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A Meta-Analytic Review of the Association Between Disgust and Prejudice Toward Gay Men

Mark J. Kiss, PhD, Melanie A. Morrison, PhD, and Todd G. Morrison, PhD

Psychology, University of Saskatchewan, Saskatoon, Canada

ABSTRACT

A sizeable number of studies have documented a relationship between heterosexual persons' experience of disgust (measured as an individual difference variable or induced experimentally) and prejudice toward gay men (i.e., homonegativity). Yet, to date, no one has attempted to meta-analytically review this corpus of research. We address this gap by conducting a meta-analysis of published and unpublished work examining heterosexual men and women's disgust and their homonegativity toward gay men. Fourteen articles (12 published, two unpublished) containing 17 studies were analyzed ($N = 7,322$). The average effect size for disgust sensitivity studies was moderate to large ($d = 0.64$), whereas for disgust induction studies, the effect was large ($d = 0.77$). No evidence of effect size heterogeneity emerged. Future directions and recommendations for methodological improvements are outlined.

KEYWORDS

Gay men; disgust; prejudice; homonegativity; emotions; meta-analysis

From an evolutionary standpoint, it is argued that emotions serve an adaptive function that allows a person to successfully navigate fundamental life-tasks and interpersonal exchanges (Ekman, 1992). The specific emotion that arises (e.g., fear) is a behavior that has been previously used as a successful social strategy or has an adaptive function that has contributed to the human species' continued survival (e.g., fleeing from danger). Emotions are also conceptualized as a cognitive process whereby people or situations are appraised and consequential judgments are produced. These judgments may be based on tangible personal threats—such as avoidance of disease—or may be more abstract, with a person's emotional reaction serving to maintain their conceptualization of morality or lawfulness (Ekman, 1992; Horberg, Oveis, & Keltner, 2011; Rozin, Haidt, & McCauley, 2008). Furthermore, these cognitive appraisals are automatic, subconscious, and argued to be out of a person's control (Rozin et al., 2008; Tapis et al., 2007).

Considerable effort has been afforded to understand emotions in relation to prejudice; in the context of emotional reactions, prejudice refers to negative beliefs about others that may or may not be based on actual

experience (Allport, 1954). Anger and happiness have been shown to exacerbate prejudicial judgments of racial outgroups (Bodenhausen, Sheppard, & Kramer, 1994; Tiedens & Linton, 2001). For example, Hugenberg and Bodenhausen (2003) computer-generated Black and White faces that were matched for facial structure and expression. The faces were animated so that their facial expressions could change over time from happy to hostile. European American participants were tasked with watching the animated faces (two White, two Black) and told to press a button when they saw a new facial expression. Additionally, they completed a measure of implicit prejudice. The researchers observed that faster recognition of a hostile Black face was associated with higher levels of prejudice. In comparison, response times to detect anger in White faces were unrelated to implicit prejudice.

Disgust

Within the realm of emotions and prejudice, researchers have allocated attention to the study of disgust, operationalized as an individual difference variable (i.e., disgust sensitivity) or as an induced state, and prejudice toward sexual minority persons (typically, gay men). Disgust is commonly understood as the rejection of unpleasant stimuli based on sight, smell, or even mere thought. However, it is a complicated emotion because its elicitors may originate from a variety of sources, including bodily products, sexual behaviors, animals, interpersonal contact, and moral offenses (Rozin et al., 2008). A number of disgust domains have been identified: (1) core; (2) animal-reminder; (3) interpersonal; (4) moral; and, most recently, (5) sexual (Haidt, McCauley, & Rozin, 1994; Hodson et al., 2013; Smith, 2012; Tybur, Lieberman, & Griskevicius, 2009). Each form of disgust will be outlined briefly. However, in doing so, we are not implying that these domains are orthogonal (i.e., they do not overlap).

Core disgust

This form (also known as *pathogen* disgust) refers to a biologically based rejection response (e.g., gagging and vomiting) that serves as a protective function against potential sickness. Core disgust is tied to the stomach and digestive system and the need to reject objects that are inedible because they may cause sickness or death (Rozin et al., 2008; Rozin, Haidt, McCauley, & Imada, 1997). According to evolutionary psychology, core disgust is the product of natural selection: the instinct to avoid biological pathogens and increase one's likelihood of survival (Rozin & Fallon, 1987; Rozin et al., 1997).

Core disgust also can describe a person's refusal to consume or touch unpleasant or offensive objects because of where they have been previously (e.g., Haidt, Rozin, McCauley, & Imada, 1997). Further, objects that are initially considered neutral (e.g., a dinner plate) can become imbued with

disgust due to contact with something offensive (e.g., feces); a process referred to as *contamination disgust* (Haidt et al., 1997; Olatunji & Sawchuk, 2005). Even if said dinner plate were washed thoroughly, people would be unlikely to want to eat off it. Importantly, core disgust may have ramifications for social interactions. Groups perceived to have been in contact with disgusting objects (e.g., wearing dirty clothing) or places (e.g., a garbage dump) may become contaminated with disgusting attributes.

