organizations Is Associated with Underutilization of Health Services.* Health Services Research, 2009. **44**(6): p. 2093-2105.
91. Aron-Dine, A., L. Einav, and A. Finkelstein, *The RAND Health Insurance Experiment, Three Decades Later.* Journal of Economic Perspectives, 2013. **27**(1): p. 197-222.
92. Thom, D.H., D.A. Bloch, and E.S. Segal, *An intervention to increase patients' trust in their physicians.* Academic Medicine, 1999. **74**(2): p. 195-198.
93. Mainous, A.G., 3rd, V.A. Diaz, and M. Carnemolla, *Factors affecting Latino adults' use of antibiotics for self-medication.* J Am Board Fam Med, 2008. **21**(2): p. 128-34.
94. Angel, R. and P.D. Cleary, *The effects of social structure and culture on reported health.* Social Science Quarterly, 1984. **65**: p. 814-828.
95. Angel, R.J., et al., *Shorter Stay, Longer Life: Age at Migration and Mortality Among the Older Mexican-Origin Population.* Journal of Aging & Health, 2010. **22**(7): p. 914-931.
96. Otiniano Verissimo, A.D., et al., *Discrimination and substance use disorders among Latinos: the role of gender, nativity, and ethnicity.* American Journal Of Public Health, 2014. **104**(8): p. 1421-1428.
97. Kline, R.B., *Principles and practice of structural equation modeling 2nd ed*. Methodology in the social sciences. 2005: Guilford Press.
98. Hall, M.A., et al., *Measuring Trust in Medical Researchers.* Medical Care, 2006. **44**(11): p. 1048-1053.
99. Dong, E.H., et al., *Construction and validation of a preliminary Chinese version of the Wake Forest Physician Trust Scale.* Medical Science Monitor, 2014. **20**: p. 1142-1150.

100. Skrondal, A. and S. Rabe-Hesketh, *Generalized latent variable modeling: multilevel, longitudinal, and structural equation models*. Interdisciplinary statistics. 2004, United States of America: Chapman & Hall\CRC.

101. Gregorich, S.E., *Do Self-Report Instruments Allow Meaningful Comparisons Across Diverse Population Groups? Testing Measurement Invariance Using the Confirmatory Factor Analysis Framework.* Medical Care, 2006. **44**(11, Suppl 3): p. S78-S94.

102. Rabe-Hesketh, S., A. Skrondal, and A. Pickles, *Maximum likelihood estimation of limited and discrete dependent variable models with nested random effects.* Journal of Econometrics, 2005. **128**(2): p. 301-323.

103. Muthén, B. and T. Asparouhov, *Beyond multilevel regression modeling: Multilevel analysis in a general latent variable framework*, in *Handbook for advanced multilevel analysis.*, J.J. Hox, et al., Editors. 2011, Routledge/Taylor & Francis Group: New York, NY, US. p. 15-40.

104. Bachinger, S.M., A.M. Kolk, and E.M.A. Smets, *Patients' trust in their physician-Psychometric properties of the Dutch version of the "Wake Forest Physician Trust Scale".* Patient Education and Counseling, 2009. **76**(1): p. 126-131.

105. Pearson, S.D. and L.H. Raeke, *Patients' Trust in Physicians: Many Theories, Few Measures, and Little Data.* JGIM: Journal of General Internal Medicine, 2000. **15**(7): p. 509.

106. Vissman, A.T., et al., *Applying the theory of planned behavior to explore HAART adherence among HIV-positive immigrant Latinos: Elicitation interview results.* Patient Education and Counseling, 2011. **85**(3): p. 454-460.

107. Song, E.-Y., et al., *The Use of Prescription Medications Obtained from Non-medical Sources among Immigrant Latinos in the Rural Southeastern U.S.* Journal of Health Care for the Poor and Underserved, 2012. **23**(2): p. 678-693.

108. Vissman, A.T., et al., *Correlates of HAART adherence among immigrant Latinos in the southeastern United States.* AIDS Care, 2012: p. 1-8.

109. Marin, G. and et al., *Development of a Short Acculturation Scale for Hispanics.* Hispanic Journal of Behavioral Sciences, 1987. **9**(2): p. 183-205.

