“I am totally fine with gay people. As long as they do not touch me”

A study about the social contagion of gay male sexual orientation

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Abstract

Cross-orientation interactions, in which a heterosexual person interacts with a gay person, can be experienced differently than 'regular' interactions between heterosexual peers. The present study examined if fear to be perceived as gay (misclassification concern) would lead heterosexual males to a state of threat in a cross-orientation interaction. It also researched if this would ultimately lead to different behavior. Next to the traditional psychological measurements, cardiovascular measurements and behavioral reactions were measured to test these hypotheses. From cardiovascular measures such as heart rate and blood pressure, threat was derived. Behavioral reactions were assessed by means of performance on a real-life task, for which participants had to engage in physical contact with another same-sex person. No support was found that fear of being perceived as gay in a cross-orientation interaction led to a threat response. However, a significant indication was found that the more participants were afraid to be perceived as gay, the worse they performed on the task when they had to interact with an individual that appeared to be gay. This means that cross-orientation interaction situations in combination with high misclassification concerns, do elicit different behavioral reactions from heterosexuals.

Introduction

Gay male sexual orientation

Although it is hard to determine how many people have a gay male sexual orientation worldwide (Bogaert, 2004), we know it is common practice. Same-gender sexual behavior amongst males is generally estimated to be around ten per cent, which in a more illustrative term means that one out of ten men is gay (Bagley & Tremblay, 1998). Some researchers state that the prevalence of gay male sexual orientation in modern Western countries is lower than this estimated number (Bogaert, 2004). However, when we look at the different definitions that are used for sexual orientation, these varying numbers are not surprising. Some studies define a male individual as 'gay' when he engages in same-sex behavior, whereas other studies apply this definition when a man is merely attracted to a person of the same gender. Most (modern) research on this topic shows a general tendency towards attraction in defining sexual orientation, instead of the actual behavior of having sex. According to Gijs, Gianotten, Vanwesenbeeck and Weijenborg (2009) the percentages for prevalence of same-sex sexual orientation amongst males in the Netherlands varies between 7.1 and 13.4 per cent, confirming earlier studies. All these findings indicate that the gay male population is quite large and that we should all know at least a few men that are gay.

Same-gender sexual orientation appears to be a controversial topic, demonstrated by the fact that calling someone 'homo' is generally meant as a term of abuse that most people will find offensive (Lehtonen, 2002). Even in primary school, children tend to know that heterosexuality is the norm. This 'heteronormativity' greatly influences one's identity and relationships. Moreover, kids sometimes have to deal with violating

pressures of compulsory heterosexuality (Renold, 2000). This line of (problems resulting from) heteronormativity can stretch further into adult life (Herek, 2009). In fact, among the elderly, openness of gay adults about their sexual orientation is associated with more victimization (D'Augelli & Grossman, 2001).

A relatively new trend, however, is the 'increased acceptance of homosexuality' (Andersen & Fetner, 2008), showing that with time, people can become more and more tolerant towards individuals who are attracted to people of the same sex. Despite this positive trend, people with this sexual orientation still suffer from antigay prejudice (Ambady, Hallahan & Conner, 1999) and discrimination (Herek, 2009; Van der Klein et al., 2009). Recent research by Herek (2009) has shown that one in five gay male, lesbian or bisexual individuals has suffered from a person- or property crime. Moreover, about fifty per cent had to endure verbal harassment, while ten per cent was discriminated on the job- or housing market. According to Herek, gay males frequently experience (the threat of) physical violence, as well as other forms of victimization. All of these woes seem to be mainly due to their 'different' sexual orientation. Obnoxious acts against people with a same-gender sexual orientation often sprout from sexual stigma. That is, the fact that any form of sexuality that is not heterosexual is negatively regarded and socially constructed as invalid relative to heterosexuality (Herek, 2008). Since one out of ten men has a same-gender sexual orientation, we face a vital issue. While a large part of our fellowmen happen to have a same-sex sexual orientation, apparently we do not – or our society does not – consider them as equals. For example, gay men are not allowed to openly serve in the U.S. military and legislations withhold people the right to be legally gay married in certain countries and states (Andersen & Fetner, 2008). In order to learn

more about this intriguing stigma problem and the varying attitudes towards gay men, the current research will examine the interaction process between heterosexual males and gay males and tries to identify the consequences of knowing about someone's same-sexual orientation on this interaction. We will apply a psychophysiological approach in cross-orientation (i.e. gay-straight) interactions in which antigay attitudes and misclassification concerns play a role.