Animal-reminder disgust

This form of disgust is evoked by a variety of prompts implying that human beings are essentially animals—a linkage that people typically find aversive (Haidt et al., 1997; Hodson, Kteily, & Hoffarth, 2014). It is posited that human aversion toward animals is rooted in their fear of death. By subconsciously downplaying their own animalistic traits, human beings can manage death-related anxiety (Hodson et al., 2014). For example, numerous popular religions assert that animals cannot transcend into an afterlife; instead, only “chosen” humans are able to do so. Thus some people may want to be considered transcendent beings and, thus, reject their “creaturely” attributes (Hodson et al., 2014; Rozin et al., 2008).

Animal-reminder disgust theoretically overlaps with core disgust because animals are associated with creaturely acts such as public urination and defecation, brutally killing other creatures for sustenance (including cannibalism), and eating raw bloody flesh (i.e., humans require most meats to be cooked to be edible). Sexual practices by groups considered animalistic (e.g., anal intercourse) are considered repulsive, and sexual gratification from these practices is often seen as abhorrent (Avilla, 2011; Hodson et al., 2014; Tybur et al., 2009). Thus many cultures seek to regulate sexual practices by promulgating the message that certain sexual activities are more hygienic—both physically and morally—than other sexual activities (Haidt et al., 1994; Olatunji & Sawchuk, 2005). Many humans’ grooming practices, which are designed to eliminate presumably disgusting smells such as body odor and foul breath, also underscore rejection of their animal origins. If a person neglects hygiene, disgust may be evoked, and those individuals may be considered more animalistic (Olatunji & Sawchuk, 2005).

Interpersonal disgust

This form is induced by interpersonal contact with dissimilar groups of people (i.e., outgroups; Hodson et al., 2014; Olatunji & Sawchuk, 2005). Once induced, the person experiencing disgust may feel superior to members of the group that elicited the disgust, thus establishing an ingroup/outgroup cleavage. The *intergroup emotions theory* (IET; Devos, Silver, Mackie, & Smith, 2002) suggests that disgust may result from an ingroup’s cognitive appraisals of an outgroup (e.g., an outgroup’s cultural practices and traditions). Hodson et al. (2014) expanded on this theory by arguing that disgust

arises not only from cognitive appraisal but also at a visceral subconscious level. In other words, a group may be considered disgusting for what it symbolizes, with whom or what it has been in contact, or where it has been.

The sensation of disgust that an ingroup holds toward an outgroup or minority can be further understood by the *behavioral immune system* (BIS; Schaller & Park, 2011). BIS is a psychological disgust mechanism that serves to protect an individual from certain social relations. Schaller and Park (2011) compared this mechanism to a mental alarm that is triggered when a person or group is perceived to be socially “deviant” or exhibits the potential for disease contamination. Historically, human beings are social creatures and have often lived in groups to increase their likelihood of survival. Within these groups, members may have certain diseases that are considered benign due to the group’s prior or continued exposure. However, outgroups are considered to have novel pathogens that should be avoided to decrease the group’s exposure to unfamiliar illnesses (Duncan, Schaller, & Park, 2009; Terrizi, Shook, & McDaniel, 2013).

Moral disgust

This form is linked with perceptions of morality/immorality in that certain moral transgressions may be considered disgusting (Olatunji & Sawchuk, 2005; Pizarro, Inbar, & Helion, 2011). Bifurcating this type of disgust, Russell and Giner-Sorolla (2013) detailed two distinct forms: *bodily moral disgust*, which is evoked when “moral codes related to the body are violated” (p. 328), and *non-bodily moral disgust*, which focuses on social transgressions. Moral judgments are subconscious, rapid guttural reactions to people’s behaviors, the valence of which can be positive or negative (Haidt, 2001). Pizarro et al. (2011) claimed that experiencing disgust may lead to an increased severity of moral judgments. For instance, relatively benign moral violations (e.g., lying to a friend or being habitually late for work) tend to be evaluated more harshly by individuals who are easily disgusted (i.e., greater in disgust sensitivity) or when they are experiencing an induced state of disgust. Purity and sanctity also have been theorized within the moral domain of disgust. Specifically, purity—in this context—refers to the protection of the human body and soul through the adoption of certain values and principles (e.g., premarital celibacy, church attendance; Horberg, Overis, Keltner, & Cohen, 2009). Horberg et al. (2009) suggested that purity relates to moral concerns regarding one’s character and social conduct. Purity is said to be violated when someone outwardly acts in a self-polluting, hedonistic, or ungodly manner (e.g., sex outside the confines of reproduction; Haidt & Joseph, 2007; Olatunji & Sawchuk, 2005; Rozin, Lowery, Imada, & Haidt, 1999). Thus when an individual’s actions are deemed to violate the state of purity, disgust may be evoked.

