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Acculturation and HIV-related sexual behaviors among international migrants: A systematic review and meta-analysis

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Abstract

This review examines the global literature regarding the relationship between acculturation and HIV-related sexual behaviors among international migrants. Seventy-nine articles published in English-language journals prior to July 2012 met the criteria for inclusion. We conducted a systematic review and subset meta-analysis of correlations between acculturation and five types of sexual behaviors including condom use, multiple partnerships, early sexual initiation, sexually transmitted diseases (STDs), and other unsafe sexual practices. Immigrants high in mainstream acculturation were more likely to have multiple partnerships, early sexual initiation, STDs, and unsafe sex (r s ranged from .10 to .16), but acculturation was not associated with condom use ($r = .02$). Gender moderated the relationships between acculturation and multiple partnerships, STDs, and unsafe sex. The relationship between acculturation and unsafe sex also varied across ethnicity. These findings suggest that acculturation may serve as a risk factor towards immigrants' HIV-related sexual health. We offered a theoretical framework and suggested applying cross-cultural and longitudinal designs in future research on acculturation and health behaviors.

Keywords

Acculturation; Sexual behaviors; HIV/AIDS; International migrants

Introduction

According to the United Nations Population Division (2009), the estimated number of international migrants has increased by 37% from 156 million in 1990 to 214 million in 2010. Immigration poses numerous challenges to public health because immigrants may suffer from separation from families and original societies and face language barriers, substandard living conditions, and discrimination (Abraído-Lanza, Armbrister, Flórez, & Aguirre, 2006; Magaña & Hovey, 2003). Low levels of mainstream acculturation were associated with low chances of learning knowledge on health, negative attitudes towards health maintenance, and high barriers to health care (Bradford, Allen, Casey, & Emmers-Sommer, 2002; Lara, Gamboa, Kahramanian, Morales, & Hayes Bautista, 2005; Rogler, Cortes, & Malgady, 1991). This paper reports a systematic review and meta-analysis of empirical studies concerning the influence of acculturation on HIV-related sexual behaviors.

Theories and assessment of acculturation

Acculturation is the process whereby immigrants adopt the values, beliefs, attitudes, and behaviors of the receiving culture (LaFromboise, Coleman, & Gerton, 1993; Rogler et al., 1991). Both adoption of receiving culture and maintenance of heritage culture have impacts on acculturation. Moreover, individual level factors (e.g., gender, motivation, coping skills) interact with sociocultural influences to facilitate or resist the adaptation (Berry, 1997). Researchers have proposed two conceptual models to interpret immigrants' adherence or adaptation to heritage and receiving cultures: unidimensional and bidimensional models. The unidimensional model considers the acculturation process as a one-dimensional continuum, with the orientation from one's heritage culture to the receiving culture. In contrast, the bidimensional model states that acculturation includes two independent dimensions: maintenance of the heritage culture and adaptation to the receiving culture, and immigrants can retain their ethnic minority culture along with acculturation to the receiving culture (Berry, 1997; Cuellar, Arnold, & Maldonado, 1995).

Researchers have used diverse measures to assess acculturation. Country of birth and years in the receiving culture are the two commonly used markers of acculturation (Schwartz, Pantin, Sullivan, Prado, & Szapocznik, 2006). The use of language such as language preference and language proficiency is also a frequently assessed domain among acculturation measures (Zane & Mak, 2003). Moreover, many acculturation scales are multi-faceted and assess more than one domain relevant to cultural change (e.g., cultural knowledge, language use, social affiliations). Ethnic identity, the extent to which a person identifies with a particular culture, is another domain which has been employed to indicate acculturation (Shehadeh et al., 2012). Some established acculturation measures include identification of ethnicity as a dimension (e.g., Cuellar et al., 1995; Suinn, Rickard-Figueroa, Lew, & Vigil, 1987), although recent research suggests that ethnic identity and acculturation may represent different aspects of cultural identity (Schwartz, Zamboanga, & Jarvis, 2007).

Acculturation and health

In recent years, a considerable number of studies have documented a relation between acculturation and health (Lara et al., 2005; Rogler et al., 1991). Researchers have found an immigrant paradox regarding the effect of acculturation on health: More acculturated immigrants have greater access to health care but have worse behavioral outcomes (Lara et al., 2005). The reasons for the immigrant paradox may be complex, such as the deterioration of cultural, social and familial norms as well as the increased exposure to risky situations in receiving cultures (Prado et al., 2009). Two theoretical approaches may explain the influence of acculturation on health-related behaviors. Cultural norms theory posits that immigrants adopt the norms and values in the receiving culture and thereby learn and display corresponding behaviors (Meston & Ahrold, 2010), which emphasizes the roles of norms in mainstream cultures. Acculturation stress theory postulates that immigrants have to face stressful situations in the process of adapting to the receiving culture. Stressors (e.g., discrimination, language barriers) make them highly vulnerable to maladaptive behaviors (Guilamo-Ramos, Jaccard, Pena, & Goldberg, 2005; Vega, Zimmerman, Gil, Warheit, & Apospori, 1993). The focal point of the acculturation stress theory is that the process of adapting to a new environment leads to adjustment strain which triggers acceptance of

maladaptive behaviors. The two theories present different perspectives on the influence of acculturation on behavior.

Berry (1997) proposed an integrative model of acculturation addressing the influence of both cultural norms and stress which is useful in understanding the relationship between acculturation and health-related behaviors. According to the model, acculturation exerts an impact on long term outcomes through life events and stressors. The impact varies by individual level (e.g., gender, age) and group level factors (e.g., ethnicity, social support, attitudes of the receiving culture). The current review attempted to employ this model to summarize the studies on acculturation and HIV-related sexual behaviors.

Acculturation and HIV-related sexual behaviors

Empirical studies have emerged to investigate whether acculturation is associated with behaviors related to HIV infection or HIV risk reduction (Wei et al., 2011). Some previous reviews have examined immigrants' HIV-related behaviors but have not focused on the impact of acculturation on sexual behaviors (Organista & Organista, 1997; Tosh & Simmons, 2007; Wei et al., 2011). Two exceptions are the reviews conducted by Bradford et al. (2002) and Afable-Munsuz and Brindis (2006). Through a meta-analysis of 11 studies undertaken between 1990 and 1998, Bradford et al. (2002) found that acculturation among Latinos in the US was positively associated with condom use; however, acculturation was also positively associated with risk behaviors in terms of risky sex practices and needle sharing. Afable-Munsuz and Brindis (2006) examined 17 studies from 1985 to 2005 and revealed positive associations of acculturation with early sexual initiation and condom use in most of the studies.

The two reviews are informative in synthesizing existing research on acculturation and sexual health. However, these reviews only included Latino-focused studies in the US. Given that both heritage and receiving cultures exert influences on acculturation (Berry, 1997), immigrants from different cultural backgrounds may have different experiences of acculturation that result in ethnic differences in sexual behaviors. The current review will expand on previous reviews by examining findings on the impact of acculturation on HIV-related sexual behaviors among various ethnic groups. Moreover, this review will expand on the current literature by examining the potential moderators in the relationships between acculturation and sexual behaviors. Gender and ethnicity has emerged as the moderators in previous literature (Ahrold & Meston, 2010; Marin, Tschann, Gomez, & Kegeles, 1993). Conceptualizations and measures of acculturation have also been identified as a factor contributing to inconsistent findings (Cabassa, 2003). Therefore, the current review will test the moderating effects of gender, ethnicity, and measures of acculturation in associations between acculturation and sexual behaviors.

