

Gender Atypicality and Anxiety Response to Social Interaction Stress in Homosexual and
Heterosexual Men

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(in press, *Archives of Sexual Behavior*)

ABSTRACT

Gender non-conforming behavior and a homosexual sexual orientation have both been linked to higher levels of anxiety. This study examined the independent and interactive effects of gender atypicality and sexual orientation on levels of state anxiety immediately following a stressful social interaction task among a sample of homosexual and heterosexual Israeli men (n = 36). Gender atypicality was measured via both self-report and observer ratings. State anxiety was measured via both self-report immediately subsequent to the stressful social interaction task and pre- to post task changes in salivary cortisol. Results showed that self-reported gender atypicality and heterosexual sexual orientation predicted higher levels of self-reported social interaction anxiety, but not changes in cortisol. There were no sexual orientation by gender behavior interactions and there were no significant effects for observer rated gender atypicality. These findings suggest that gender atypicality, not homosexuality, place individuals at risk for increased anxiety.

KEYWORDS: gender behavior; homosexual; anxiety; gay.

INTRODUCTION

Homosexual men appear to be more prone to experience anxiety during social interactions than heterosexual men. Indeed, a number of population based studies have shown elevated lifetime rates of anxiety disorders among homosexual men (Cochran & Mays, 2009; Gilman et al., 2001; King et al., 2008; Sandfort, De Graaf, Bijl, & Shnabel, 2001), with 12 month prevalence rates for social anxiety ranging from 7.3%-8.8%, as opposed to 3.0%-6.3% for heterosexual males (Gilman et al., 2001; Sandfort et al., 2001). Results from a study comparing lesbian, gay, and bisexual (LGB) youth recruited from LGB afterschool programs to a comparison group of heterosexual youth showed that LGB youth experienced higher rates of social interaction anxiety (e.g., "I find myself worrying that I won't know what to say in social situations," "I am nervous mixing with people I don't know very well") than their heterosexual counterparts (Safren & Pantalone, 2006). Extending this line of work, Pachankis and Goldfried (2006) found that in a sample of 87 homosexual and 87 heterosexual male undergraduate college students, homosexual students reported higher levels of social interaction anxiety, as well as a greater fear of negative evaluation.

The association between homosexuality and anxiety is most commonly explained by minority stress theory. This theory (Meyer, 1995, 2003, 2013) suggests that gay-related discrimination, rejection, and victimization, occurring in the past or present, can lead to internalized homonegativity, expectations of future gay-related discrimination, rejection and victimization, as well as efforts to conceal one's same-sex orientation, all of which, in turn, can lead to elevated levels of anxiety (Hatzenbuehler, 2009; Hatzenbuehler, McLaughlin, Keyes, & Hasin, 2010; Pachankis, Goldfried, & Ramrattan, 2008). There is some empirical support for the link between minority stress and anxiety. For example, in one study of over 2,500 sexual minority adults, homosexual men who had experienced a hate crime over the past 5 years reported higher levels of anxiety than homosexual men who had experienced

either no crime at all or only crimes not related to their sexual orientation (Herek, Gillis, & Kogan, 1999). A subsequent, large scale nationally representative study found that homosexual men and lesbians experienced higher rates of lifetime and daily discrimination than did their heterosexual peers, and that such discrimination was associated with greater psychological distress (Mays & Cochran, 2001).

Moreover, data from a number of recent studies provide preliminary support for some of the proposed causal pathways linking sexual orientation discrimination and anxiety. For example, in a study of almost 500 lesbians and gay men, participants' negative feelings about their own sexual orientation, and concerns about being rejected or discriminated against in the future due to their sexual orientation, partly mediated the link between past discrimination and current psychological symptoms of depression and anxiety (Feinstein, Goldfried, & Davilla, 2012). In another study of 136 gay male young adults, participants' daily sexual orientation covering (i.e., downplaying the visibility or relevance of one's sexual orientation) mediated the relationship between public self-consciousness and daily anxiety (Pachankis & Bernstein, 2012). Together, these findings suggest that, as a group, homosexual men may be more prone to suffer from anxiety in the context of social interactions due to, at least in part, concerns about being rejected or evaluated negatively based on their sexual orientation.