Sexual disgust

Though previously considered a subdomain of animal-reminder disgust (Haidt et al., 1994), it has been suggested that sexual disgust should be understood using human mating strategies as well as disgust toward certain sexual acts. First, humans select mates on the basis of their genetic quality and other required compatibilities (e.g., access to resources and lack of disease; Avilla, 2011; Jennions, Moller, & Petrie, 2001). Therefore, when an individual assesses a prospective mate to be unsuitable for sexual reproduction, the individual actively avoids that person, and a disgusted state may be evoked by the mere idea of mating with them. Sexual contact also involves the exchange of bodily fluids (e.g., vaginal secretions and semen), which may carry infectious diseases and, thus, trigger disgust.

Gay men as elicitors of disgust

Few studies have attempted to elucidate why heterosexual individuals are disgusted by gay men. However, a review of the existing literature on homonegativity (i.e., prejudice and discrimination directed toward individuals perceived to be gay or lesbian; Morrison & Morrison, 2003) suggested that certain widely held beliefs may account for gay men's ability to trigger this affective state in certain persons. These are: (1) "sodomy" stigma; (2) gay men as vectors of disease; (3) gay men as destabilizers of heteronormative values; and (4) gay men's (perceived) inimicality to religiousness. Each of these factors and their linkage with disgust will be outlined briefly.

"Sodomy" stigma

Historically, anal intercourse (AI) has been a highly controversial practice. For example, AI is routinely referred to as *sodomy*, which describes both oral sex and AI with another person or animal (Jordan, 1997). Markedly negative evaluations of sodomy began to surface during the Medieval Inquisition (1184) when the sexual act was associated with hedonism and, consequently, witchcraft and Satanic worship. Sodomy was rejected by certain religions, and anti-sodomy laws were enacted in several countries such as the United States and United Kingdom (McBride & Fortenberry, 2010). Some have argued that these laws were purposely created to punish gay men, who were strongly associated with practicing AI (Branfman & Ekberg Stiritz, 2012). This is evidenced by gay men being referred to as "sodomites" and the consequential punishment for being a sodomite (Trumbach, 1977). AI involves penetrating the rectum with a penis, fingers, and/or toys and, thus, may be associated with feces expelled from the anus (Melby, 2007). Numerous studies also have noted that AI is a high-risk sex act due to potential disease transmission via feces and tearing of the anus (Baldwin & Baldwin, 2000; Gross et al., 2000).¹

Gay men may be derogated on the basis of their (presumed) engagement in AI. For example, Inbar, Pizarro, Knobe, and Bloom (2009) observed that heterosexual participants became more negative toward gay men, but not other minoritized groups, when disgust was induced using a fecal odor. Taking this finding into consideration, sodomy stigma may be useful in understanding the relationship between disgust and attitudes toward gay men. For instance, core disgust toward this group may be rationalized by the evolutionary need to reject physical pathogens (i.e., fecal matter is often associated with disease transmission). As expelling feces may be considered animal-like, the practice of AI—and, by extension, gay men—may be associated with animal-reminder disgust. Moral disgust also may be evoked because some people believe that AI violates hygienic norms and, due to religious teachings, compromises spiritual purity. As well, interpersonal disgust may be evoked in people who believe that gay men are at higher risk for certain feces-related pathogens via AI and, thus, pose a risk to the health of the ingroup. Finally, the perceived nonreproductive function of AI may elicit sexual disgust.

Gay men as vectors of disease

The gay liberation movement of the 1970s strove for increased acceptance of individuals who chose not to embrace the constraints of heteronormativity (Herek, 1999). Along with the motifs of freedom and acceptance, the movement was unabashedly sexual. The increased visibility of gay male sexuality sought to desensitize heterosexual persons to images of same-sex desire. Unfortunately, due to the emergence of HIV and the ensuing AIDS crisis of the 1980s and 1990s, heterosexual disapproval of the gay community (and its sexuality) increased exponentially (Herek, 1999; Herek, Capitano, & Widaman, 2002). As a result, gay male sex and HIV were conflated. For instance, Lawrence and Husfeldt (1990) showed heterosexual college students ($N = 300$) identical pictures of an ill person coded as having either leukemia or AIDS. These targets also were described as either heterosexual or gay. Participants then were instructed to complete a series of measures assessing interpersonal evaluation, prejudicial attitudes, and willingness to interact casually with the portrayed target. The results indicated that participants had greater prejudicial attitudes toward individuals with AIDS who were gay in comparison to targets coded as having leukemia (Lawrence & Husfeldt, 1990). More recently, Vincent, Peterson, and Parrott (2016) assessed a sample of American heterosexual men's ($N = 194$) attitudes toward AIDS and gay men. A positive association was observed between AIDS-related stigma and homonegativity, suggesting that specific negative attitudes toward gay men remain situated around HIV/AIDS.

Gay men as destabilizers of heteronormative values

The argument that heterosexuality is not simply a sexual orientation but, rather, a socially agreed-upon, normalized, and taken-for-granted set of behaviors is

a concept referred to as *heteronormativity* (Jackson, 2006). Heteronormativity suggests that heterosexuality, in all its forms (e.g., marriage, opposite-sex coupling, family traditionalism, and monogamy), is “normal” and that other configurations of sexual orientation and desire are inferior and deviant (McNeill, 2013). Furthermore, heteronormativity is a dominant ideal that is simultaneously policed and maintained through daily social interactions.