Misclassification: social contagion concern

Earlier research has mainly focused on the features and prevalence of same-gender sexual orientation (Bagley & Tremblay, 1998; Bogaert, 2004). The current study, however, will focus on cross-orientation interaction; a gay male individual interacting with a heterosexual male individual. It will take into account the experience and perspective of the heterosexual person, instead of focusing on the experience or behavior of the gay person. The main focus of this study is on the reactions that heterosexual men display when performing a task with a gay male. We predict that in cross-orientation interaction, some heterosexual men with misclassification concerns will show a threat response. Generally, people aspire a positive self-perception, which is embedded in the groups that people are members of (Tajfel & Turner, 1979). Gay men are part of socially stigmatized and marginal groups (Ambady et al., 1999). For this reason, we predict that cross-orientation interaction exposes heterosexuals to social contagion concerns. Social contagion concern regards the fear that one may be incorrectly classified as belonging to a stigmatized group when interacting with a member of that group (Buck et al., 2013). In other words, being seen or interacting with an individual that has a same-gender sexual orientation, would entail the risk of being perceived as having this particular sexual

orientation yourself.

In some cases, it can be visibly perceived if a person belongs to a stigmatized group: you can see if a person is, for example, a woman, a black person, or obese. This does not hold for sexual orientation however, since it is a perceptually ambiguous social category: you cannot be sure if a man is gay just by his looks (Ambady et al., 1999). Moreover, there is a greater chance at misclassification when the criteria of stigma classification are hard to identify (Jones, 1984). If a heterosexual individual does not have the opportunity to verbally disclose his sexual preference, he thus has a realistic chance of being misclassified as gay. Provided that this person is in fact heterosexual, being misclassified by others as having a same-sex sexual orientation can form a serious threat to one's identity. Being perceived as gay could lead to experiencing stigma, discrimination and potential disadvantages to procreate with the opposite sex (Buck et al., 2013). Following this line of reasoning, people will try to avoid (interacting with) the gay person, because of the associated potential threat and might experience anxiety as a result. Specifically, when actual avoidance is not possible, we hypothesize that a heterosexual male with large misclassification (social contagion) concerns, will display a physiological threat response as a result. In the current study, a heterosexual male will have to perform a task with a gay male (confederate) in which the two men have to work together and coordinate their actions tangible in order to perform sufficiently on the task. We predict that the elicited threat response in the heterosexual male will decrease task performance. That is, a higher concern for misclassification is expected to lead to decreased cardiac efficiency, greater systemic vascular resistance (physiological state of

threat, see Blascovich & Tomaka, 1996), which is predicted to undermine task performance.

Physiological threat

The expected elicited physiological response discussed above is supposed to provide us information about cross-orientation interaction situations and misclassification concerns. In his seminal paper, Blascovich (2000) showed the existence of a direct relationship between covert physiological responses and the psychological constructs of threat and challenge. Thus, we can assume that psychological processes and physiological changes are linked (Seery, 2013). In the current research, we will focus on threat and the biopsychosocial model of challenge and threat (BPS-CT) in particular, as explained by Seery (2013). This model states that, in a motivated performance situation, challenge results from evaluating high resources and low demands, whereas threat results from evaluating low resources and high demands. Resources could be described as certain competencies or knowledge, while demands reflect, for example, the effort that is required for a certain task or the uncertainty this elicits. In addition, the BPS model pinpoints cardiovascular (CV) markers of challenge and threat.

According to the BPS, challenge as well as threat leads the heart to beat faster and harder than during rest. However, challenge results in dilation in arteries (TPR) and more blood pumped through the body (CO), whereas threat results in constriction and less blood pumped through the body (Seery, 2013). Consequently for cardiovascular responses, this holds that challenge will be displayed by low peripheral resistance (TPR), in combination with a high cardiac output (CO). This combination results in an effective mobilization and transportation of energy during motivated performances. The pattern for

cardiovascular responses for threat is reversed: high TPR and low CO. The latter combination results in less adequate mobilization and transportation of energy (Blascovich & Mendes, 2010). Our prediction states that a cross-orientation interaction cooperation task will elicit experiencing low personal resources for coping (e.g. discomfort, stress) and high situational demands (cooperation with a gay male individual through unwanted physical contact) due to misclassification concerns, hence resulting in a threat response. In the current study, we will measure the expected threat response on the basis of heart rate and blood pressure measurements and determine if an actual threat response takes place. We will also assess if this response is being accompanied by behavioral factors such as physical discomfort and a worse performance on the required task.

Behavioral reactions

We predict that the threat response caused by the social identity threat of misclassification influences multiple behavioral factors. People tend to display different behaviors when faced with either positive, or negative stimuli. In most cases, we approach pleasure and avoid pain (Higgins, 1997). More specifically in this context: people have a tendency to avoid stigmatized individuals (Goffman, 1963). Furthermore, people seem to show different nonverbal behaviors when interacting with a member of a stigmatized group (Word, Zanna & Cooper, 1974). Previous research has shown that people displayed less eye contact with a stigmatized person and in fact, more eye-blinking (Dovidio et al., 1997). In addition, frequency of self-touching (manipulation of any part of the body with one's hand or hands) increases when interaction with a member of a stigmatized group occurs (Olson & Fazlo, 2007). These findings are a strong

indication that cross-orientation interactions will also elicit discomfort behaviors such as eye-blinking and self-touching in this current study.