To achieve these aims, we synthesize studies examining associations between acculturation and HIV-related sexual behaviors including condom use, multiple partnerships, unsafe sex, early sexual initiation, and STDs. Unsafe sex in the current review refers to commercial sex, sexual behaviors assessed by composite sexual risk indices, and other sexual acts (vaginal, oral, and anal sex) that place individuals at risk of STDs/HIV. Moreover, this review mainly focuses on the influence of mainstream acculturation. The term "acculturation" in the

current review refers to mainstream acculturation. We also report the findings of heritage acculturation, but we do not include this in meta-analysis, because relatively few studies examined the impact of the maintenance of heritage culture. Regarding each type of sexual behavior, we examined whether its association with acculturation is consistent across gender, ethnicity of immigrants, and measures of acculturation. To examine potential influences of various measures of acculturation, we categorized the measures of acculturation into three groups including length of stay in a receiving culture and residency, language use and preference, and multi-faceted scales (Zane & Mak, 2003).

Methods

Inclusion criterion

We conducted a systematic literature search to identify studies that : (1) were peer-reviewed and published in English-language journals prior to July 2012; (2) included measures of acculturation and measures of HIV-related sexual behaviors; and (3) provided quantitative data regarding the associations between acculturation and HIV-related sexual behaviors.

Data source

We conducted the literature search in PubMed, PsycINFO, Sociological Abstracts, and Web of Science by using the following terms: acculturation AND HIV OR AIDS, acculturation AND condom use, acculturation AND multiple partners, acculturation AND commercial sex, and acculturation AND sexual risk. We also hand-searched reference lists from previous literature reviews (Afael-Munsuz & Brindis, 2006; Bradford et al., 2002; Hunt, Schneider, & Comer, 2004; Roncancio, Ward, & Berenson, 2012; Schwartz, Unger, Zamboanga, & Szapocznik, 2010; Wei et al., 2011). Seventy-nine studies met all the aforementioned inclusion criteria. Figure 1 provides a flow chart of the process in which the records were screened, assessed for eligibility, and included in the review. Of these 79 studies, 15 studies were excluded from meta-analysis because these studies (1) did not present information that allows for an exact estimate of effect size (i.e., means, standard deviations, exact probability levels, and population proportions), (2) did not separately report results of immigrant and native populations, and (3) did not examine the relationship between sexual behaviors and mainstream acculturation (e.g., examined heritage acculturation), leaving 64 studies for meta-analysis (see Table 1).

Data abstraction

Data abstraction forms were used to retrieve information on the study characteristics, the measures of acculturation, and the associations between acculturation and HIV-related sexual behaviors. The study characteristics included study location and sample characteristics (e.g., ethnicity, sample size).

Meta-analytic procedure

We used Pearson product moment correlations as the index of effect size. When no correlations were given, we computed r from other information available (Lipsey & Wilson, 2001). Many studies reported more than one association between acculturation and each sexual behavior since these studies used more than one measure of acculturation and more

than one ethnic sample. To assure independence of the correlations, we averaged multiple correlations within each study so that effect sizes in meta-analysis were derived from different samples (Lipsey & Wilson, 2001). Gender groups within each study were retained given that gender was a potential moderator in the relationships between acculturation and sexual behaviors (Marin et al., 1993).

Meta-analyses were conducted with random effects models because such an approach is a conservative solution to deal with heterogeneity (Kisamore & Brannick, 2008). Following recommendations by Lipsey and Wilson (2001), we transformed correlation coefficients to Fisher's z s, combined these statistics using meta-analysis, and transformed the pooled z statistic to pooled r . A mean effect size of each type of sexual behavior was calculated. To test whether effect sizes differed for moderator variables, we partitioned between study variance using an ANOVA analog procedure that yields a Q_b test for moderators and a Q_w test for remaining unexplained variance (Lipsey & Wilson, 2001). We evaluated publication bias using funnel plots and rank correlation tests between sample size and effect size.

Results

Study characteristics

Of the 79 studies in this review, 73 studies were conducted in the US, one study in both the US and Mexico, two studies in Canada, one study each in Australia, Spain, and England. Table 1 presents a summary of all studies including information about research design, study location, sample size, ethnicity, age distribution, and basic findings.

Most of the studies investigated the associations between acculturation and sexual behaviors among Hispanic or Latino samples (53 studies). Eight studies have focused on Asian and Pacific Islanders. Two studies have exclusively focused on other minorities (one among Russians, one among Middle Easterners). Other studies used samples from diverse ethnic groups. Twenty studies exclusively sampled female immigrants, whereas ten studies only sampled male immigrants. Other studies include both female and male samples.

Measures of acculturation

Measures of acculturation in these studies were very diverse and included both proxy indicators (e.g., length of residency, country of birth, and language preference) and established scales. Table 2 listed the established measurement instruments. We categorized the measures of acculturation into three groups: length of time living in the receiving culture and residency, language use and preference, and multi-faceted measures. Given that some multi-faceted measures include ethnic identity as a domain of acculturation, we categorized the two studies using the ethnic identity measure (Raffaelli, Zamboanga, & Carlo, 2005; Shehadeh et al., 2012) into the group of multi-faceted measures.

In the first group, length of residency (10 studies) and country of birth (14 studies) were mostly used. There is a debate on whether people who are born in the receiving country but raised by foreign-born parents are migrants. We included this population since being born in the receiving country does not mean that this population is only exposed to the receiving culture. Second- or even third-generation individuals can be influenced by both the receiving

and heritage cultures. For example, parents may direct children to selectively acculturate while maintaining their original cultural traditions (Rothe, Pumariega, & Sabagh, 2011). Other proxy indicators included nationality, percentage of life living in the receiving country, country of birth of parents, and generation status. Language use and preference was assessed through either participants' preference for the language of interview (e.g. in Spanish vs. English) or established scales. Other studies used multi-faceted established scales or composite measures including more than one proxy indicator.

Overall analyses

The current meta-analysis included 38 studies on condom use, 37 studies on multiple partnerships, 16 studies on unsafe sex, 18 studies on early sexual initiation, and 15 studies on STDs. Effect sizes for individual studies appear in Table 1, and pooled effect sizes appear in Table 3. The Q statistics, the number of independent correlation coefficient (k), sample size (N), combined effect size (r), and corresponding 95% confidence intervals are also shown in Table 3.

Condom use

Acculturation was not associated with condom use ($r = .01$, 95% CI, $-.03$ to $.06$). While the pooled effect size was heterogeneous ($p < .001$), the association did not differ by gender, ($Q_b(2) = 5.67$, $p = .06$), ethnicity, ($Q_b(2) = 1.36$, $p = .51$), or measures of acculturation ($Q_b(3) = 1.86$, $p = .60$).

Two studies, not included in the meta-analysis, examined the impact of maintenance of original culture on condom use (Dixon, Saul, & Peters, 2010; Nakamura & Zea, 2010). Dixon et al. (2010) found that lower attachment to the heritage culture was associated with more condom use among Puerto Rican women in the US. Nakamura and Zea (2010) conducted a study among Latino gay and bisexual men and found that attachment to the original culture was negatively associated with both condom use during receptive anal intercourse and condom use during sex under the influence of drug, while it was positively associated with condom use during insertive anal intercourse. These findings show conflicting associations of maintenance of heritage culture and condom use.