Some have suggested that what places homosexuals at risk is less their sexual orientation per se and, more, their gender non-conforming behavior (Rieger & Savin-Williams, 2012; Roberts, Rosario, Slopen, Calzo, & Austin, 2013). Research has shown that homosexual men are more likely to exhibit atypical gender behaviors such as dressing, speaking or walking in an effeminate manner (Lippa, 2000, 2005, 2008; Rieger, Linsenmeier, Gygax, & Bailey, 2008). Such atypical gender behaviors increase the likelihood that an individual is identified as gay and therefore targeted for victimization (Skidmore, Linsenmeier, & Bailey, 2006). Indeed, findings from a large scale study of Latino gay and

bisexual men showed that those who described themselves as more effeminate were more likely to have been physically and sexually abused, with the link between gender atypicality and mental distress, including reports of anxiety, being mediated by homophobic experiences (Sandfort, Melendez & Diaz, 2007). In another study of same-sex oriented adults, self-reported (but not observer-rated) level of gender non-conformity was associated with higher levels of trait anxiety among gay males, but not lesbians (Skidmore et al., 2006). Moreover, because gender atypical behavior may be a liability in certain contexts, gender non-conforming gay men may exert effort to cover or diminish their gender nonconforming behavior (Pachankis & Goldfried, 2006). This may be particularly true in new and potentially threatening interpersonal social situations (Sylva, Rieger, Linsenmeier, & Bailey, 2010). Such efforts (e.g., hypervigilance, self-monitoring, deception), however, have been shown to deplete cognitive control, negatively impact upon mood (Critcher & Ferguson, 2013; Pachankis, 2007) and may, ironically, increase intrusive reminders of threat (Wegner, 1992, 1994) and, as a result, levels of anxiety.

Interestingly, gender non-conforming behavior appears to confer risk for anxiety independent of sexual orientation. Indeed, gender atypicality has been linked to higher rates of anxiety, not only among homosexual men but also among heterosexual men. In one study utilizing an ethnically diverse U.S. convenience sample, Lippa (2008) found that self-reports of gender nonconformity and anxiety were correlated among both homosexual and heterosexual men, with no significant between-sexual orientations differences. In another study using a large longitudinal cohort of U.S. youth, a high level of gender nonconformity was associated with increased risk for a lifetime diagnosis of probable PTSD, even after controlling for sexual orientation. It is also worth noting that, in this sample, the majority (in absolute terms) of individuals reporting the highest level of childhood gender nonconformity identified as heterosexual (Roberts, Rosario, Corliss, Koenen, & Austin, 2012).

The link between gender atypicality and anxiety among heterosexual males may be the result of a number of factors. One possibility is that nonconforming gender behaving males may be assumed to be homosexual and, therefore, be at greater risk of being victimized, even if they are not gay. Another possibility is that gender conforming men target effeminate behavior in other males, independent of sexual orientation. Sociologists and gender researchers have suggested that typical male behaviors, including aggressiveness, serve to distinguish masculinity from femininity and facilitate men's social dominance of women (Connell & Messerschmidt, 2005; Poteat & Anderson, 2012). They argue that gender is inherently relational and that masculinity is defined in contradistinction from femininity (Connell & Messerschmidt, 2005). In that context, anti-feminine sentiments, and acts of aggression toward effeminately behaving men, can be understood as men's attempt to disavow their femininity and prove their masculinity, thereby maintaining their privileged gender status (Vandello & Bosson, 2013; Vandello, Bosson, Cohen, Burnaford, & Weaver, 2008). A third possibility, in light of the apparent genetic contribution to variations in both gender atypical behavior (Alanko et al., 2010; Knafo, Iervolino, & Plomin, 2005) and social anxiety (Hettema, Neale, & Kendler, 2001), is that there is a genetic link between gender behavior and anxiety (Rieger & Savin-Williams, 2012). These three explanations are not mutually exclusive and may interact with one another. What is clear is that, regardless of sexual orientation, gender atypical individuals are more likely to experience rejection, stigmatization, and victimization, beginning from early childhood (Corliss, Cochran, & Mays, 2002; Fagot, 1977; Horn, 2007; Smith & Leaper, 2006; Toomey, McGuire, & Russell, 2012; Zucker, Wilson-Smith, Kurita, & Stern, 1995).

The fact that both sexual orientation and gender atypical behavior have been linked to higher levels of anxiety, and the fact that sexual orientation and gender behavior are correlated, raises questions about whether gender atypical behavior completely or partly

explains the association between sexual orientation and anxiety. In an effort to answer that question, this study was designed to examine the independent and interactive effects of sexual orientation and gender atypical behavior on individuals' level of anxiety. In one previous study of Finnish adults, both sexual orientation and self-recalled gender atypical behavior before the age of the 12 were found to independently contribute to participants' self-reported current levels of anxiety and depressive symptoms (Alanko et al., 2009).