We also predict that task performance will be affected by this phenomenon. Inzlicht and Kang (2010) state that "performance is hurt by a broader category of events—it can occur whenever environmental cues hint that one's social identity makes one vulnerable to devaluation, when one feels like the victim of a social identity threat" (p. 467). Moreover, on tasks during which challenge or threat is assessed, threat is typically associated with lower performance (Chalabaev, 2009). This association is explained by the fact that experiencing threat elicits active coping responses that will cost the individual (mental) resources. This leads the individual to be less capable and less willing to perform tasks that demand conscious self-control and regulation (Inzlicht & Kang, 2010). The combined lower capability to perform and the lower motivation to actively do one's best, will inevitably lead to decreased performance on this task. We therefore predict that in the current study, cross-orientation interaction will elicit physiological threat, causing worse performance among participants. We will measure both the behavioral reactions as well as physiological responses of the participants.

Use of physiological measurements

Examining whether or not heterosexuals will show physiological (threat) responses in cross-orientation interactions is meaningful for a number of reasons. To our knowledge, the current study is the first in this domain that will not base its conclusions entirely on self-report questionnaires; in addition we will also measure physiological responses such as heart rate and blood pressure. A self-report questionnaire (although very useful to assess psychological experiences) is a tool limited in discovering physical

– and thus psychological – changes. Therefore, using physiological measurement eliminates other possible underlying influences, like answering questions on a self-report questionnaire in a socially desirable way. Indeed, people have a tendency to give 'politically correct' answers when filling out surveys on sensitive topics (Krumpal, 2011) such as same-gender orientation. Moreover, questionnaires try to capture the experience of the psyche, but in order to fill them out, a conscious mind and full attention are needed (Seery, 2013). This means that a person would have to shift his attention away from the original task, towards filling out the questions, with the unwanted effect of changing the experience of the task altogether. Using physiological measures avoids this problem; conscious attention of the participant is not needed to assess experience. Furthermore, physiological measurements will give insight into processes, factors and influences throughout the execution of a task instead of afterwards. Since previous research indicates that emotions fade over time (Walker, Skowronski & Thompson, 2000), these measurements will provide a more accurate 'snapshot' and valid estimations of people's feelings during the moment of interaction itself.

Furthermore, this provides insights about possible interventions in the same-gender sexual orientation domain. According to Riggs, Rosenthal and Smith-Bonahue (2011), interventions have been mainly focused on either a cognitive approach, an affective approach or a combination of these two approaches. The aim of these interventions was reducing the negative attitudes towards gay male, lesbian or bisexual persons or same-sex sexual orientation in general. However, it may be possible that these interventions do not work since they do not take the basic responses of the physiology into account. Even with positive cognitive attitudes towards same-gender sexual

orientation, it is possible that individuals may still display those primal prejudice behaviors towards gay individuals (Buck et al., 2013). A person who has 'nothing against gay people' might still fear misclassification, which in turn could affect his cardiovascular responses. In the sense that physiological responses have not yet been taken into consideration, such a new approach might be helpful for understanding the bodily processes associated with discrimination and avoidance of sexual minorities. It may be clear that this interrelation could contribute to developing future interventions in this field, as well as for other societal issues.

Method

Participants and design

A total of 56 heterosexual males participated in the current research. Participants were recruited through Leiden University Research Participation Study (SONA), or through advertisement posters that were hung in the faculty building. The males were rewarded with either two course credits, or €10,- for their participation. One participant completed the study, but was not included in the analyses due to technical issues which prevented us to save his data on the computer, leaving us with 55 participants (M_{age} = 23.64 years, range: 18-31 years). Besides this, due to signal loss and motion artifact, the blood pressure data for nine participants were missing or incomplete. Lastly, four participants were excluded from the analysis due to missing, incomplete or unscorable ICG and/or ECG data. A 2 (heterosexual vs. gay male confederate condition) x 2 (lower amounts of misclassification concern vs. higher amounts of misclassification concern) factorial design was used to test the hypotheses.

Cardiovascular Recording

During the entire experiment, participants' impedance-cardiographic (ICG), electrocardiographic (ECG) and blood pressure signals were measured. These measurements were identified with a Biopac MP150 system. The Biopac system and four spot electrodes were used to gather ICG measures. Two of these electrodes were placed on the participant's neck (one at the base, the second electrode about 5 centimeters above that). The two other spot electrodes were placed at the lower back (once more with 5 cm. distance in between). The two inner electrodes were placed at an approximate 30 cm. distance from each other. In the end, the Biopac produced output measures of baseline impedance (Z_0) and the rate of change in impedance (dZ/dt). These factors, along with ECG, were used to derive measures of Pre-Ejection Period (PEP) and CO (Sherwood et al., 1990).