Negativity toward gay men may be attributed to their inability to fit into a heteronormative system. Attempts by gay men to “infiltrate” institutions that privilege heterosexuality (e.g., marriage) may threaten the dominant status of heterosexual persons and, consequently, trigger a disgust response. For instance, among a sample of heterosexual Americans ($N = 236$), Crawford, Inbar, and Maloney (2014) observed that greater disgust sensitivity predicted negative attitudes toward groups that threaten traditional sexual morality (e.g., gay men), and positive attitudes toward groups that uphold traditional sexual morality (e.g., anti-gay activists).

Perceived inimicality to religion

Whitley (2009) referred to religiosity as the degree to which individuals are actively involved with their specific religion (e.g., frequency of attendance at religious services). Whitley (2009) also contended that, by design, religion has inclusionary and exclusionary criteria that expressly or indirectly forbid same-sex desire on the basis of sacred scripture (e.g., the Old Testament or the Quran). Generally, it is evidenced that the stronger individuals’ endorsement of traditional religious beliefs, the greater their homonegative attitudes toward gay men. This association has been observed in different races and cultures (Hooghe, Claes, Harell, Quintelier, & Dejaeghere, 2010; Hunsberger, Owusu, & Duck, 1999; Ward, 2005), and in both genders (although women often report lower homonegativity when compared to men; Scherer, Wu, & Haughey, 1991). Affiliation with a religion may explain why some individuals find gay men disgusting. For instance, certain individuals that self-identify as highly religious may be disgusted by gay men’s intentions to participate in certain religious traditions because they do not view gay men as their equals (Hodson et al., 2014; Terrizzi Jr. et al., 2012).

Disgust directed toward gay men may be due to their perceived lack of purity because concepts such as purity and symbolic cleansing (e.g., baptism, mikven) play an important role in most popular religions (Terrizzi et al., 2012). Purity and sanctity also are crucial elements of moral disgust. Religious beliefs frequently frame gay men as abnormal and depraved and, thus, devoid of sanctimony (Devos et al., 2002; Helminiak, 2008).

Purpose of the current research

Although a meta-analysis was conducted on studies examining disgust and the severity of moral judgments (Landy & Goodwin, 2015), there has yet to

be a review of studies assessing disgust in relation to homonegativity.² We addressed this omission by conducting a meta-analysis of the relevant literature on disgust (operationalized as either an individual difference variable or as an induced state) and homonegativity toward gay men.

Method

Literature review

To locate research suitable for this meta-analysis, the following online databases were targeted: PsycInfo, PsycArticles, and Google Scholar. The search keywords and terms that were used for all databases can be found in [Table 1](#). A broad examination of available literature was necessary, so an advanced full-text search was conducted. This approach locates the targeted keywords within the entire article rather than strictly in the title and abstract. To ensure that unpublished research was included, ISI Web of Science's unpublished thesis and dissertation database was used. Additionally, a general Google search was conducted to identify research on personal portfolios, postsecondary institutions' Web sites, and open-access journals that scientific databases may not index. Researchgate.com (a social media portfolio for scientists) also was investigated for both published and unpublished articles. Lastly, e-mails, requesting unpublished studies or findings, were sent to researchers who frequently published in the field of disgust in relation to prejudice.

This systematic review identified an initial pool of 54 articles. We then applied three inclusion criteria. First, each study needed to measure homonegativity (or homophobia) using at least one of the following: (1) a scale that assesses attitudes toward gay men or homosexuals³; (2) a feeling thermometer that assesses attitudes toward gay men/homosexuals; (3) a measure of support for gay-related social issues (e.g., support for gay marriage or gay adoption); and (4) an implicit measure of homonegativity such as the implicit association test (IAT). Second,

Table 1. Search queries used for all search databases.

Search Keywords and Terms
Disgust Sensitivity
Disgust Induction
Disgust AND Gay Men
Disgust AND Prejudice
Disgust AND Homonegativity
Disgust AND Homophobia
Disgust AND Gay Adoption
Disgust AND Gay Marriage
Disgust AND Gay Rights
Disgust AND Conservatism
Disgust AND Religion
Evoking Disgust
Incidental Disgust

each study was required to assess disgust using measures that indicate a person’s propensity to be disgusted (i.e., disgust sensitivity) and/or a method of disgust induction that was demonstrated to be effective on the basis of a manipulation check. In relation to the latter point, we expected researchers to document that those experiencing induced disgust should evidence a significantly greater level of state disgust. Third, in each study, the sample of participants must consist primarily of heterosexual individuals.⁴ The measures that were used to assess homonegativity and disgust are detailed in [Tables 2](#) and [3](#).

Table 2. Measures of homonegativity toward gay men.