Multiple partnerships

Acculturation was positively associated with multiple partnerships ($r = .15$, 95% CI, $.09$ to $.20$). The pooled effect size was heterogeneous ($p < .001$). The association differed by gender ($Q_b(2) = 11.22$, $p < .01$), such that the mean effect size was significantly positive in the studies including females only ($r = .21$, $p < .001$) and in the studies employing mixed gender ($r = .15$, $p < .001$), whereas it was not significant in the studies including males only ($r = .01$, $p = .83$). The findings suggest that acculturation may lead to multiple sexual partners among women more than men. However, the association did not differ by ethnicity, ($Q_b(1) = 0.001$, $p = .98$), or measures of acculturation ($Q_b(2) = 0.55$, $p = .76$).

Recent research has also revealed the impact of heritage acculturation on multiple partnerships. Deardorff et al. (2010) found that a preference for speaking Spanish was associated with declines in multiple partnerships among female adolescents but not among

male adolescents. Meston and Ahrold (2010) revealed that heritage and mainstream acculturation interacted to affect multiple partnerships. They found that mainstream acculturation was positively associated with multiple partnerships among Asian women but not among men. Moreover, this effect was stronger among Asian women who were less involved in their original cultures. Among Hispanic men (but not women), mainstream acculturation was positively associated with multiple partnerships among those who had low attachment to the heritage culture, but it was negatively associated with multiple partnerships among those who had high attachment to the heritage culture. Heritage acculturation had some association with multiple partnerships, but no single pattern emerged.

Unsafe sex

Acculturation was positively associated with unsafe sex ($r = .16$, 95% CI, .08 to .23). The pooled effect size was heterogeneous ($p < .001$). The association differed by gender, ($Q_b(2) = 9.79$, $p < .01$), such that the mean effect size was significantly positive in the studies including females only ($r = .27$, $p < .001$) and in the studies employing mixed gender ($r = .11$, $p < .05$), whereas it was not significant in the studies including males only ($r = -.13$, $p = .35$). The findings indicate that acculturation was associated with a tendency to have unsafe sex among female immigrants but not among male immigrants.

The association also differed by ethnicity, ($Q_b(2) = 18.76$, $p < .001$), such that there was a small effect size among Hispanic immigrants ($r = .10$, $p < .05$), a medium effect size among Asian immigrants ($r = .25$, $p < .001$), but a large effect size among other ethnicities (i.e., Russians, White, and Black immigrants) ($r = .63$, $p < .001$). Closer scrutiny revealed that the large effect size among other ethnicities was mainly attributable to a strong correlation between acculturation and unsafe sex among Russian immigrants ($r = .63$). However, the relationship between acculturation and unsafe sex did not differ by measures of acculturation ($Q_b(2) = .08$, $p = .96$).

Two studies examined the effect of heritage acculturation on unsafe sex. Raffaelli et al. (2005) found that the maintenance of original culture (i.e., the identification with ethnic culture) was positively associated with unsafe sex among Cuban women in the US. Schwartz et al. (2011) revealed a negative association between Hispanic cultural orientation and unsafe sex among Hispanic immigrants. Additional evidence is needed to clarify the influence of heritage acculturation on unsafe sex.

Early sexual initiation

Acculturation was positively associated with early sexual initiation ($r = .13$, 95% CI, .05 to .21). While the pooled effect size was heterogeneous ($p < .001$), the association did not differ by gender, ($Q_b(2) = 3.24$, $p = .20$), by ethnicity, ($Q_b(1) = 0.11$, $p = .74$), or by measures of acculturation ($Q_b(2) = 1.28$, $p = .53$). There was a tendency towards a gender difference such that the mean effect size was significant in the studies including females only ($r = .18$, $p < .01$) and in the studies employing mixed gender ($r = .14$, $p < .01$) but not in the studies including males only ($r = -.02$, $p = .82$).

STDs

Acculturation was positively associated with STDs ($r = .10$, 95% CI, .04 to .17). The pooled effect size was heterogeneous ($p < .001$). The association differed by gender ($Q_b(2) = 10.75$, $p < .01$), such that the mean effect size was significantly positive in the studies including females only ($r = .14$, $p < .001$) and in the studies employing mixed gender ($r = .16$, $p < .001$), whereas it was not significant in the studies including males only ($r = -.07$, $p = .25$). The association did not differ by ethnicity, ($Q_b(1) = 0.14$, $p = .71$), or by measures of acculturation ($Q_b(2) = 1.23$, $p = .54$).

Publication bias

To assess the possibility of publication bias, we generated a funnel plot (Light & Pillemer, 1984) with the studies' sample size by effect size for each type of sexual behavior. The observations in the plots appeared to be symmetrically distributed around the grand mean. The rank correlations between acculturation and sexual behaviors were $r = .13$ ($p = .42$) in the studies on condom use, $r = -.03$ ($p = .88$) in the studies on multiple partnerships, $r = -.34$ ($p = .20$) in the studies on unsafe sex, $r = .03$ ($p = .91$) in the studies on early sexual initiation, and $r = .10$ ($p = .71$) in the studies on STDs. These findings did not indicate publication bias.

Discussion

The present review examines the literature on the impact of acculturation on HIV-related sexual behaviors. Researchers have proposed acculturation as an important factor influencing immigrants' health and behavior (Frisbie, Cho, & Hummer, 2001; Kaplan, Chang, Newsom, & McFarland, 2002). The present review brought sexual behaviors into the focus due to its considerable impact on health among immigrants. Through examining recent findings, we summarized the evidence of the impact of acculturation on sexual behaviors and recognized confounding variables such as gender and ethnicity.

The impact of acculturation on sexual behaviors varied across types of sexual behaviors. Acculturation was positively associated with four types of risky sexual behaviors including multiple partnership, unsafe sex, early sexual initiation, and STDs, which is consistent with previous findings (Afaible-Munsuz & Brindis, 2006; Bradford et al., 2002). Gender moderated the relationships between acculturation and multiple partnerships, unsafe sex, and STDs. The associations between acculturation and risky sexual behaviors were stronger among female immigrants than male immigrants. In addition, ethnicity moderated the relationship between acculturation and unsafe sex. On the other hand, there was no reliable relationship between acculturation and condom use. This finding is inconsistent with the finding of Bradford et al. (2002).

Ethnicity

Ethnicity served as a moderator between acculturation and unsafe sex but not between acculturation and other types of sexual behaviors. Caution should be taken in interpreting these findings. In the current review, most of the studies included Hispanic samples. Only a small number of the studies involved samples of other ethnic immigrants (e.g., Asians,

Russians). The disproportionate samples may lead to bias of the findings. Future research focusing on ethnicity differences is definitely needed.

Many factors may contribute to the ethnic difference in the relationship between acculturation and unsafe sex. According to the acculturation stress theory, immigrants may suffer from stress due to cultural barriers (e.g., language) and discrimination in the receiving culture, which may induce immigrants to engage in risky behaviors in order to cope with aversive moods and seek pleasure. People with different ethnic backgrounds may experience different levels of barriers and experience and display varied levels of maladaptive behaviors.