For assessing ECG measurements, we used the Biopac and two electrodes. One electrode was placed at the upper side of the chest and the other one on the left side of the chest. This ECG data was further used to determine the heart rate of participants and PEP, in combination with the gathered ICG. We measured blood pressure using a blood pressure monitor (Vasotrac). This device was provided with a wrist sensor, and placed over the ring- or middle finger of the participant's right hand to measure pulse wave. The unit gave a measure of mean arterial pressure (MAP). MAP measurements together with CO measurements were used to calculate TPR. In this context, we applied the following formula: TPR = (MAP/CO) X 80. For storing and assessing all these physiological data, we used Acqknowledge and AMS-IMP software.

Procedure

Independent of and (at least) one week prior to our experiment, participants filled out a questionnaire that we sent them by e-mail. This questionnaire measured social contagion concerns (Buck et al., 2013) and attitudes towards gay males (Herek, 1994). Filler questions were also incorporated in the questionnaire so as to not arouse suspicion of the true aim of the research. Imbedded in the pre-study questionnaire were (a selection of) questions that measured attitudes towards Muslims (derived from the attitude towards gay males questionnaire; Herek, 1994), emotion regulation (Gross & John, 2003), disgust sensitivity (Haidt, McCauley & Rozin, 1994) and self-esteem (Franck, De Raedt, Barbez & Rosseel, 2008). We took into account the fact that people tend to remember the first and last items of presented information better (primacy and recency effect; Postman & Phillips, 1965) and made an effort to further disguise the true aim of the current research by deliberately putting the filler questions at the end and at the beginning of the questionnaire.

When participating in the actual experiment, participants were greeted by the female experimenter upon arrival in the lab and requested to provide informed consent. Participants were randomly assigned to either the experimental condition or the control condition. In the experimental condition, the heterosexual male participants interacted with a male confederate actor that appeared to be gay. By doing this, we created a cross-orientation interaction. In the control condition, the confederate appeared heterosexual, in which no cross-orientation (interaction) arose. The use of a heterosexual confederate control condition allowed us to check whether the confederate's gay male sexual orientation would indeed be associated with more discomfort behaviors and worse

performance of participants.

The participants were told that the other participant (i.e. the confederate actor) had already arrived and participants were invited to take a seat in a private cubicle with a computer. Next, the physiological sensors and blood pressure devide were attached. We then took a baseline measurement of heart rate and blood pressure, during which the participants rested quietly and watched a short, relaxing movie. The participants were told that the recording would take six minutes time, while in fact this lasted for five minutes, in order to prevent last-moment excitement in the cardiovascular measures (Seery, 2013). From this moment on, all further instructions were given on the computer screen. After the baseline measurement of participants' physiology, a baseline measurement of participants' emotions was assessed. Participants had to fill out a questionnaire about their expectations of the experiment and their interaction partner, as well as the extent to which they felt e.g. anxious or nervous (see the Appendix for a complete list of all the items that were assessed). Note that at the time of filling in that questionnaire, participants were not informed yet about the exact content of the upcoming experiment. It was explained that the purpose of the experiment was to study how people interact with new acquaintances and how people feel during these interactions. Participants were informed that they would interact with their partner (i.e., the confederate) throughout the rest of the study and that they would have to perform a task together.

After this, participants and their partner had five minutes time to get to know each other. This happened in a controlled manner, in which they both had to answer questions about themselves. These questions were provided by us and the confederate answered his

questions following a preconceived script (see the Appendix for an overview). Essential to our experiment is the verbal disclosure of the confederate's sexual orientation during this introduction. In the experimental condition, the confederate would reveal his gay male sexual orientation, whereas in the control condition he would disclose his heterosexual orientation. Following the script, he answered the question: "Who in your life makes you the most happy and why?" by telling the participant that his boyfriend (vs. girlfriend) is the person who makes him most happy. This made the nature of the cross-orientation interaction salient for the participants in the experimental condition. After the introductions, participants were informed about the exact content of the dyadic task and then it became salient that they would have to engage in physical contact with the (gay vs. heterosexual) confederate. Participants would at that point fill out another questionnaire about their expectations, including expectations regarding (cooperation with) their partner.

Then participants engaged in a five-minute dyadic task interaction by completing a structured game. They performed the Fast Friends task with the confederate (Aron et al., 1997; Page-Gould et al., 2008). This task consists of signing and guessing American Sign Language (ASL) words with an interaction partner. A supposedly random allocation decided who has to sign and who has to guess, in which the confederate always had to sign and the participant always had to guess. Participants could not see the confederate's hand while he signed, but had to touch the confederate's hand within an enclosed box in order to guess which letters were being signed. The box was positioned between the two cubicles in which the participants and confederate were placed. Participants were provided with an ASL alphabet to use as a guide during the task, in the form of a poster

taped to the cabinet in which the Biopac was placed. Previous research has found that the Fast Friends task can be highly anxiety provoking (Stern & West, 2014). In a cross-orientation interaction, this task would therefore induce anxiety given that the participant has not been able to explicitly disclose his own sexual orientation and is demanded to have physical contact with the (gay) confederate.