Measure	Focus
Attitude Thermometer (Hodson et al., 2013)	Homosexuals
Attitudes Toward Gay Men – Short Scale (ATG-S; Herek 1994; 1998)	Gay men
Attitudes Toward Lesbians and Gays (ATLG; Herek 1994; 1998)	Gay men/Lesbian women
The Homophobia Scale (Wright, Jr., Adams, & Bernat, 1999)	Homosexuals
The Index of Attitudes toward Homosexuals (IAH; Hudson & Ricketts, 1980)	Homosexuals
Feeling Thermometer (Avilla, 2011)	Gay men
Feeling Thermometer (Crawford et al., 2014)	Gay men/Lesbian women
Feeling Thermometer (Cunningham, et al., 2013)	Gay men
Feeling Thermometer (Inbar, Pizarro, & Bloom, 2012)	Gay men
Gay-Straight Implicit Associations Test (Gay-straight IAT; Nosek, Greenwald, & Banaji, 2007)	Gay men/Lesbian women
Political Issues (Inbar, Pizarro, & Bloom, 2009)	Gay marriage
Sexualities Implicit Associations Test (Sexualities IAT; Greenwald, McGhee, & Schwartz, 1998)	Homosexuals
Support for Public Policy (Kam & Estes, 2016)	Gay marriage
Universal Measure of Bias – Gay (Latner et al., 2008)	Gay men/Lesbian women

Table 3. Measures of disgust.

Measure	Domains	Sub-Domains
Direct Disgust toward Gay Men (Smith, 2012)	Core	-
	Interpersonal	-
	Sexual	-
Disgust Sensitivity Scale (DSS; Haidt et al., 1994)	Core	Food* Animals* Body products*
	Animal-Reminder*	Sex Personal hygiene* Envelope violations* Death*
	Core	-
	Animal-reminder*	-
	Interpersonal	-
Disgust Scale–Revised (DS-R; Haidt et al., 1994; modified by Olatunji et al., 2007)	Core	-
	Animal-Reminder*	-
	Contamination	-
	Intergroup	-
Intergroup Disgust Sensitivity (ITG-DS; Hodson et al., 2013)	Intergroup	-
	Pathogen	-
	Sexual	-
	Moral	-
Three Domain Disgust Scale (TDDS; Tybur et al., 2009)	Intergroup	-
	Pathogen	-
	Sexual	-
	Moral	-

*Refers to domains and subdomains that were not considered in the retained studies.

Meta-analytic sample

The application of these inclusion criteria resulted in 39 articles being removed (i.e., 15 articles containing 18 studies were retained). However, one of the retained articles was subsequently eliminated because the study's authors were unable to furnish the statistical details needed to compute an effect size. Thus the final sample consisted of 14 articles containing 17 studies ($N = 7,322$). Of the 14, two were unpublished. Thirteen of the articles originated from the United States, and one article originated from Canada. Dates of publication ranged from 2008 to 2016. Details about each study are provided in Table 4.

Determining effect size

Statistical procedures for the included studies were standardized. Specifically, mean difference tests (t and F), correlation coefficients (r), and regression coefficients (β) were converted to effect sizes (Cohen's d).

For studies using a comparison test of group means (e.g., t test), Wolf (1986) recommended that d be calculated by subtracting the sample's total mean scores for each group ($M_1 - M_2$), then dividing by the pooled standard deviation (SD_{pooled}). Cohen (1988) provided a formula to compute the pooled SD . For studies using correlation coefficients (r) or beta coefficients (β), Friedman's (1968) commonly used equation for determining the standardized mean difference from the correlation coefficient r was used. Transforming a regression coefficient (β) to d requires a two-step approach. Peterson and Brown (2005) investigated 1,700 beta coefficients and correlation coefficients from published studies to determine an appropriate effect size transformation. The resulting equation produces a precise effect size from β in the form of a correlation coefficient (r). Once β is transformed to r , Friedman's (1968) formula then may be employed.

For the current meta-analysis, positive d values indicate that disgust is positively associated with homonegativity toward gay men, whereas negative d values represent an inverse association (i.e., as disgust increases, homonegativity decreases). With respect to interpreting the magnitude of the observed effect sizes, Cohen's (1988) thresholds are commonly used. These absolute values, which were expanded by Sawilowsky (2009), are: $d = .00$ (no effect), $d = .20$ (small effect), $d = .50$ (medium effect), $d = .80$ (large effect), $d = 1.2$ (very large effect), and $d = 2.0$ (huge effect).

It is critical that researchers assess whether the individual effects observed in each study are similar enough that one can be reasonably confident the combined d will offer an accurate description of the set of studies. Heterogeneity, which occurs when there is excessive variation between each study, means they should not be compared. Combined effect sizes in meta-analysis are often

Table 4. List of retained studies.