This study extends previous research in a number of important ways. First, we employed an experimental rather than correlational design. More specifically, this study examined participants' levels of state anxiety aroused in the context of a standardized, stressful, evaluative social interaction event, the Trier Social Stress Test (TSST; Kirschbaum, Pirke, & Hellhammer, 1993), rather than examining trait anxiety or average level of anxiety symptoms over the past week or month. The TSST is one of the most frequently used protocols to induce mild psychosocial stress in laboratory settings. Over the past 20 years, the TSST has been used in hundreds of studies worldwide (Dickerson & Kemeny, 2004; Kudielka, Hellhammer, & Kirschbaum, 2007; von Dawans, Kirschbaum, & Heinrichs, 2011).

Second, this study utilized both self-report and observer-rated measures to assess gender atypical behavior. Most previous research examining the link between gender behavior and psychological distress has relied on participant self-report only, which may be subject, to some degree, to reporter bias.

Third, we employed both self-report and objective physiological measures (i.e., cortisol levels) to quantify stress. A large body of work has established that the hypothalamic-pituitary-adrenal (HPA) axis, a central regulatory and control system that connects the central nervous system with the endocrine system, is modified by exposure to psychosocial stress (Chrousos, 2009; Kudielka et al., 2007), and that the secretion of glucocorticoids, such as cortisol, is a biomarker of such stress (Hellhammer, Wust, &

Kudielka, 2009; Juster, Smith, Ouellette, Sindi, & Lupien, 2013). Prior research has documented increases in salivary cortisol levels in many stress-provoking situations, from political voting (Waismel-Manor, Ifergane, & Cohen, 2011) to anticipating academic examinations (Martinek, Oberascher-Holzinger, Weishuhn, Klimesch, & Kerschbaum, 2003). Salivary cortisol levels have been used as a measure of stress in the context of the TSST for over a decade (Kudielka et al., 2007). Social interactions which expose one's self-identity to possible or actual negative evaluations by others tend to elicit large cortisol responses (Dickerson & Kemeny, 2004).

Finally, this study was conducted on Israelis. The great majority of previous research on sexual orientation, gender typicality, and social interaction stress has been conducted on U.S. samples. Cultural factors, however, may influence the link between these variables. Despite progressive non-discriminatory laws regarding sexual orientation, gender identity, and expression (Shilo & Savaya, 2012), and despite high levels of acceptance in certain urban centers, Israeli public opinion regarding the acceptance of homosexuality is still divided (Pew Research Center, 2013). There is evidence of high levels of verbal victimization experienced by LGBT youth in Israeli schools (Pizmony-Levy, Kama, Shilo, & Lavee, 2008) and high levels of sexual orientation based victimization experienced by LGB soldiers in the Israeli Defense Force (Shilo, Pizmony-Levy, Kama, Lavee, & Pinhassi, 2006). In light of the fact that army service is compulsory, and in light of the emphasis the army places on typical masculine ideals such as aggression, risk taking, and heterosexuality, Israeli men may face greater pressure to "defeminize" and conceal their homosexual orientation, at least during their years of service (Kaplan & Ben-Ari, 2000)

We hypothesized that both sexual orientation and gender atypicality would independently predict level of anxiety measured immediately after participating in the stressful social interaction task. Also, because homosexual individuals who also evidence

gender atypical behavior may be at greater risk for past victimization, internalized homophobia, and fear of future rejection due to their gender atypicality, we hypothesized that there would be an additive interaction between gender atypicality and sexual orientation, such that gender atypical homosexuals would experience the highest levels of anxiety.

METHOD

Participants

The sample consisted of a group 36 Israeli men, 18 who self-identified as homosexual and 18 who self-identified as heterosexual. Participants were recruited via advertisements inviting people to participate in a study on "gender and sexuality." Advertisements were placed in and around the university, at the local branch of the national LGBT association, and on social media sites. Those interested in participating were asked to first complete a demographic form requesting information about their age, contact information, and sexual orientation. Regarding sexual orientation, potential participants were asked to describe their sexual orientation as "heterosexual," "homosexual," "bisexual," or "other," with the opportunity to describe what they meant by "other." Eighteen individuals described themselves as homosexual, one as queer, and one as "fluid." None defined themselves as bisexual. Since the overwhelming majority defined themselves as "homosexual," and in an effort to increase the internal validity of the study, we included only those 18 individuals who self-identified as homosexual. In addition, for comparison purposes, we included the first 18 participants self-identifying as heterosexual. The mean age of participants in the homosexual group was 26.83 years ($SD = 3.63$) and in the heterosexual group was 24.72 years ($SD = 1.40$). All participants were either university graduates or current students.