How the dyad performed on the task was measured through the amount of correctly guessed words during a time slot of five minutes. After performing the task, participants' evaluation of their partner was assessed, as well as the indication of how anxious and uncomfortable participants felt throughout the interaction. All these items were adapted from Buck et al. (2013) and Stern and West (2014). Lastly, participants provided some demographic information, their sexual orientation, political ideology and political preferences, religiosity and social economic status. Afterwards, the physiological sensors were removed and participants were thanked and debriefed about the aim of the experiment. Participants received either money (€10,-) or course credits (2) for their participation.

Measures

As mentioned earlier, we tried to capture participants' concerns about being misclassified as gay by measuring social contagion concerns beforehand (Buck et al., 2013). This questionnaire contains 10 items that are rated on a 7-point Likert scale (1 = strongly disagree; 4 = neutral; 7 = strongly agree). Participants were expected to answer to what extent they agreed with each item. Multiple misclassification items were assessed such as "I would worry that others would think I was homosexual if they knew I was

friends with a homosexual person", or "If I were friendly toward a homosexual male, he would likely mistake my friendliness for flirtation" (α =.79).

The primary dependent measure was the cardiovascular reactivity of participants during baseline and task. However, on three separate time moments we also administered several self-report measurements: Before the introduction with the confederate (T_1), just before the task (T_2) and just after the task (T_3). Responses to the items were recorded on 7-point Likert scales (1 = not at all, 7 = very much). Affect was measured by asking participants to indicate to what extent they experienced the following feelings and emotions: anxiousness, embarrassment, frustration, happiness, interest, relaxation, uncomfortableness, nervousness, irritation, annoyance, enthusiasm, stress, and tenseness (α_{T1} =.86, α_{T2} =.88 and α_{T3} =.90). Positive affect items (happiness, interest, relaxation, enthusiasm) were recoded in order to calculate their overall reliability scores.

Results

Analytic strategy

A multiple regression analysis was conducted with the following predictors: sexual orientation (coded 1 = gay male sexual condition; -1 = heterosexual control condition), misclassification concerns (fear of being perceived as gay; from now on referred to as 'FOG scale') (grand-mean centered), positivity of previous encounters with gay males (grand-mean centered) and the two-way interaction. The dependent variable differed across analyses. Bivariate correlations among variables can be found Table 1.

Performance

First, we found a moderate significant effect of condition on task performance (β = -.24, $t(49) = -1.72$, $p = .09$) and a trending effect of the FOG scale on the task

performance of participants (β = .24, $t(49) = 1.65$, $p = .11$). However, we did not find an interaction effect between the two sexual orientation conditions and the FOG scale on task performance (β = -.18, $t(49) = 1.36$, $p = .18$). Specifically, participants in the gay condition performed worse on the task ($M = 4.94$, $SD = 2.08$) than participants in the heterosexual condition ($M = 5.94$, $SD = 2.19$; $F(1, 51) = 3.25$, $p = .077$ $\eta^2_p = .06$). Moreover, we found that the more participants were afraid of being perceived as gay, the better they performed on the task (hence the positive relationship between FOG and performance). Although the interaction-effect did not reach significance, additional analyses demonstrated a positive and significant relationship between FOG and task performance in the heterosexual condition ($r = .34$, $p = .057$) but no relationship between FOG and performance in the gay condition ($r = -.05$, $p = .84$).

What could explain this unexpected result? The majority of participants in the gay condition expressed suspicion about the gay-confederate manipulation. These 14 participants correctly answered the question 'What is the aim of this research, to your opinion?' with answers as "It is about homophobia", or "It is about physical reactions to physical contact with a stranger, who is involved in the research conspiracy, probably an actor?". After excluding these specific participants from the analyses, we did not find a significant main effect of condition on task performance (β = -.19, $t(34) = -1.16$, $p > .25$), nor a significant main effect of FOG scale on performance (β = .18, $t(34) = 1.05$, $p > .3$). However, we did find a significant interaction effect between condition and FOG scale (β = -.47, $t(34) = -2.41$, $p = .022$). This significant interaction effect does give an indication that, as we hypothesized, the more participants were afraid to be perceived as gay (misclassified), the worse they performed on the task in the gay condition. When

excluding covariates of previous contact with gay males over this sample of participants, we were not able to find a main effect of condition on performance (β = -.18, $t(36) = -1.11$, $p > .27$) and found no main effect of FOG scale (β = .15, $t(36) = .94$, $p > .35$). So, task performance overall was not significantly different in the heterosexual condition than in the gay condition and FOG by itself did not affect performance either. However, we did find a significant interaction effect between condition and the FOG scale on performance, β = -.485 $t(36) = -2.56$, $p = .015$ (see Figure 1). This again indicates that the more participants were afraid to be perceived as gay, the worse they performed on the task in the gay condition, compared to the heterosexual condition. More specifically, participants in the gay condition performed considerably worse when they had high misclassification concerns ($M = 4.00$, $SD = 3.41$) than participants in the heterosexual condition ($M = 6.87$, $SD = 2.02$), $F(1,17) = 4.80$, $p = .043$. The difference between condition for participants with low misclassification concerns was not statistically significant, $F(1, 19) = 0.22$, $p > .64$ for the gay condition ($M = 5.39$, $SD = 1.99$) compared to the heterosexual condition ($M = 4.93$, $SD = 2.05$). Overall, the results show that participants' behavioral reactions were impaired by misclassification concerns when interacting with a gay male. The higher fear to be perceived as gay, the lower task performance in the gay condition, regardless whether or not participants have had previous contacts with gay males.