Study	Type	Disgust Measure (and/or) Disgust Induction ^a	Outcome Measure	N	d
Avilla (2011) – Study 1 ^b	Sensitivity	Disgust Sensitivity Scale II – Core – Interpersonal	Feeling Thermometer (Gay men)	224	0.29 0.30 0.28
Avilla (2001) – Study 3 ^b	Sensitivity	Disgust Sensitivity Scale II – Core – Interpersonal	Attitudes Toward Gay Men	77	1.63 1.89 1.54
Avilla (2001) – Study 5 ^b	Sensitivity	Disgust Scale – Revised Core	Feeling Thermometer (Gay men)	116	0.41
Crawford, Inbar & Maloney (2014)	Sensitivity	Disgust Scale – Revised	Feeling Thermometer (Gay men/lesbian women)	236	0.41
Cunningham et al. (2013)	Induction	Body Odor	Attitudes Toward Lesbians and Gay Men	146	2.38
		Cheese Odor	Feeling Thermometer (Gay men/lesbian women)		3.76
		Photos	Attitudes Toward Lesbians and Gay Men		0.02
Dasgupta, DeSteno, Williams, and Hunsinger (2009) – Study 2	Induction	Photos	Feeling Thermometer (Gay men/lesbian women)		2.38
Hodson et al. (2013) – Study 1–5	Sensitivity	Interpersonal Disgust Scale	Implicit Associations Test (Sexualities)	130	0.61
		Interpersonal Disgust Scale	Feeling Thermometer (Gay men/lesbian women)	708	0.61
Inbar et al. (2009) – Study 2	Sensitivity	Disgust Sensitivity Scale	Attitudes Toward Lesbians and Gay Men	119	0.68
Inbar, Pizarro & Bloom (2012)	Induction	Feces Odor	Implicit Associations Test (Gay-Straight)	91	0.88
		Disgust Scale–Revised	Feeling Thermometer (Gay men)	61	0.23
Inbar et al. (2009)	Sensitivity	Disgust Scale–Revised	Implicit Associations Test (Gay-Straight)		0.16
		– Core	Political Issues (Gay marriage)	82	0.52
Kam and Estes (2016)	Sensitivity	Disgust Scale–Revised	Support for Public Policy (Gay marriage)	1309	0.63
Lai, Haidt, and Nosek (2014)	Sensitivity	Disgust Scale–Revised	Attitudes Toward Gay Men – Short	3030	0.82
		Disgust Scale–Revised	Implicit Associations Test (Gay-Straight)		0.24
Olatunji (2008)	Sensitivity	Disgust Scale–Revised	Index of Attitudes toward Homosexuals	100	0.72
Smith (2012) ^{b c}	Sensitivity	Three Domain Disgust Scale – Core – Moral – Sexual	Attitudes toward Gay Men	91	0.38 0.41 0.45
		Direct Disgust toward Gay Men – Core	Attitudes toward Gay Men		0.28 1.74 1.67

(Continued)



Table 4. (Continued).

Study	Type	Disgust Measure (and/or) Disgust Induction ^a	Outcome Measure	N	d
Tapis et al. (2007)	Induced Sensitivity	– Moral – Sexual Video Clips Disgust Sensitivity Scale (Sex subscale only)	Implicit Associations Test (Gay-Straight) Attitudes toward Gay Men	81	0.40
Terrizzi, Shook, and Ventis (2010) – Study 1	Sensitivity	Disgust Sensitivity Scale	Attitudes Toward Lesbians and Gay Men	146	0.80
Terrizzi et al. (2010) – Study 2	Induced	Disgust Sensitivity Scale Essay	Attitudes Toward Lesbians and Gay Men	102	0.18

a. Domains are included when they were reported by the included studies.

b. Unpublished dissertation.

c. Smith (2012) included five disparate measures of homonegativity. For the sake of space, the measure that focuses on gay men exclusively was included in the table.

heterogeneous (Higgins & Thompson, 2002), which then necessitates subgroup analyses (i.e., on the basis of specific grouping variables [e.g., type of sample], studies are partitioned into smaller clusters, and the homogeneity of each cluster is ascertained).

For purpose of gauging whether the effect sizes are heterogeneous (thereby necessitating subgroup analyses), Cochran's Q in conjunction with I^2 were used. Cochran's Q tests whether the effect sizes obtained "are more variable than [would be] expected by chance" (Goh, Hall, & Rosenthal, 2016, p. 544). If the Q statistic has a probability value $< .05$, then effect sizes may be regarded as heterogeneous. I^2 indicates the proportion of variance across studies that is a result of heterogeneity using a percentile value where $<30\%$ is low, $30\%–59\%$ is moderate, $60\%–89\%$ is substantial, and $90\%–100\%$ is complete heterogeneity (Higgin et al., 2003).

The Comprehensive Meta-Analysis (CMA) version 3.0 software program (Borenstein, Hedges, Higgins, & Rothstein, 2007–2014) was used to establish the $d_{average}$, the 95% confidence intervals (CI) for d and all heterogeneity statistics (Q and I^2). Finally, a random-effects model was used (see Borenstein, Hedges, Higgins, & Rothstein, 2010 for a brief discussion of the differences between fixed and random-effects models).

Results

The 14 studies produced 65 effect sizes; 58 pertaining to disgust sensitivity and six pertaining to disgust induction. The effect sizes for each study are presented in Table 4. Out of the 7,322 participants, approximately 3,765 were women and 2,178 were men.^{5,6} Undergraduate students constituted 1,739 of the total number of participants.