Measures

The State Anxiety subscale of the State-Trait Anxiety Inventory (Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983) consists of 20 self-administered, pencil-and-paper

questions that "measure the intensity of feelings of anxiety at a particular moment in time" (Ramanaiah, Franzen, & Schill, 1983). Items were rated on a 4-point Likert scale, with higher scores reflecting greater anxiety. Scores of all items were summed to produce a general score ranging from 20 to 80. Items include: "I feel calm (reversed scored)" and "I feel anxious." The STAI has demonstrated good construct validity and high reliability (Spielberger et al., 1983), and is one of the most long-standing and commonly used measures of state anxiety (Balsamo et al., 2013). In this study, Cronbach's alpha for the State Anxiety subscale was .93.

The Liebowitz Social Anxiety Scale (LSAS; Liebowitz, 1987) consists of 24 items which measure fear and avoidance in a variety of social situations as experienced over the course of the previous week. The LSAS differs from most social anxiety measures in that it assesses fear and avoidance across specific situations (Beard et al., 2011), such as "writing while being observed" and "giving a prepared oral talk to a group." Each item was rated for both avoidance and fear on a 4-point Likert scale, ranging from 0 (*none or never*) to 3 (*severe or usually correct*). Scores were summed to produce two factor scores: one for avoidance and one for anxiety. In addition, a general score (i.e., sum of all items) was calculated. The LSAS displays good internal consistency ($\alpha = .96$) and correlates significantly with other measures of social anxiety (Heimberg et al., 1999). It has been found to be a reliable aid in the screening of social anxiety disorder (Rytwinski et al., 2009). The self-report version used in this study has also shown adequate reliability and validity (Baker, Heinrichs, Kim, & Hofman, 2002; Fresco et al., 2001). In this study, the LSAS produced a Cronbach's alpha of .90.

Observer-rated gender typicality was rated using a procedure similar to that employed by Skidmore et al. (2006). Two raters observed each participant's videotaped 5 minute self-description and assigned a score from 1 (*masculine*) to 4 (*feminine*). Raters were asked to base their ratings on whether the participant gestured, looked, or spoke in a more masculine

or feminine manner, as well as on their overall impression of that participant's masculinity-femininity. Observer-rated gender scores were calculated by averaging the scores of the two raters.

Prior to rating tapes, coders were trained for a period of 3 weeks. Training consisted of weekly meetings of 2.5 hours duration. During the course of the training, each rater independently coded 30 video segments drawn from the popular media. Their ratings were discussed during the weekly meetings in order to clarify discrepancies and reach consensus with the primary investigator (first author). Once raters obtained sufficient interrater reliability among themselves and with the primary investigator ($ICC_{[2,2]} > 0.70$), they began coding actual study tapes. In previous research utilizing a similar procedure, investigators reported a coefficient alpha of .84 for overall gender typicality ratings (Skidmore et al., 2006). Raters were naïve to the purpose and hypotheses of the study.

Self-reported gender typicality was measured by asking participants, "To what degree do you believe that others perceive you to be masculine?" Participants were asked to respond using a 7-point Likert scale, with a score of 1 representing least masculine and a score of 7 representing most masculine.

Salivary cortisol was assayed by EIA (Diagnostic System Laboratories, Inc., Webster, TX, USA), using a competitive enzyme-linked immunosorbent assay method in accordance with the manufacturer's instructions. The intra- and inter-assay coefficients of variation (CVs) were 3.5% and of 5.1%, respectively (Salimetrics, State College, PA). Expected daytime cortisol levels for men between the ages 21-30 have been reported to range between 0.112-0.743 $\mu\text{g/dL}$ (Aardal & Holm, 1995). Rises in cortisol were calculated by subtracting pre-TSST cortisol levels from post-TSST cortisol measures.

Procedure

Upon arriving at the lab, each participant was greeted by a research assistant whose job it was to make the individual feel comfortable. After resting comfortably for 10 minutes, participants were asked to provide a saliva swab to measure cortisol levels. Immediately thereafter, research assistants administered a modified version of the Trier Social Stress Test (TSST; Kirschbaum et al., 1993).

Research assistants included six undergraduate students recruited and trained to conduct the Trier Social Stress Test (TSST; see description below). Three of these assistants were male and three were female. All self-identified as heterosexual. They ranged in age from 24-29 years ($M = 25.60$, $SD = 1.75$). A separate, independent pair of undergraduate students, both male, were recruited and trained to observationally rate participants' gender behavior. Both raters were 26 years old and both self-identified as heterosexual.