Discarding one's original culture during the adaptation to a new culture is another risk factor towards health-related behaviors (Abraído-Lanza et al., 2006). Moreover, the influence of losing original cultures on unsafe sex varies across ethnicity (Schwartz et al., 2011). Traditional cultural norms, sexual values, and religious proscriptions may play a role in the effect of heritage acculturation (Edwards, Fehring, Jarrett, & Haglund, 2008). For example, Asian cultures attach crucial importance to family unity so that family members tend to conform to family values and norms (Du et al., 2013; Du, King, & Chi, 2012). The pressure from family members may hinder Asians from engaging in sex (Hahm et al., 2008; Schuster, Bell, Nakajima, & Kanouse, 1998). Researchers have also assumed that sexually conservative beliefs in Asian cultures may protect Asian immigrants against risky sexual behaviors during the acculturation process (Hahm et al., 2008; O'Connor, Shaw, Wen, & Quine, 2009). However, if Asians discard the traditional values and beliefs in the process of acculturation, they may become more vulnerable to risky sexual behaviors than other ethnic groups.

Gender

Gender is a notable moderator of the relation between acculturation and sexual behaviors. Gender differences in sexual behaviors may be related to immigrants' cultural values (Deardorff et al., 2010). For example, traditional Latino cultures advocate sexual abstinence and discourage sexual activity among adolescent girls (Pavich, 1986). During the acculturation process, Latino women may discard the traditional values on sexual abstinence and engage in risky sexual behaviors (Jimenez, Potts, & Jimenez, 2002; Schwartz et al., 2011). In contrast, Latino men who are not restricted by the norm of sexual abstinence may experience a small change in sexual behaviors. In addition, acculturation may lead to less family support so that more acculturated women are more likely to seek attachment in partner relationships and thereby get involved in risky sexual activity (Hahm, Lahiff, & Barreto, 2006). Future research may consider cultural meanings of gender in addition to biological sex. For example, in a society in which women are perceived inferior to men, women may not have much sexual decision-making power so they might need to comply with men's requests and get involved in risky sexual behaviors (Gómez & Marin, 1996).

Measurement of acculturation

The relationships between acculturation and sexual behaviors were not different across the variety of acculturation measures. Caution should be exercised in interpreting this result.

Although we attempted to differentiate the measurements, it should be recognized that the three groups (i.e., length of stay in receiving culture and residency, language use and preference, and multi-faceted scales) were not completely distinct. For example, many multi-faceted instruments involve language use as an indicator of acculturation, which leads to an overlap between the group of language use and the group of multi-faceted scales. Moreover, a large variety of measures exist within each group. The first group includes several proxy indicators such as country of birth, length of living in the receiving culture, and generation status. Also, some multi-faceted scales assessed both ethnic identification and behavioral acculturation, which represent different aspects of acculturation and contribute to the ambiguity of the findings (Lopez-Class, Castro, & Ramirez, 2011; Schwartz et al., 2010). Therefore, based on available data, we cannot rule out the possibility that inconsistent findings in literature were partly due to the mixed use of acculturation measures.

The studies using more than one measure of acculturation could be informative in detecting the distinction between different domains of acculturation. For example, Shehadeh et al. (2012) reported that length of residency, country of birth, and ethnic identity positively predicted condom use, whereas language preference was not associated with condom use. This finding suggests that different domains of acculturation may have differential associations with sexual behaviors. In the current meta-analysis, although measures of acculturation did not emerge as a significant moderator between acculturation and sexual behaviors, we did observe different tendencies across measures. For example, regarding the association between acculturation and early sexual initiation, the studies using length of time and residency as indicators showed a small effect size ($r = .06, p = .59$), whereas the studies assessing acculturation through language use ($r = .14, p = .07$) and the studies assessing acculturation with multi-faceted scales ($r = .19, p < .01$) demonstrated relatively stronger associations. The findings indicate that relative to simplistic proxy measures (e.g., country of birth), multi-domain conceptualizations of acculturation including behaviors, attitudes, values, and identifications may more accurately represent the acculturation.

Another issue contributing to inconsistent findings is that the measures of acculturation may assess not only the domains relevant to sexual behaviors but also the domains that are not closely associated with sexual behaviors. The advantage of multi-faceted scales is the ability to assess acculturation from a broader perspective such as language use, media use, food use, and cultural practices. However, it is unclear if all the domains of acculturation included in the instruments are related to the outcomes of interest such as sexual behaviors. For example, language and media can strongly influence immigrants' social interaction with the receiving society so that these two indicators can be related to immigrants' sexual lifestyle. In contrast, food use is less relevant to the immigrants' sexual activity (So, Wong, & DeLeon, 2005). The inclusion of an indicator for acculturation that is not closely associated with sexual behaviors (e.g., food use) may contribute to non-significant findings. In addition, acculturation in the public domain (e.g., language, news, and social contacts) and acculturation in the private domain (e.g., cultural habits, celebrations) may have different influences on sexual behaviors. One may adhere to sexual conservatism of their culture of origin at home (i.e., private domain) but engage in unsafe sex with casual sexual partners

outside the home (i.e., public domain). In this case, acculturation in the public domain may predict sexual behaviors better than acculturation in the private domain. Therefore, choosing an appropriate acculturation instrument may improve the validity of studies.

Most of the studies in the current review examined acculturation as a unidimensional construct. However, the bidimensional model of acculturation (Berry, 1997) posits that both adaptation to the receiving culture and maintenance of the original culture exert influences on acculturation. Several studies included in the current review confirmed this assumption by showing a difference in the influence of heritage culture and mainstream culture on sexual behaviors (e.g., Meston & Ahrold, 2010; Schwartz et al., 2011). Future research should strive to use the bidimensional model of acculturation which holds promise in advancing our understanding of the relation between acculturation and sexual behaviors.

Suggestions for future research

Theoretical frameworks are strongly needed for advancing the research on acculturation and HIV-related behaviors (Abraído-Lanza et al., 2006; Cabassa, 2003; Hunt et al., 2004). Many studies in the current review did not include a theoretical model and did not examine the mechanism through which acculturation can influence sexual behaviors. Based on previous literature (Berry, 1997; Cabassa, 2003), we proposed a three-level conceptual model. The first level focuses on the influence of heritage and receiving cultures. Acculturation is a process happening in cultural contact and cultural changes between two cultural worldviews. It is crucial to understand where immigrants come from and go to and what knowledge and behavior immigrants carry with them and will learn in the process. Cultural background could be a reliable predictor of health-related behavior. Cultural factors may include cultural sexual norms, gender sexual norms, religious proscriptions, and HIV beliefs in both heritage and mainstream societies (Gómez & Marin, 1996). For example, Asian immigrants hold traditional values associated with sexual conservatism and Latino female immigrants hold traditional values on sexual abstinence. The extent of Asians and Latinos adhering to their sexual beliefs in the receiving culture can partly determine the impact of acculturation on sexual behaviors.

The second level focuses on social factors including the relationships with family, peers, and community. Social support from family is beneficial for immigrants to cope with acculturation stress. Moreover, in some cultures, such as the Asian, people can perceive pressure from family members, which prevents them from engaging in risky sexual behaviors (Hahm et al., 2008). In contrast, separation from family and spouse makes migrants vulnerable to HIV risk behaviors (Wang et al., 2007). In addition, peers and community can exert impacts on sexual behaviors in the acculturation process because immigrants can adopt peers' and community residents' sexual attitudes and learn their sexual behaviors (Campbell, Williams, & Gilgen, 2002; Le & Kato, 2006).