Disgust induction

The averaged d value for studies examining the relationship between induced disgust and homonegativity was 0.77 (moderate to large effect), 95% $CI = 0.10$ to 1.44. As Cochran's $Q(4) = 4.37$ did not exceed the χ^2 critical value of 9.49 ($p = .05$), the null assumption of homogeneity was retained. The I^2 value was 8.39%, suggesting that only a small amount of variance in the studies' effect sizes could be attributed to heterogeneity. The absence of heterogeneity, as tested by Cochran's Q and I^2 , indicates that potential moderating factors such as method of disgust induction or measure of homonegativity do not need to be identified (i.e., it is unlikely that effect sizes will differ appreciably across subsets of studies).

Disgust sensitivity

The averaged d value for studies investigating the relationship between disgust sensitivity and homonegativity was 0.64 (moderate effect), 95% $CI = 0.47$ to 0.82.

Again, Cochran's $Q(12) = 12.38$ did not exceed the χ^2 critical value of 21.06 ($p = .05$), suggesting that the null hypothesis of homogeneity should be retained. The I^2 value was 3.04%, which reveals that only a very small proportion of variance in the studies' effect sizes could be attributed to heterogeneity. Akin to the findings for disgust induction, Cochran's Q and I^2 suggest that it is unlikely effect sizes differ appreciably across subsets of studies grouped on the basis of potential moderating variables (e.g., measure of disgust sensitivity or measure of homonegativity).

Publication bias

Publication bias refers to the tendency for studies with positive findings to be published in comparison to negative or null findings. To determine whether publication bias inflated the effect sizes of the current meta-analysis, an Egger's test was conducted. Egger's test did not reach statistical significance: $b^\circ = 2.81$, $t(7) = 1.75$; $p = .10$. This suggests that publication bias did not influence the effect sizes observed. The Egger test is considered to be a robust indicator of publication bias (Borenstein, Hedges, Higgins, & Rothstein, 2009; Egger, Smith, Schneider, & Minder, 1997).

Discussion

The purpose of the current meta-analysis was to determine whether disgust, as an individual difference variable (i.e., disgust sensitivity) or induced state, is associated with homonegative attitudes toward gay men. A moderate to large effect size was obtained for studies that induced disgust in their participants, whereas a moderate effect size was noted for studies that measured disgust sensitivity. As the averaged effect sizes were found to be homogeneous, it was not necessary to identify potential moderating variables through subset analyses. Such homogeneity is particularly noteworthy when taking into consideration the disparate measures of homonegativity and disgust used by the studies analyzed. Thus, regardless of the measures of homonegativity or disgust employed, a positive association between disgust and negative attitudes toward gay men is apparent. It also should be noted that seven of the homonegativity measures used in this meta-analysis considered lesbian women in addition to gay men. Herek (1998, 2000) has demonstrated that heterosexual individuals hold markedly less positive attitudes toward gay men in comparison to lesbian women. Therefore, the observed effect sizes may be conservative estimates of the "true" relationship between disgust and homonegativity, in cases where gay men are unambiguously the attitudinal targets.

Several limitations warrant discussion. First, the number of studies included in the meta-analysis was relatively small. As the d values were averaged, an outlier d (high or low) may skew the overall effect observed.

To illustrate: Cunningham, Forestell, and Dickter (2013) had three d values exceeding 2.00. When these values were removed, the resultant d for disgust induction was a modest 0.44. As research on disgust and homonegativity accumulates, further meta-analytic reviews will be needed to gauge whether the effect sizes reported herein are replicable. Furthermore, the random-effects model accounts for the lower number of studies because the weights will be determined by the individual study variance and standard error (Valentine, Pigott, & Rothstein, 2010).

A second limitation concerns the use of Q and I^2 statistics to determine homogeneity. Studies have shown that these indices may have low power to assess heterogeneity when the number of studies included is small (Higgins et al., 2003). Unfortunately, no alternative measures of heterogeneity for meta-analyses containing a small number of studies have been universally adopted (Higgins et al., 2003).

The third, and final, limitation is that the researchers did not code the included studies based on quality. If the methodological rigor for a majority of the studies is low then, despite the large effect sizes that were reported, the “actual” association between disgust and homonegativity remains unclear. It should be noted, however, that coding for quality in a meta-analysis is considered somewhat controversial because it is argued to be a subjective process (Stroup et al., 2000).

Recommendations

Nine of the studies included in this meta-analysis neglected to use disgust subscales that measure specific domains and, instead, opted for total disgust scores. Further, there was a noticeable reliance on the Disgust Scale–Revised (DS-R). Problematically, the DS-R (Haidt et al., 1994; modified by Olatunji et al., 2007) focuses solely on pathogen-related avoidance, thereby occluding the possible role that sexual and moral disgust play in homonegativity. The second most commonly used scale, the Disgust Sensitivity Scale (DSS; Haidt et al., 1994), similarly measures only core and animal-reminder disgust and, thus, has a pathogen focus. The Three Domain Disgust Scale (TDDS; Tybur et al., 2009), which takes pathogen, sexual and moral disgust into consideration, has been offered as an alternative; however, it remains under-used. Lastly, the Intergroup Disgust Scale (ITG-DS; Hodson et al., 2013) has been developed to measure interpersonal disgust, which is theorized to be a factor contributing to homonegativity toward gay men. But, again, this scale has yet to be used extensively.