Cardiovascular Responses

It is important to note that the following analyses do include suspicious participants[1], due to the fact that excluding them yielded no significant results and

[1] We divided the 'suspicious' participants into three groups, because we believed there were different degrees of suspiciousness. The first group consisted of clueless participants, who did not guess the aim of

lowered the number of participants in this study in such a way that no meaningful analyses could be performed on this group.

Preparatory steps. First, we checked for between-conditions differences on baseline levels of the CV measures. ANOVAs on baseline PEP and HR did not reveal any significant main effects or interactions, *F*s < 1.12, *p*s > .295. The ANOVAs on TPR and CO, however, revealed significant baseline differences between participants in the control and gay conditions, $F(1, 46) = 13.99$, $p = .001$ and $F(1, 46) = 6.61$, $p = .013$ respectively. Despite the random assignment to the different conditions, participants in the heterosexual control condition had lower baseline levels of TPR ($M = 2497.84$, $SD = 1419.76$) than participants in the gay male condition ($M = 4180.15$, $SD = 1697.24$). Moreover, participants in the heterosexual control condition had higher baseline levels of CO ($M = 4.69$, $SD = 3.85$) than participants in the gay male condition ($M = 2.40$, $SD = 1.75$). In order to correct for this a priori difference between the sexual orientation conditions, baseline TPR and baseline CO were included as a covariate in further analyses of the relevant CV measures.

Next, CV reactivity scores were calculated for HR, PEP, CO, and TPR by subtracting the baseline values from the task values for each measurement. Following the standard protocol, the resulting reactivity scores were then examined for outliers, which were defined as values 3.3*SD* greater or smaller than the mean (e.g., Van Beest & Scheepers, 2013; see also Weisbuch-Remington et al., 2005). There were 2 outliers in the current dataset. We corrected for these outliers by manually adjusting their values to

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the research at all. The second group guessed that the experiment was about gay male sexuality; a medium degree of suspiciousness. The third group consisted of men who guessed that the "other participant" was in fact a confederate actor; a large degree of suspiciousness. In all analyses, we considered the second group, together with the third group, to be 'suspicious participants'. When performing analyses in which only the third group was labeled 'suspicious', no significantly different results were found.

values within an acceptable range (data trimming). The cardiovascular reactivity scores, as a function of Sexual Orientation, are presented in Table 2.

Task engagement. We first checked task engagement, as is the general analytical procedure in BPS challenge and threat studies. Checking for task engagement was done by testing the reactivity scores of both PEP and HR against the baseline, using one-sample *t*-tests. Across conditions, PEP reactivity was significantly smaller than zero (M = -5.64, SEM = 1.49, $t(44)$ = -3,78, $p < .001$) while HR reactivity was significantly greater than zero (M = 6.48, SEM = 1.10, $t(54)$ = 5.92, $p < .001$). This gives a clear indication of an overall task engagement, implying that one is allowed to interpret cardiovascular measurements with regards to challenge and threat. Inspecting task engagement in the different conditions in depth (as shown in Table 2) indicated that in both conditions, participants all showed a significant level of task engagement (increased HR, decreased PEP). However, even though unambiguous displays of engagement were present in the gay condition, only moderate task engagement was shown in the heterosexual condition. Even though HR increased in the heterosexual condition, PEP (representing a more direct index for engagement / BAS ; Brenner et al., 2005), differed only marginally though significant from zero.[2] ANOVA analyses revealed that HR reactivity differed significantly between the two conditions, $F(1, 53)$ = 6,90, p = .011, indicating that HR increased from baseline across the task and differed significantly across condition, with a lower HR for participants in the heterosexual condition (M = 4.17, SD = 8.39) than in the

[2] However, when suspicious participants were excluded from the analysis, PEP reached a level of marginal significance in the gay condition as well. This indicates an overall moderate task engagement when participants were not suspicious of the aim of the research.

gay condition (M = 9.71, SD = 6.63).[3]

Challenge and threat. To examine relative differences in cardiovascular markers of challenge and threat, ANOVAs on CO and TPR were performed, which did not reveal any significant effects of these markers, Fs < .29, ps > .598. When examining the absolute patterns of CV reactivity (see Table 2), no evidence was found for our main predictions either, namely that threat would become visible in the gay condition. As can be seen in Table 2, there is only one condition where the classic threat pattern (strongly increased TPR, stable CO) emerges: the heterosexual condition. This contradicts our main prediction that a threat response would elicit from a cross-orientation interaction. Moreover, there was a marginally significant increase in CO (which is part of the challenge CV-pattern) observed in the gay condition[4].