The third level focuses on individual factors such as coping strategy, personality, expectation, economic status, and demographic factors. Although acculturative stress is common in the adaptation process (Berry, Kim, Minde, & Mok, 1987), immigrants can use their coping strategies to attenuate negative effects of stressors. People who have positive attitudes, seek social support, perceive a higher degree of control over sexual acts, and

engage in spiritual activities are more likely to have safe sex (Folkman, Chesney, Pollack, & Phillips, 1992; Loue, Cooper, Traore, & Fiedler, 2004; Taylor et al., 1992). These individual factors may moderate or mediate the impact of acculturation on sexual behaviors.

Cultural, social, and individual factors, separately or interactively, enhance or mitigate the influence of acculturation on sexual behaviors. Examination of this model requires cross-cultural and longitudinal designs and sensitive measures of acculturation. A cross-cultural perspective may be useful in understanding the differences in sexual norms and behavior between heritage and receiving cultures and predicting possible sexual behavioral changes among immigrants. Recognizing sexual beliefs in the two cultures also facilitates interpreting the relationship between acculturation and sexual behaviors. Longitudinal research is needed to track sexual activities and observe changes in sexual behaviors of immigrants since their arrival in the receiving society. Moreover, longitudinal studies should include social and individual factors, which may explain variations of sexual behaviors within ethnic groups.

Limitations of the current review

This review is subject to some limitations. First, we examined the studies focusing on international migrants. The literature on internal migrants, which was excluded in the current review, may provide additional evidence on the relationship between acculturation and risky sexual behaviors. Second, for practical reasons (e.g., full-text of the study was not available), we did not consider non-English publications, which may lead to selection bias. Third, regarding the categorization of measures of acculturation, caution should be taken in interpreting the findings because the group of multi-faceted scales was not totally distinct from the group of length of stay in a receiving culture and residency, and the group of language use. Finally, we categorized composite measures of risky sexual behaviors as unsafe sex, which partly overlapped with other types of sexual behaviors. Hence, caution is needed with regard to interpreting the findings on unsafe sex.

Conclusion

Adaptation to a new culture brings new challenges to immigrants' sexual health. This article reviews the empirical literature on acculturation and sexual behaviors. The results showed that immigrants high in mainstream acculturation were more likely to have multiple partners, early sexual initiation, STDs, and unsafe sex. Moreover, the associations between mainstream acculturation and multiple partnerships, early sexual initiation, STDs, and unsafe sex were stronger among female immigrants than among male immigrants. Acculturation seems to have limited impact on condom use. The current review calls for more attention to the role of context given that the association between acculturation and sexual behaviors may be context-dependent. To depict the complex relationship between acculturation and sexual behaviors, we proposed a three-level conceptual model which illustrates the roles of cultural, social, and individual factors in the relationship. Cross-cultural and longitudinal research has the potential to clarify the impact of acculturation on sexual behaviors as well as elucidate the roles of potential mediators and moderators. Measures of acculturation need to include both adaptation to a new culture and maintenance

of the original culture. Improved instruments to measure acculturation may be needed. A greater understanding of the relationship between acculturation and HIV-related behaviors would help in developing culturally based prevention and intervention programs among the growing immigrant population.

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Fig. 1. Overview of the study selection process following the PRISMA Statement (Moher et al. 2009)

Table 1

Summary of studies (listed in chronological order)

Source	Design	Location	Population	Age: mean (SD) /range	Main findings
Shehadeh et al., 2012 ¹	Serial cross sectional survey	US	78 Hispanics	38 (11.85)	Acculturation (as measured by ethnic identity, length of residency, and country of birth) was positively associated with condom use ($r = .13$, $r = .14$, $r = .17$). Language preference did not significantly predict condom use ($r = .11$)
Kapadia et al., 2012 ^{1, 2}	Cross sectional survey	US	92 Latinos	17.2 (1.1)	Acculturation (as measured by length of residency) was negatively associated with condom use ($r = -.21$). Country of birth and language use did not significantly predict condom use ($r = -.09$, $r = -.16$). Acculturation (as measured by length of residency, country of birth, and language use) was not associated with multiple partnerships ($r = -.08$, $r = .09$, $r = .01$)
Farrelly et al., 2012 ¹	Cross sectional survey	US	235 Hispanics	14.7 (1.4)	Acculturation was not associated with condom use ($r = -.18$)
Schwartz et al., 2011 ³	Cross sectional survey	US	1302 Hispanics, 1373 Asians, 106 Middle Easterners, 423 African Americans	20.22 (3.31)	Mainstream acculturation was positively associated with unsafe sex among East Asians ($r = .05$) but not among Hispanics ($r = .01$). South Asians ($r = .03$), Black immigrants ($r = -.04$), and White immigrants ($r = -.01$). Heritage acculturation was negatively associated with unsafe sex ($p < .05$) among Hispanics
Moreno et al., 2011 ^{1, 2, 5}	Cross sectional survey	US	1003 Puerto Rican women	38.32 (11.87)	Acculturation (as measured by country of birth, language preference) was positively associated with condom use ($r = .25$, $r = .37$), multiple partnerships ($r = .40$, $r = .54$), and STDs ($r = .31$, $r = .52$). Length of residency was not associated with sexual behaviors
Kao et al., 2011 ⁴	Longitudinal study	US	433 Asian Pacific Islanders	range 15–17	Acculturation (as measured by length of residency) was negatively associated with early sexual initiation ($r = -.14$)
Hennessy-Burt et al., 2011 ²	Cross sectional survey	US	93 Mexicans	32, range 18–49	Acculturation was positively associated with multiple partnerships ($r = .21$)
Castro et al., 2011	Cross sectional survey	Spain	357 Latin Americans	16.64 (1.4)	Acculturation was negatively associated with unsafe sex ($p < .01$)
Ward et al., 2010 ^{2, 4, 5}	Cross sectional survey	US	3149 Hispanics	30.5 (8.32)	Acculturation was positively associated with multiple partnerships, early sexual initiation, and STDs ($r = .37$, $r = .27$, $r = .17$)
Schoueri et al., 2010 ¹	Cross sectional survey	Canada	92 Middle Easterners	23.5 (3.9)	Acculturation was negatively associated with condom use ($r = -.08$)
Sanchez et al., 2010	Cross sectional survey	US	209 Latino women	39.2 (8.2)	Women high in acculturation (as measured by percentage of life living the receiving country, country of birth, and language preference) were more likely to adopt negative coping ($p < .01$) and thereby display increased unsafe sex ($p < .01$)
Prado et al., 2010 ⁴	Cross sectional survey	US	586 Hispanics	13.6 (0.75)	Acculturation (as measured by parent-adolescent acculturation gap) was positively associated with early sexual initiation ($r = .06$)
Nakamura et al., 2010	Cross sectional survey	US	226 Latino gay and bisexual men	35 (9.35)	Heritage acculturation was negatively associated with condom use during receptive anal intercourse and condom use during sex under influence of drug, while it was positively associated with condom use during insertive anal intercourse ($ps < .01$)