110. Ong, A.S.J. and C. Ward, *The construction and validation of a social support measure for sojourners: the Index of Sojourner Social Support (ISSS) Scale.* Journal of Cross-Cultural Psychology, 2005. **36**(6): p. 637-661.

111. Lee, Y.Y. and J.L. Lin, *The effects of trust in physician on self-efficacy, adherence and diabetes outcomes.* Soc Sci Med, 2009. **68**(6): p. 1060-8.

112. Cronbach, L.J. and P.E. Meehl, *Construct validity in psychological tests.* Psychological Bulletin, 1955. **52**(4): p. 281-302.

113. Gilbert, P.A. and S.D. Rhodes, *Psychometric Performance of a Novel Measure of Social Support among Spanish-Speaking Immigrant Latino Gay Men.* Hispanic Journal of Behavioral Sciences, 2012. **34**(3): p. 491-504.

114. Schechter, S. and D. Herrmann, *The proper use of self-report questions in effective measurement of health outcomes.* Evaluation & the Health Professions, 1997. **20**(1): p. 28-46.

115. Shetterly, S.M., et al., *Self-rated health among Hispanic vs non-Hispanic white adults: the San Luis Valley Health and Aging Study.* American Journal of Public Health, 1996. **86**(12): p. 1798-1801.

116. Morales, L.S., et al., *Sociodemographic differences in access to care among Hispanic patients who are HIV infected in the United States.* American Journal of Public Health, 2004. **94**(7): p. 1119-1121.

117. Ridgeway, C., *The Social Construction of Status Value: Gender and Other Nominal Characteristics.* Social Forces, 1991. **70**(2): p. 367-386.

118. Rhodes, S.D., et al., *Exploring Latino men's HIV risk using community-based participatory research.* Am J Health Behav, 2007. **31**(2): p. 146-158.

119. Rhodes, S.D., et al., *Sexual and alcohol use behaviours of Latino men in the south-eastern USA.* Culture, Health & Sexuality, 2009. **11**(1): p. 17-34.

120. Vissman, A.T., et al., *Exploring the Use of Nonmedical Sources of Prescription Drugs Among Immigrant Latinos in the Rural Southeastern USA.* The Journal of Rural Health, 2011. **27**(2): p. 159-167.

121. Vissman, A.T., et al., *What do men who serve as lay health advisers really do?: Immigrant Latino men share their experiences as Navegantes to prevent HIV.* AIDS Education & Prevention, 2009. **21**(3): p. 220-232.

122. Rhodes, S.D., et al., *Outcomes From a Community-Based, Participatory Lay Health Adviser HIV/STD Prevention Intervention for Recently Arrived Immigrant Latino Men in Rural North Carolina.* AIDS Education and Prevention, 2009. **21**(supplement b): p. 103-108.

123. Rhodes, S.D., R.M. Malow, and C. Jolly, *Community-Based Participatory Research: A New and Not-So-New Approach to HIV/AIDS Prevention, Care, and Treatment.* AIDS Education and Prevention, 2010. **22**(3): p. 173-183.

124. Wingood, G.M., et al., *Comparative effectiveness of a faith-based HIV intervention for African American women: importance of enhancing religious social capital.* Am J Public Health, 2013. **103**(12): p. 2226-33.

125. Aral, S.O., N.S. Padian, and K.K. Holmes, *Advances in multilevel approaches to understanding the epidemiology and prevention of sexually transmitted infections and HIV: an overview.* Journal of Infectious Diseases, 2005. **191**: p. S1-6.

126. Doherty, I.A., P.A. Leone, and S.O. Aral, *Social determinants of HIV infection in the Deep South.* Am J Public Health, 2007. **97**(3): p. 391; author reply 391-2.

127. Williams, D.R., H.W. Neighbors, and J.S. Jackson, *Racial/ethnic discrimination and health: findings from community studies.* Am J Public Health, 2008. **98**(9 Suppl): p. S29-37.

128. Marín, B.V., *HIV prevention in the Hispanic community: sex, culture, and empowerment.* Journal of Transcultural Nursing, 2003. **14**(3): p. 186-192.

129. Henrich, J., S.J. Heine, and A. Norenzayan, *The weirdest people in the world?* The Behavioral And Brain Sciences, 2010. **33**(2-3): p. 61-83.