CV measures, performance and FOG scale. After conducting a multiple regression analysis, we found a significant effect of condition on HR (β = .31, t(52) = 2.45, p = .02) but no effect of condition on the FOG scale (β = -.18, t(52) = -1.375, p > .17). We did not find an interaction effect between condition and the FOG scale on HR (β = .07, t(51) = .54, p > .55). When performing the same analyses for PEP, CO and TPR, we did not find any significant main effects of condition on either CV measure or FOG scale (Fs < 1.10, p > .149), nor significant interaction effects (Fs < 1.08, p > 31).[5] Bivariate correlations among CV measures and performance can be found Table 3. The higher TPR (believed to be a good indicator for a threat response), the higher task

[3] When excluding the suspicious participants, however, this effect disappeared. The ANOVA on PEP revealed no significant effect of condition, F(1, 43) = 2.25, p >.14, indicating that although PEP increased from baseline across the board, PEP was not significantly different per condition.
[4] Interestingly, when excluding suspicious participants, this effect was reduced, since CO became only marginally significant in the gay condition. However, since a decreased TPR in this condition is not present, we should be cautious with interpreting this increased CO as indicative of challenge.
[5] Similar results were found when excluding suspicious participants.

performance. Also, higher CO was accompanied by lower PEP in the gay condition (related to task engagement) measures. Lastly, TPR has a (significant) negative correlation with CO.

Discussion

In this current study we examined if misclassification concerns would lead male individuals to a state of threat in a cross-orientation interaction, ultimately leading to lower task performances. In addition to earlier research, next to the psychological measurements, cardiovascular measurements and actual task performance on a real-life task were used to clarify this matter. We were not able to find any support for the first hypothesis, namely that fear of being perceived as gay in a cross-orientation interaction led to a threat response (high TPR, low CO). Contrary to our expectations, the threat pattern in participants became visible in the experimental, heterosexual condition. Even more, we found an indication that a pattern of challenge (low TPR, high CO) arose in the gay condition of the experiment, instead of threat. However, as hypothesized, we found a significant indication that the more participants were afraid to be perceived as gay (misclassified), the worse they performed on the task in the gay condition.

A number of factors might explain why a threat pattern would not emerge from a cross-orientation interaction. As stated before, many participants guessed the aim of the research during the experiment. These participants were usually (in 86% of the cases) part of the gay condition of the experiment. It is possible that participants did not feel threatened, because they sensed the experiment was not real. Their suspicion can be interpreted as (fore)knowledge, and knowledge about a situation has proven to lower threat (Peeters, Meijer & Verhoeff, 2012). This seems logically; when something is less

or not real and one knows it, environmental demands are probably not perceived as exceeding resources or ability to cope anymore. Another explanation for the absence of a threat pattern in this cross-orientation interaction, is that no peers or fellow social group members of the heterosexual participant were present in person during the experiment. Therefore, the risk of misclassification by relevant others – and thus threat - was low to non-existent. If one or two other heterosexual peer(s) would have been attended during the experiment, a threat response might have occurred after all.

In line with our previous reasoning, the – at first appearing paradoxical – result of threat in the heterosexual condition, might not be so surprising after all. Since participants in the control condition for the largest part (94%) did not see through the aim of the research, this setting may have turned out to be more 'realistic' and believable than the gay condition. The realistic setting could have heightened uncertainty and the sense that one 'should perform well'. These sensations and the possibility that participants felt that they were not able to adequately handle the situation, could have led to a state of threat.

Theoretical implications

The aim of this research was to contribute to the domain of same-gender sexual orientation studies. Our research is the first that we know of that focuses on heterosexual responses in a cross-orientation interaction and the first that uses physiological (cardiovascular) measurements. Although information about the feelings and behaviors of same-gender oriented people in cross-orientation interaction is of great value, little is known about the actual behavioral and physical responses of heterosexuals in these sort of situations. The current research was a first attempt in this domain to see if answered

questions on a self-report questionnaire regarding attitudes or behaviors, actually match a person's bodily (physiological) reactions. Although this study did not confirm all of our hypotheses, further similar research is needed and could prove to be very influential both within the domain of sexual orientation, as in other research domains as well. Heterosexual peers may in fact not be as open-minded as they think they are. It would be very interesting to study this subject further and see if, and to what extent, this inconsistency (unconsciously) affects people's behavior towards the same-gender sexually oriented person. Findings in this area could provide more insight into cross-orientation interactions. If physiological measurements prove to be helpful, future research methods such as assessing cardiovascular measures might even become standard procedure, to verify answers given on self-report questionnaires and strengthen the outcomes of research.