In this variation of the TSST, participants were taken by the research assistant into a room where two people (a man and a woman) were already seated behind a desk with a video camera placed behind them, facing the subject. The participant was asked to face the interviewers and then told that, after 10 minutes of preparation, he would be given 5 minutes to introduce and describe himself to the interviewers. He was also told that the interviewers would evaluate the quality of his presentation and that the videotape of the interview would be sent to a lab for voice analysis. Following these instructions, the research assistant escorted the participant into a different room where pencils and paper were already placed. The participant was told that he should write a draft of what he would like to say, but that he would not be allowed to use his written draft during his speech. After 10 minutes, the participant was taken back to the room where the interviewers were seated and was asked, by the interviewers, to commence his speech. If he finished his speech before the 5 minutes were over, the interviewers responded in a standardized way: "You still have some time left. Please

continue." If the participant once again finished before the 5 minutes were over, the interviewers were quiet for 20 seconds and then asked prepared questions. Five minutes after the participant began his speech, the task was stopped and the participant was escorted by the research assistant to a separate room where he provided a second saliva sample exactly 20 minutes after the moment the TSST had begun. Saliva samples were initially placed in a regular freezer with a temperature of approximately -18°C and, at the end of the day, stored in freezers in the lab at -80°C until being thawed, centrifuged (15 min, 3000 g, and 4°C), and the supernatants used for assay. After providing their second saliva sample, participants were asked to complete all of the self-report measures (i.e., LSAS, STAXI, SRGT). After the entire procedure was completed, participants were debriefed regarding the purpose of the study. The study was approved by the university's ethics committee for research on human subjects.

RESULTS

Preliminary analyses

Reliability.

In order to estimate the interrater reliability of the two raters coding gender typicality, we calculated an intraclass correlation coefficient (Shrout & Fleiss, 1979). The result was an average $\text{ICC}_{(2,2)} = .75$, suggesting good interrater reliability.

Between-group equivalence.

In order to examine whether the two groups were equivalent in regards to age, past social anxiety symptoms, degree to which they believed others perceived them as being masculine, observer-rated gender typicality, and baseline cortisol levels, we conducted a series of independent *t*-tests. Results indicated that there were no significant between-group differences on any variables except for age (means, SD, and results of all *t*-tests appear in Table 1). Consequently, age was included as a covariate in subsequent analyses. Zero-order correlations between all study measures are shown in Table 2.

Manipulation check.

In order to examine whether the TSST effectively created stress among participants, we compared average pre-TSST cortisol levels to average post-TSST cortisol levels, across groups. As expected, the average post-TSST cortisol level, $M = 1618.07$ ($SD = 804.77$), was greater than the average pre-TSST cortisol level, $M = 1334.29$ ($SD = 753.69$), $t(35) = 3.11$, $p = .004$.

Primary analyses

In order to examine the impact of gender typicality, sexual orientation, and their interaction on participants' level of anxiety immediately after undergoing the TSST, we conducted a series of hierarchical regression analyses. In the first model, age and history of social anxiety symptoms were entered in the first step, followed by sexual orientation and participants' belief about how masculine others perceived them to be in the second step. Finally, in the third step, we entered the interaction between sexual orientation and participants' belief about how masculine others perceived them to be. Self-reported state anxiety, measured immediately after the TSST, served as the dependent variable. The model as a whole was significant, $R = .68$, $R^2 = .46$, $F(5, 30) = 5.07$, $p < .005$. As can be seen in Table 3, the standardized coefficient weight for belief about how masculine others perceived one to be was significant and negative, indicating that the less masculine participants believed that others perceived them to be, the more anxious they reported feeling after the TSST, after controlling for the other variables in the model, including sexual orientation. The standardized coefficient weight for sexual orientation was also significant, indicating that homosexual participants experienced less anxiety measured immediately after the TSST than did heterosexual participants, after controlling for the other variables in the model, including gender atypicality. The interaction between sexual orientation and belief about how masculine others perceived one to be was not significant.

In the second model, age and history of social anxiety symptoms were entered in the first step, followed by sexual orientation and observer-rated gender typicality in the second step. Finally, in the third step, we entered the interaction between sexual orientation and observer-rated gender typicality. Self-reported state anxiety, measured immediately after the TSST, served as the dependent variable. While the model as a whole was significant, $R = .55$, $R^2 = .30$, $F(5, 30) = 2.56$, $p < .05$, the standardized coefficient weights associated with the hypothesized predictor variables were not significant (see Table 4).