Source	Design	Location	Population	Age: mean (SD)/range	Main findings
Minnis et al., 2010 ²	Cross sectional survey	US	341 Latino adolescents	16.6, range 14–19	Acculturation was not associated with multiple partnerships ($r = .08$)
Meston et al., 2010	Cross sectional survey	US	1348 undergraduate students (17% Hispanics, 16% Asians)	range 18–42	Mainstream acculturation was positively associated with multiple partnerships among Asian women, especially among those low in acculturation to the heritage culture. Mainstream acculturation was positively associated with multiple partnerships among Hispanic men low in acculturation to the heritage culture, but was negatively associated with multiple partnerships among Hispanic men high in acculturation to the heritage culture ($ps < .05$)
Lee et al., 2010 ^{1, 2, 5}	Longitudinal study	US	1073 Latinas	11–20 at baseline	Acculturation (as measured by country of birth and language preference) was positively associated with multiple partnerships ($r = .32$) and STDs ($r = .15$) but not with condom use ($r = -.02$)
Kepka et al., 2010 ⁵	Cross sectional survey	US	457 Latinas, 407 Mexican women	age 59	Acculturation (as measured by parents' country of birth and language preference) was positively associated with STDs among Mexican women ($r = .29$, $r = .24$) and among Latinas ($r = .25$, $r = .20$). Acculturation as measured by country of birth was positively associated with STDs among Mexican women ($r = .20$) but not among Latinas ($r = .20$)
Gindi et al., 2010 ^{1, 2, 5}	Cross sectional survey	US	930 Latinas	28.9	Among females, acculturation (as measured by language preference) was positively associated with condom use ($r = .10$) and multiple partnerships ($r = .12$) but not with STDs ($r = .08$). Among males, acculturation was not associated with condom use ($r = -.07$), multiple partnerships ($r = -.01$), and STDs ($r = .02$)
Dixon et al., 2010	Cross sectional survey	US	187 Puerto Rican women	range 18–35	Acculturation was positively associated with condom use ($p < .01$)
Deardorff et al., 2010 ^{1, 2, 4}	Cross sectional survey	US	839 Latinos	18.5 (1.7)	Among females, mainstream acculturation (as measured by language preference) was positively associated with early sexual initiation ($r = .10$) but not condom use ($r = -.01$) and multiple partnerships ($r = .04$). Among males, mainstream acculturation was not associated with early sexual initiation ($r = .06$), condom use ($r = .02$), and multiple partnerships ($r = .08$). Heritage acculturation was negatively associated with condom use ($p < .05$) and multiple partnerships ($p < .01$)
Weiss et al., 2009 ^{1, 2}	Cross sectional survey	US	709 Hispanics	range 18–23	Acculturation (as measured by country of birth) was positively associated with multiple partnerships among females ($r = .19$) but not among males ($r = -.03$). Acculturation was not associated with condom use among either females ($r = -.09$) or males ($r = -.15$). Age at immigration did not predict condom use and multiple partnerships
Uribe et al., 2009 ^{1, 5}	Cross sectional survey	US	1596 Hispanics	range 18–39	Acculturation (as measured by country of birth) was negatively associated with condom use among Mexicans ($r = -.16$) but not among Colombians ($r = -.06$), Cubans ($r = .04$), Peruvians ($r = -.15$), and Puerto Ricans ($r = .09$). Acculturation was positively associated with STDs among Puerto Ricans ($r = .16$) but not among Colombians ($r = .12$), Cubans ($r = -.07$), Mexicans ($r = .13$), and Peruvians ($r = .04$). Language preference did not predict condom use ($r = .09$) and STDs ($r = .04$)
Thurman et al., 2009 ^{1, 2, 4, 5}	Cross sectional survey	US	416 Hispanic women	range 14–45	Acculturation (as measured by language preference) was not associated with condom use ($r = .01$), multiple partnerships ($r = -.03$), early sexual initiation ($r = -.06$), and STDs ($r = .15$)
Ragsdale et al., 2009 ¹	Cross sectional survey	US	40 Latinas	range 18–29	Acculturation was not associated with condom use ($r = -.25$)

Source	Design	Location	Population	Age: mean (SD)/range	Main findings
O'Connor et al., 2009	Cross sectional survey	Australia	499 Vietnamese men	range 16–59	Acculturation was positively associated with condom use ($p < .05$) and negatively associated with multiple partnerships ($p < .01$), unsafe sex ($p < .001$), and STDs ($p < .05$)
McDonald et al., 2009 ^{1, 4}	Longitudinal study	US	1614 Hispanics	12–16 at baseline	Acculturation (as measured by generation status, language use) was not associated with condom use ($r = .07$, $r = .00$) and early sexual initiation ($r = .03$, $r = .07$)
Kang et al., 2009 ^{1, 2, 3}	Cross sectional survey	US	259 Puerto Ricans	42 (8.8)	Mainstream acculturation was negatively associated with multiple partnerships ($r = -.24$) and unsafe sex ($r = -.17$) but not with condom use ($r = .04$). Heritage acculturation was negatively associated with condom use ($p < .05$) but not with unsafe sex and multiple partnerships
Guilamo-Ramos et al., 2009	Cross sectional survey	US	702 Latinos	13	Acculturation was not associated with condom use, multiple partnerships, and unsafe sex
Hahm et al., 2008 ^{2, 3, 4, 5}	Longitudinal study	US	1195 Asian Pacific Islanders	22	Foreign-born Asian Pacific Islanders reported more unsafe sex than US-born ones ($r = .43$). Acculturation (as measured by country of birth) was not associated with multiple partnerships ($r = .13$), early sexual initiation ($r = .11$), and STDs ($r = .15$)
Gonzalez-Guarda et al., 2008 ¹	Cross sectional survey	US	82 Hispanic women	39.28 (10.91)	Neither mainstream nor heritage acculturation was associated with condom use ($r = -.07$ for mainstream acculturation)
Edwards et al., 2008 ^{2, 4}	Cross sectional survey	US	570 Latino adolescents	17.91 (1.98)	Acculturation (as measured by language preference) was positively associated with multiple partners ($r = .12$) but not with early sexual initiation ($r = .05$)
Villarruel et al., 2007 ¹	Cross sectional survey	US	233 Latinos	15.4 (1.49)	Acculturation was positively associated with condom use ($r = .13$)
Page, 2007 ²	Cross sectional survey	US	291 Hispanic women	range 15–44	Acculturation (as measured by language preference) was not associated with multiple partnerships ($r = .44$)
Knipper et al., 2007 ¹	Cross sectional survey	US	222 Latino men	29.8 (8.3)	Acculturation was not associated with condom use ($r = .12$)
Gilliam et al., 2007 ¹	Cross sectional survey	US	271 Mexican women	20	Acculturation (as measured by language preference) was positively associated with condom use ($r = .20$)
Le & Kato, 2006 ³	Cross sectional survey	US	112 Cambodians, 67 Laotians	range 13–19	Acculturation was not associated with unsafe sex among either Cambodians ($r = -.05$) or Laotians ($r = .14$)
Hahm et al., 2006 ⁴	Longitudinal study	US	689 Asians	range 12–18	Acculturation was positively associated with early sexual initiation among Asian women ($r = .30$) but not among Asian men ($r = .02$)
So et al., 2005 ³	Cross sectional survey	US	248 Asians	range 18–27	Acculturation was positively associated with unsafe sex ($r = .21$)
Rojas-Guyler et al., 2005 ²	Cross sectional survey	US	295 Hispanic women	29.5, range 18–60	Mainstream acculturation was not associated with multiple partnerships ($r = .05$). Heritage acculturation was negatively associated with multiple partnerships ($p < .05$)
Raffaelli et al., 2005 ³	Cross sectional survey	US	61 Cuban women	18.4 (1.2)	Acculturation (as measured by country of birth, ethnic identity, and language use) was not associated with unsafe sex ($r = .10$, $r = -.02$, $r = .13$)
Lin et al., 2005 ^{1, 2}	Cross sectional survey	US	144 Taiwanese	25.9 (5.4)	Acculturation (as measured by language preference) was not associated with condom use ($r = -.15$) and multiple partnerships ($r = .16$)