The studies included in this meta-analysis employed numerous measures of homonegativity (15 separate measures were used). Examining the content of these instruments reveals that, in many cases, gay men in combination with lesbian women served as evaluative targets. However, from the vantage

of disgust research, the merging of the two groups in the item content of measures may be problematic—for example, Inbar et al. (2012) found that disgust induction affected attitudes toward gay men but not lesbian women. In a recent psychometric assessment of composite indices of homonegativity (i.e., those that assess multiple sexual minority targets within the same item/scale), Morrison, Bishop, and Morrison (*in press*) also cautioned against their use.

Future directions

The current meta-analysis reveals that disgust is associated with negative attitudes toward gay men. While a number of possible explanations for this association were elucidated, the question remains: Why do heterosexuals who experience or are sensitive to disgust evidence greater prejudice toward gay men but not lesbian women or other minoritized social groups? What is it about gay men—as a social category—that links them to the affective state of disgust? Relatedly, although disgust can be evoked using disparate methods, is there a specific type of disgust induction that is most salient vis-à-vis homonegative attitudes toward gay men? Morrison, Kiss, et al. (*in press*) noted:

Gay men may be regarded as disgusting because anal intercourse is widely (mis) perceived as a common practice among members of this social category. This behaviour, especially when engaged in receptively, constitutes a nexus of taboos: violation of hegemonic standards of masculinity; a disconcerting proximity to faeces and attendant concerns about germs/disease; and, given its non-procreative and “base” nature, the capacity to erode the distinction between humans and animals and, hence, undermine our faith in speciesism (pp. 18).

Whether one or more of these perceived taboos contributes to the disgust/homonegativity association awaits further inquiry.

In this meta-analysis, we also reviewed studies suggesting that the induction of disgust increases homonegativity toward gay men. Thus, at present, it is unclear if gay men trigger disgust or if they are unintentional targets of prejudice when individuals occupy (or are prone to occupy) a disgusted state. We believe that gay men are capable of eliciting disgust perhaps due to the nexus of taboos articulated earlier. However, it also seems reasonable to assert that individuals, when in a disgusted state, view gay men as a potential source of their disgust and punish them accordingly.

Another topic worthy of scrutiny concerns disgust and gay men's attitudes about their own sexual practices (in particular, the act of receptive anal intercourse) and, more globally, themselves. Internalized homonegativity describes negative attitudes and behaviors that gay individuals adopt because of prolonged exposure to a homonegative or antigay environment (Mayfield, 2001; Meyer, 1995). If disgust contributes to homonegative

attitudes, it raises the question: Can gay men experience internalized disgust? And, if so, what are the correlates of being disgusted by one's sexual identity? There may be value in examining this relationship using gay men as participants.

Conclusion

The current meta-analysis provides additional empirical evidence that disgust, in its induced states, amplifies homonegativity toward gay men. However, we strongly advise that researchers aim to understand the complicated nature of the emotion of disgust and its domains rather than settling for the most commonly used measures of disgust, which tend to have a pathogen focus. Additionally, studies that endeavor to measure attitudes toward gay men should select scales that specifically target gay men rather than ambiguous referents such as homosexuals or "gays." Homonegativity remains a topical issue for sexual minority persons. By enhancing our understanding of the precise role disgust and its domains play vis-à-vis homonegativity, we may move closer to developing interventions for attitudinal change.

Notes

1. While AI is a stigmatized sexual practice, particularly when engaged in by gay men, it appears to be a fairly commonplace behavior among heterosexual men and women (e.g., Leichter, Chandra, Liddon, Fenton, & Aral, 2007; Owen et al., 2015). Morrison, Kiss, Bishop, and Morrison (in press) suggested that one of the reasons why anal intercourse is considered taboo when practiced by gay men is that the act of being penetrated violates hegemonic standards of masculinity.
2. To minimize overlap between the current meta-analysis and the one conducted by Landy and Goodwin (2015), we did not include studies assessing moral judgments of gay men. Moral judgments relate to individuals' cognitive appraisals of others' behaviors (e.g., swearing, cheating on an exam). The severity of these judgments may differ according to the specific social group enacting them. However, these moral judgments target enacted behaviors rather than overall attitudes toward the group.
3. Herek (2000) provided evidence that the term *homosexual* is generally used to label gay men rather than lesbian women. Thus although the referent point is somewhat ambiguous, we opted to include studies that employed scales measuring endorsement of the broad concept of "homosexuality."
4. All the studies used in our meta-analysis consisted of heterosexual participants.
5. Gender effects were not analyzed because only two studies provided mean difference tests (t and F), correlation coefficients (r), and/or regression coefficients (β) separately for men and women.
6. Kam and Estes (2016) and Avilla (Study 5; 2011) did not report the proportion of participants by gender. This combined omission resulted in 1,379 participants being unaccounted for in the gender analysis.

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