In the third model, age and history of social anxiety symptoms were entered in the first step, followed by sexual orientation and participants' belief about how masculine others perceived them to be in the second step. Finally, in the third step, we entered the interaction between sexual orientation and participants' belief about how masculine others perceived them to be. Change in cortisol from pre-TSST to post-TSST served as the dependent variable. The model as a whole was not significant (see Table 5).

In the fourth model, age and history of social anxiety symptoms were entered in the first step, followed by sexual orientation and observer-rated gender typicality in the second step. Finally, in the third step, we entered the interaction between sexual orientation and observer-rated gender typicality. Change in cortisol from pre-TSST to post-TSST served as the dependent variable. The model as a whole was not significant (see Table 6).

Finally, we conducted two independent *t*-tests to examine whether the homosexual and heterosexual groups differed on observer-rated gender typicality measured during the TSST, and/or on levels of self-reported state anxiety immediately after the TSST. Results showed that while there was no significance difference on observer-rated gender typicality, the two groups did differ on post-TSST levels of state anxiety, with homosexuals reporting less anxiety than heterosexuals immediately after the TSST (see Table 1).

DISCUSSION

This study examined the independent and interactive effects of gender atypicality and sexual orientation on young men's level of anxiety experienced during a stress inducing social interaction with strangers. Findings from our sample suggest that gender atypicality, but not homosexual orientation, predicted higher self-reported anxiety immediately after the interaction. More specifically, the less masculine men reported believing that others perceived them to be, the more anxious they were. Surprisingly, homosexuality predicted lower levels of state anxiety, and the homosexual participants in our sample were less anxious after the stressful social interaction than were the heterosexual participants.

The finding regarding gender atypicality was consistent with previous research showing that higher levels of self-reported gender non-conformity are linked to higher levels of self-reported stress and anxiety among both homosexual and heterosexual males, above and beyond sexual orientation (Alanko et al., 2009, Lippa, 2008; Rieger & Savin-Williams, 2012; Roberts, et al., 2012, 2013). While this study did not examine mechanisms, one reasonable hypothesis is that gender-atypicality leads to higher lifetime rates of experiencing rejection and victimization. Indeed, research shows that gender non-conforming boys suffer more criticism, ridicule, and rejection by teachers, peers, and family, beginning as early as pre-school (Fagot, 1977; Landolt, Bartholomew, Saffrey, Oram, & Perlman, 2004; Roberts et al., 2013; Zucker et al., 1995) and continuing up through adolescence (Horn, 2007). Such experiences may negatively impact self-esteem (Smith & Leaper, 2006) and engender rejection sensitivity (Feinstein et al., 2012) which, in turn, may lead to heightened anxiety in social interactions, particularly those involving strangers and evaluation (Sylva et al., 2010). Findings like the ones from this study have led some researchers to suggest that the correlation between same-sex attraction and anxiety may be partly, if not fully, mediated by gender nonconformity, or more specifically, by negative environmental reactions to gender

nonconformity (Rieger & Savin-Williams, 2012). In that sense, minority stress may be more about one's gender behavior than one's sexual orientation per se, though completely disentangling these two constructs may prove challenging.

An interesting and unexpected finding was that homosexual sexual orientation actually predicted less of an increase in anxiety from pre- to post social interaction, and homosexual men, as a group, reported less anxiety at the end of the social interaction than did their heterosexual peers. These findings may reflect the resilience of the homosexual participants in our sample. By definition, all of our homosexual participants were "out of the closet" and felt comfortable enough to voluntarily participate in a study on gender and sexuality, and disclose their sexual orientation to researchers whom they did not know. This suggests a certain degree of self-acceptance that may serve a protective function in the context of potentially threatening, anxiety-producing contexts, leading them to experience less stress during evaluative social interactions. In other words, for at least some, the coming out process may have made them more resilient and less anxious. Some prior research based on self-report data suggests that there may be psychological benefits associated with disclosing one's same-sex orientation (Beals, Peplau, & Gable, 2009; Rosario, Schrimshaw, & Hunter, 2011), though other findings have been more equivocal (Kuyper & Fokkema, 2011). It may also be the case that more resilient and less anxious individuals are more likely to come out. In one recent study including biological markers, disclosed gay men evidenced fewer self-reported psychiatric symptoms and lower awakening cortisol levels than non-disclosed gay men (Juster et al., 2013), though findings from another study showed that gay men who were more out at work suffered greater levels of negative affect and higher levels of diurnal cortisol (Huebner & Davis, 2005).