Source	Design	Location	Population	Age: mean (SD)/range	Main findings
Levy et al., 2005 ^{1, 2, 3}	Cross sectional survey	US	410 Hispanic men	range 18–35	Acculturation (as measured by length of residency) was negatively associated with condom use ($r = -.17$) and unsafe sex ($r = -.13$) but not with multiple partnerships ($r = .01$)
Kasirye et al., 2005 ^{2, 4}	Longitudinal study	US	1062 Latina women	25.2 (6.3)	Acculturation (as measured by language preference) was positively associated with multiple partnerships ($r = .23$) and early sexual initiation ($r = .40$)
Jeltova et al., 2005 ³	Cross sectional survey	US	103 Russian women	16.2, range 13–19	Mainstream acculturation was positively associated with unsafe sex ($r = .63$) and heritage acculturation was negatively associated with unsafe sex ($p < .0001$)
Ibanez et al., 2005 ¹	Cross sectional survey	US	591 Latino men	26.5 (7.5)	Acculturation (as measured by language preference) was not associated with condom use ($r = .04$)
Adam et al., 2005 ⁴	Cross sectional survey	US	3187 Hispanics	range 12–18	Acculturation (as measured by language preference) was positively associated with early sexual initiation ($r = .28$)
Poppen et al., 2004	Cross sectional survey	US	155 Latino gay and bisexual men	range 18–67	Acculturation was negatively associated with unsafe sex ($p < .05$)
Salazar-Pena et al., 2003 ¹	Cross sectional survey	US	175 Central American women	range 18–50	Acculturation was positively associated with condom use ($r = .34$)
Ross et al., 2003 ⁵	Cross sectional survey	England	385 black Caribbean men	range 16–35	Acculturation (as measured by country of birth, language preference, and length of residency) was negatively associated with STDs ($r = -.13$, $r = -.31$, $r = -.30$)
Loue et al., 2003 ³	Cross sectional survey	US	189 Puerto Ricans, 143 Mexicans	range 18–45	Acculturation (as measured by country of birth, length of residency, and a multi-faceted scale) was not associated with unsafe sex among either Puerto Ricans ($r = .07$, $r = .01$, $r = .02$) or Mexicans ($r = .13$, $r = .01$, $r = .05$)
O'Donnell et al., 2002 ¹	Cross sectional survey	US	465 Latino gays	range 15–25	Acculturation (as measured by language preference) was not associated with condom use ($r = -.03$)
Kaplan et al., 2002 ^{2, 4}	Cross sectional survey	US	670 Latinas	17.5 (1.29)	Acculturation (as measured by language preference) was positively associated with multiple partnerships ($r = .25$) and early sexual initiation ($r = .24$)
Upchurch et al., 2001	Longitudinal study	US	877 Hispanics	range 12–17	Acculturation (as measured by language preference) was positively associated with early sexual initiation ($p < .01$). Generation status did not predict early sexual initiation
Minnis et al., 2001 ^{2, 4, 5}	Cross sectional survey	US	98 Latino women	range 15–24	Acculturation (as measured by country of birth) was positively associated with multiple partnerships ($r = .24$), early sexual initiation ($r = .23$), and STDs ($r = .13$)
Ebin et al., 2001	Cross sectional survey	US	609 Hispanics	15, range 11–19	Acculturation (as measured by country of birth) was positively associated with early sexual initiation ($p < .05$). Language preference did not predict early sexual initiation
Ratti et al., 2000 ¹	Cross sectional survey	Canada	46 South Asian homosexual and bisexual men	34, range 21–62	Acculturation was positively associated with condom use ($r = .49$)

Source	Design	Location	Population	Age: mean (SD)/range	Main findings
Organista et al., 2000 ¹	Cross sectional survey	US	501 Mexicans	31.6 (11.4)	Acculturation (as measured by language preference, length of residency) was not associated with condom use ($r = .06$, $r = -.02$)
Martin et al., 2000	Cross sectional survey	US	2509 Adolescence	11.5, range 10–13	Acculturation (as measured by language use) was negatively associated with early sexual initiation among males ($p < .01$) but not among females. Length of residency did not predict early sexual initiation
Dolezal et al., 2000	Cross sectional survey	US	307 Latina gays	30.8 (7)	Acculturation was not associated with condom use
Castaneda et al., 2000 ¹	Cross sectional survey	US	115 Mexicans	30.86 (8.47)	Acculturation was not associated with condom use ($r = -.23$)
Carmona et al., 1999 ^{1, 2, 3}	Baseline data of longitudinal study	US	121 Latino women	range 18–50	Acculturation (as measured by length of residency and multi-faceted scale) was positively associated with multiple partnerships ($r = .31$, $r = .39$) and unsafe sex ($r = .26$, $r = .24$) but not with condom use ($r = -.23$, $r = .05$)
Newcomb et al., 1998 ³	Cross sectional survey	US	227 Latinas	32, range 18–50	Acculturation was positively associated with unsafe sex ($r = .18$)
Marks et al., 1998 ¹	Cross sectional survey	US	226 Latinas	34	Acculturation was negatively associated with condom use ($r = -.46$)
Hines et al., 1998 ^{1, 2}	Cross sectional survey	US	563 Hispanics	age 18	Acculturation was not associated with condom use and multiple partnerships among either females ($r = .01$, $r = .05$) or males ($r = .09$, $r = .01$)
Fraser et al., 1998 ³	Cross sectional survey	US	116 Hispanic women	14.8 (1.6)	Acculturation (as measured with country of birth and a multi-faceted scale) was not associated with unsafe sex ($r = .17$, $r = .09$)
Flaskerud et al., 1997 ³	Longitudinal study	US	508 Latino women	28.6 (9.6)	Acculturation was positively associated with unsafe sex ($r = .26$) but not with condom use
Sabogal et al., 1996 ^{1, 3}	Cross sectional survey	US	4390 Hispanics	range 18–49	Acculturation was positively associated with condom use and unsafe sex ($r = .14$, $r = .10$)
Peragallo, 1996 ³	Cross sectional survey	US	121 Puerto Rican women	30	Acculturation was positively associated with unsafe sex ($r = .35$)
Sabogal et al., 1995 ^{2, 4, 5}	Cross sectional survey	US	1650 Hispanics	range 35–74	Acculturation was positively associated with multiple partnerships among females ($r = .17$) but not among males ($r = .02$). Acculturation was negatively associated with early sexual initiation among males ($r = -.14$) but not among females ($r = -.01$). Acculturation was not associated with STDs among either females ($r = .01$) or males ($r = .01$)
Nyamathi et al., 1995 ^{1, 2, 5}	Cross sectional survey	US	122 Latina women	range 18–69	Acculturation was negatively associated with condom use ($r = -.21$), positively associated with multiple partnerships ($r = .14$), and not associated with STDs ($r = -.04$)
Gellert et al., 1995	Cross sectional survey	US	532 Vietnamese	range 18–45	Acculturation was not associated with multiple partnerships
Martin et al., 1994 ^{1, 2}	Cross sectional survey	US	519 Latina women	range 18–49	Acculturation was positively associated with condom use ($r = .26$) and multiple partnerships ($r = .19$)
Sabogal et al., 1993 ²	Cross sectional survey	US	4658 Hispanics	range 18–49	Acculturation was positively associated with multiple partnerships among females ($r = .17$) but not among males ($r = .06$)
Reynoso et al., 1993 ⁴	Cross sectional survey	US	155 Mexicans	range 12–18	Acculturation was positively associated with early sexual initiation ($r = .35$)