In this study, changes in pre- to post-social stress levels of cortisol did not differ between homosexual and heterosexual men nor did they vary according to gender typicality.

There is no ready explanation for this null finding in relation to gender typicality, particularly since the correlation between increases in cortisol and self-reported state anxiety was strong, and self-reported state anxiety was correlated with self-reported gender atypicality. One possibility is that changes in saliva cortisol are a less reliable, valid or sensitive measure of anxiety than are self-report.

We also did not find a link between observer-ratings of gender atypicality, measured during the stressful social encounter, and participants' self-reported levels of anxiety, measured immediately after the procedure. This null finding was surprising since there was an association between participants' reports of how masculine they believed they were perceived to be in the eyes of others and their level of self-reported anxiety immediately after the social interaction, and since prior research has shown that raters are able to accurately identify gender atypicality based on even very brief segments of video (Rieger et al., 2008, 2010). Moreover, it is reasonable to predict that observer ratings of gender atypicality would be linked to anxiety since gender nonconforming individuals are often discriminated against, rejected, and victimized based on how they appear, regardless of their actual sexual orientation. One possible explanation for this null finding is that gender non-conforming males go through a process of "defeminization," whereby they are socialized over the course of their childhood and adolescence to curb feminine type behaviors in order to appear more masculine (Harry, 1982, 1983; Whitam, 1977). This may be particularly true in the hypermasculinized culture in much of Israel (Kaplan & Ben-Ari, 2000). Consequently, observations of current gender behavior do not necessarily reflect gender behavior during childhood, and individuals' current internalized self-concept, rejection sensitivity, and anxiety related to evaluative social interactions with strangers may be based more on childhood memories of parent and peer rejection and victimization. Second, given the threatening nature of the social interaction, participants may have made an effort (consciously or not) to conceal,

or at least temper, their feminine behavior during the encounter, despite being "out" (Ambady & Hallahan, 2002). Such efforts may have attenuated any association between observer ratings and anxiety.

A number of methodological strengths of this study are worth noting. First, we employed one of the most commonly used and standardized experimental procedures to generate social stress—the Trier Social Stress Test. Indeed, the fact that cortisol levels increased from pre- to post-TSST across the entire sample testifies to the effectiveness of the manipulation. Second, a multi-measure approach was employed. That is, stress was measured via both self-report and objective measures of cortisol. Gender atypicality was measured via both self-report and observer ratings by trained, independent raters.

With that said, this study had a number of limitations. First, our sample size of 36 was small, potentially leading to insufficient power to detect weaker effects, if present. Further research on larger samples would be optimal. Also, our sample was not representative. For example, the homosexuals who participated were, by definition, "out of the closet" and, therefore, likely to be less anxious about their sexual orientation or even less anxious in general. This may explain, in part, the counterintuitive finding that homosexual men reported less state anxiety after the stressful social interaction task. Future research examining the link between sexual orientation and anxiety in social interactions would do best to include gay men who were not yet out of the closet though, for obvious reasons, such individuals are hard to recruit. Along the same lines, our recruitment advertisements called for individuals willing to participate in a study on sexuality and gender. Men who were particularly conflicted and therefore anxious about their sexuality, including sexual orientation, were probably less likely to participate in such a study. Also, future research would do well to account for other minority statuses potentially impacting upon participants' level of anxiety, including race and ethnicity. Clearly, more research is required utilizing random, or at least more heterogeneous

samples. Yet another limitation was that participants' self-reported history of social anxiety symptoms was measured after the stressful social interaction task. The stress from the task may have influenced participants' retrospective recall. Finally, all of our research assistants self-defined as heterosexual. Future studies might want to include non-heterosexual research assistants in order to examine the effect of experimenters' sexual orientation.

Despite these limitations, these results present the first experimental data (that we know of) suggesting that self-reported gender atypicality, rather than homosexuality and perhaps more than how others actually perceive one's current gender behavior, places individuals at heightened risk for social interaction anxiety. More research is required to understand which processes (e.g., peer and parental rejection during childhood, etc.) explain the link between self-perceived gender atypicality and social interaction anxiety in order to develop targeted prevention and treatment services.

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Table 1. Means and Standard Deviations for all Study Measures

Group	Age	SRGT	LSAS	Cortisol	ORGT	STAI	Cortisol	Cortisol Rise
Homosexuals (N=18)	26.83 (3.63)	4.56 (.98)	26.72 (17.0)	1221.04 (734.83)	2.13 (0.82)	36.33 (8.78)	1539.97 (805.1)	318.92 (590.70)
Heterosexuals (N=18)	24.72 (1.40)	5.11 (1.13)	36.68 (19.0)	1447.52 (776.13)	1.80 (0.66)	44.28 (12.0)	1696.17 (819.90)	248.64 (515.30)
<i>t</i>	-2.30*	1.57, n.s.	1.65, n.s.	.90, n.s.	-1.34	2.26*		
<i>df</i>	34	34	34	34	34	34		
Cohen's <i>d</i>	.76	.52	.55	.30	.44	.75		

SRGT = Self Reported Gender Typicality; LSAS = Liebowitz Social Anxiety Scale; ORGT= Observer Rated Gender Typicality; STAI = State

Anxiety Inventory

* $p < .05$.

Table 2. Zero-Order Correlations between Study Measures.

	Age	SRGT	ORGT	STAI	CortRise	LSAS
Age	–					
SRGT	.06	–				
ORGT	-.26	-.50**	–			
STAI	-.24	-.38*	.06	–		
CortRise	-.22	-.24	.18	.49**	–	
LSAS	-.34*	-.19	.25	.48**	.09	–

SRGT=Self Reported Gender Typicality; LSAS = Liebowitz Social Anxiety Scale;
 ORGT= Observer Rated Gender Typicality; STAI = State Anxiety Inventory;
 CortRise = Rise in levels of cortisol.

** $p < .01$; * $p < .05$.

Table 3. Results from Hierarchical Regression Analysis Predicting Change in State-Anxiety Using a Self-Report Measure of Gender Typicality.

	ΔR^2	Model 1		Model 2		Model 3	
		β	<i>t</i>	β	<i>t</i>	β	<i>t</i>
Step 1	.24*						
Age		-.09	-.55	.03	.23	.01	.07
LSAS		.45	2.82*	.30	2.03	.29	1.93
Step 2	.21**						
SO				-.40	-2.61*	-.39	-2.51*
SRGT				-.43	-2.99*	-.42	-2.83*
Step 3	.01						
SO X SRGT						.09	.66

Note: LSAS = Liebowitz Social Anxiety Scale; SO = Sexual Orientation; SRGT = Self Reported Gender Typicality.

* $p < .05$; ** $p < .01$.

Table 4. Results from Hierarchical Regression Analysis Predicting Change in State-Anxiety Using an Observer-Rated Measure of Gender Typicality.

	ΔR^2	Model 1		Model 2		Model 3	
		β	t	β	t	β	t
Step 1	.24*						
Age		-.09	-.55	-.01	-.05	.02	.12
LSAS		.45	2.82*	.41	2.43*	.40	2.33*
Step 2	.05						
SO				-.25	-1.39	-.26	-1.43
ORGT				.01	.08	.01	.05
Step 3	.01						
SO X ORGT						.09	.55

Note: LSAS = Liebowitz Social Anxiety Scale; SO = Sexual Orientation; ORGT = Observer Rated Gender Typicality.

* $p < .05$; ** $p < .01$.

Table 5. Results from Hierarchical Regression Analysis Predicting Change in Cortisol Rise Using a Self-Report Measure of Gender Typicality.

	ΔR^2	Model 1		Model 2		Model 3	
		β	<i>t</i>	β	<i>t</i>	β	<i>t</i>
Step 1	.05						
Age		-.22	-1.20	-.25	-1.31	-.32	-.16
LSAS		.02	.09	-.01	-.04	-.04	-.20
Step 2	.06						
SO				.10	.51	.13	.66
SRGT				-.21	-1.12	-.16	-.90
Step 3	.06						
SO X SRGT						.26	1.54

Note: LSAS = Liebowitz Social Anxiety Scale; SO = Sexual Orientation; SRGT = Self Reported Gender Typicality.

* $p < .05$; ** $p < 0.01$.

Table 6. Results from Hierarchical Regression Analysis Predicting Change in Cortisol Rise Using an Observer-Rated Measure of Gender Typicality.

	ΔR^2	Model 1		Model 2		Model 3	
		β	<i>t</i>	β	<i>t</i>	β	<i>t</i>
Step 1	.05						
Age		-.22	-1.20	-.25	-1.22	-.27	-1.25
LSAS		.02	.09	.03	.13	.03	.17
Step 2	.03						
SO				.15	.71	.15	.74
ORGT				.07	.38	.08	.39
Step 3	.003						
SO X ORGT						-.06	-.33

Note: LSAS = Liebowitz Social Anxiety Scale; SO = Sexual Orientation; ORGT = Observer Rated Gender Typicality.

* $p < .05$; ** $p < .01$.