Source	Design	Location	Population	Age: mean (SD)/range	Main findings
Nyamathi et al., 1993 2, 3, 5	Cross sectional survey	US	255 Latina women	range 18–75	Acculturation was positively associated with multiple partnerships ($r = .22$), unsafe sex ($r = .14$), and STDs ($r = .23$)
Marin et al., 1993a 2	Cross sectional survey	US	1592 Hispanics	range 18–49	Acculturation was negatively associated with multiple partnerships among males ($r = -.16$), but was positively associated with multiple partnerships among females ($r = .51$)
Marin et al., 1993b 1, 2	Cross sectional survey	US	398 Hispanics	range 20–44	Acculturation (as measured by language preference) was positively associated with condom use among males ($r = .11$) but not among females ($r = .07$). Acculturation was positively associated with multiple partnerships among males ($r = .13$) and females ($r = .23$)
Ford et al., 1993	Cross sectional survey	US	711 Hispanics	range 15–24	Acculturation was positively associated with condom use among females ($p < .05$) but not among males. Acculturation was positively associated with unsafe sex ($p < .01$). Acculturation was not associated with multiple partnerships
Slonim-Nevo, 1992	Cross sectional survey	US	706 Mexicans	range 10–19	Acculturation was positively associated with early sexual initiation ($p < .05$)

Note. Studies included in the meta-analyses were indicated by superscript numbers (1 = studies on condom use, 2 = studies on unsafe sex, 3 = studies on multiple partnerships, 4 = studies on early sexual initiation, 5 = studies on STDs). Acculturation refers to mainstream acculturation unless heritage acculturation was used. Acculturation was assessed with multi-faceted scales unless the main findings were noted with the domains of acculturation (such as language preference, country of birth).

Table 2

Summary of measurement instruments (listed by the number of studies using the measures)

Scale	No. of studies using the scale	Reference	Number of items	Domains
The Short Acculturation Scale for Hispanics - language portion	16	G. Marin, Sabogal, Marin, Otero-Sabogal, and Perez-Stable (1987)	8	Language use, preference, and proficiency
The Short Acculturation Scale for Hispanics	8	G. Marin et al. (1987)	12	Ethnic social relations, language use, media use
The Acculturation Rating Scale for Mexican Americans	3	Cuellar et al. (1980)	20	Language preference, language use, ethnic identity, ethnic classification, cultural heritage, ethnic behaviors, and ethnic interaction
The Bidimensional Acculturation Scale	3	Marín and Gamba (1996)	24	Language proficiency and media use
The Bicultural Involvement Questionnaire-Revised	2	Birman (1998)	21	Language use, food use, traditions use, and cultural practices
The Acculturation Rating Scale for Mexican Americans-II	2	Cuellar, Arnold, and Maldonado (1995)	48	Language preference, language use, ethnic identity, ethnic classification, cultural heritage, ethnic behaviors, and ethnic interaction
The Acculturation Rating Scale for Mexican Americans - language portion	2	Cuellar, Harris, and Jasso (1980)	12	Language use and preference
The Multi-Group Ethnic Identity Measure	2	Phinney (1992)	12	Ethnic identity
The Abbreviated Multidimensional Acculturation Scale	2	Zea, Asner-Self, Birman, and Buki (2003)	42	Language competence, cultural identification, and cultural knowledge
The Language, Identity, and Behavior Acculturation Scale	1	Birman and Trickett (2001)	51	Language use, ethnic identity, ethnic social relations
The Acculturation Scale	1	Celano and Tyler (1991)	13	Language preference
The Biculturalism scale	1	Cortés, Rogler, and Malgady (1994)	16	Language use, food use, ethnic pride, cultural values
The Behavioral Adaptation Inventory	1	Cruz and Cordero (1981)	123	Personal, family, school, and social adaptation
A Simple Language-based Acculturation Scale	1	Deyo, Diehl, Hazuda, and Stern (1985)	4	Language use
The acculturation scale	1	Fraser, Piacentini, Van Rossem, Hien, and Rotheram-Borus (1998)	9	Ethnic identity, ethnic social relations, media preference, and ethnic pride
The acculturation scale	1	Ghuman (1994)	30	Cultural practices and ethnic social relations
The 12-item Acculturation Scale	1	Hines and Caetano (1998)	12	Language use, media use, ethnic social relations, and cultural practices
The Bidimensional Acculturation Scale - language portion	1	Marín and Gamba (1996)	6	Language use
The Acculturation Scale with Australian culture	1	Rissel (2008)	8	Language use and ethnic identity
The Heritage and Mainstream Subscales of the Vancouver Index of Acculturation	1	Ryder, Alden, and Paulhus (2000)	20	Ethnic identity
Self-Conceptual Scale	1	Singelis (1994)	24	Cultural values

Scale	No. of studies using the scale	Reference	Number of items	Domains
The Acculturation Lifestyle Questions	1	So, Wong, and DeLeon (2005)	not reported	Language, food, and entertainment preference
The Stephenson Multigroup Acculturation Scale	1	Stephenson (2000)	32	Language use and ethnic social relations
The Acculturation Scale	1	Szapocznik, Kurtines, and Fernandez (1980)	33	Language preference and media use
Individualism and Collectivism Scale	1	Triandis and Gelfand (1998)	16	Cultural values
The Ethnocultural Identity Behavior Index	1	Marsella and Horvath (1998)	13	Language, food, media use, and cultural practices

Table 3

Combined effect sizes of the associations between acculturation and sexual behaviors by gender

Sexual behaviors	<i>k</i>	<i>N</i>	Combined effect size, <i>r</i> (95% Confidence Interval)
<i>Condom use</i>			
Overall effect size ($Q = 262.87, df = 37, p < .001$)	38	15481	.01 (−.03, .06)
Males only	9	2775	.04 (−.06, .14)
Females only	14	3846	.07 (−.01, .15)
Mixed gender	15	8860	−.06 (−.14, .02)
<i>Multiple partnerships</i>			
Overall effect size ($Q = 645.10, df = 36, p < .001$)	37	21775	.15*** (.09, .20)
Males only	9	5996	.01 (−.09, .11)
Females only	18	8712	.21*** (.15, .28)
Mixed gender	10	7067	.15*** (.05, .24)
<i>Unsafe sex</i>			
Overall effect size ($Q = 180.10, df = 15, p < .001$)	16	10873	.16*** (.08, .23)
Males only	1	410	−.13 (−.37, .14)
Females only	7	1285	.27*** (.16, .37)
Mixed gender	8	9178	.11* (.02, .20)
<i>Early sexual initiation</i>			
Overall effect size ($Q = 368.58, df = 17, p < .001$)	18	14522	.13** (.05, .21)
Males only	3	1573	−.02 (−.20, .16)
Females only	6	2971	.18** (.05, .31)
Mixed gender	9	9978	.14** (.04, .24)
<i>STDs</i>			
Overall effect size ($Q = 135.72, df = 14, p < .001$)	15	10882	.10** (.04, .17)
Males only	3	1764	−.07 (−.18, .05)
Females only	7	2325	.14*** (.06, .22)
Mixed gender	5	6793	.16*** (.07, .24)

Note. *Q* = measure of homogeneity; *k* = number of independent associations; *N* = total sample size; *r* = mean population correlation.

* $p < .05$;

** $p < .01$;

*** $p < .001$.