Limitations

Even though the current research provides valuable insights, it also holds multiple limitations. One of these was that few participants took part in the research. Also, the participants formed a homogenous group, consisting of White/European Americans, as well as Dutch males aging between 18 and 31. Next to this, the majority of the participants was an alumnus or a student, and thus highly educated. It appears that individuals with a higher educational degree tend to have more positive attitudes towards same-gender sexual orientation (Yen et al., 2007). It could therefore be that a larger, more diverse group of participants in both age, ethnicity and education would have given a more representative result and perhaps even indicated higher levels of threat in participants.

Clearly, a major limitation of the current research was the fact that participants guessed the true purpose of the research. They indicated that they believed it was about homophobia, or that they sensed the "other participant" was in fact a confederate actor. To prevent such occurrences in the future, the 'homo'-aspect could be better disguised in the pre-experiment questionnaire. One could use more filling questionnaires, perhaps on other taboo topics, so that this particular topic would not catch the attention so easily. Another possibility would be to increase the required period of time between filling out the online questionnaire and performing the actual experiment. This way, the memory of the online questionnaire might have faded and participants would be less 'prone' to the topic of the research, in this case gay male sexual orientation.

Furthermore, we did not ask participants whether or not they had previous experience with sign language. This could have significantly influenced performance on the task. Future research should take this factor into account, or only let people without sign language experience participate in experiments. Besides this, some participants had the possibility to study the poster with the ASL alphabet for a longer amount of time prior to the experiment. The time frame in which participants were able to do this, depended on coincidental factors, such as pretending to "set up the other participant" for the experiment, or waiting for the confederate to arrive. Therefore, the element of the informative poster was not adequately applied. A solution would be to keep the cabinet open on which the poster was taped, so that the alphabet would not be visible and then close it at the last moment, just before the start of the experiment.

Also, the instructions during the introduction part of the experiment were unclear. Participants were often confused about whether they had to answer the questions on the

screen themselves, or ask the other person to answer the questions. Moreover, sometimes they did not ask or answered questions in turns, but answered the 4 questions in a row. In these cases, when a participant did not understand the procedure of this part of the experiment, the actor sometimes had to point in the right direction. This could also have contributed to suspiciousness in participants. In addition, even after a small corrective action of the actor, some participants still did not fully understand what to do. When such a situation occurred, improvisation of the script by the confederate actor was necessary in order to maintain plausibility. Furthermore, the actor turned out to not have followed the exact same script in the heterosexual as in the gay condition. Thus, the result was a larger differentiation between the conditions than merely the part where the actor discloses either gay male, or heterosexual orientation. The aforementioned factors did not contribute to – and probably even impaired – the validity of the experiment. In future research, instructions should be very clear and explained one step at a time. The instructions could perhaps include a test round with a first introduction question and a button that participants have to click if they understand the instructions. Also, the actor should be made aware of possible consequences of these 'small' adjustments in an experiment and follow the script at all times. If something seems unclear during the experiment, both the 'participants' should call out for the experiment leader for help or clarification.

Conclusion

This study investigated misclassification concerns, cardiovascular measures and actual behavior in heterosexual men when engaging in physical contact with a gay male. It can be concluded that a cross-orientation interaction or high misclassification concerns

did not elicit threat in heterosexual males per se. However, an interaction effect was found between the sexual orientation conditions and the FOG scale on task performance. This indicates that the more participants are afraid to be perceived as gay, the worse they perform on tasks in cross-orientation interactions. The result confirms our assumption that cross-orientation interaction situations in combination with high classification concerns, elicit different behavioral reactions from heterosexual peers. Overall, cardiovascular measurements appear to play a promising role in research on same-gender sexual orientation in a world that has yet to prove its so-claimed tolerance.

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Table 1.

Correlations among variables

	Exp1S	Emo1S	Emo1O	Exp2S	Emo2	Eva3S	Emo3S	Emo3O
Exp1S								
Emo1S	.51**							
Emo1O	.50**	.79**						
Exp2S	.39**	.437**	.47**					
Emo2S	.16	.60**	.62**	.29*				
Emo2O	.33*	.66**	.77**	.41**	.70**			
Eva3S	.32*	.28*	.37**	.342*	.26	.18		
Emo3S	.436**	.63**	.70**	.36**	.66**	.62**	.60**	
Emo3O	.315*	.549**	-.75**	.31*	.67**	.79**	.47**	.85**

Note. Emo = emotions; Exp = expectations; Eva = evaluation; 1 = T_1 (before introduction with confederate); 2 = T_2 (before task); 3 = T_3 (after task)

*$p < .05$, **$p < .01$.

Table 2.

Cardiovascular Reactivity as a Function of Sexual Orientation

		Heterosexual condition	Gay condition
Heart Rate (HR)	*M*	4.17*	9.71**
	SEM	1.48	1.38
Pre-Ejection Period (PEP)	*M*	-3.58	-8.00*
	SEM	1.82	2.37
Cardiac Output (CO)	*M*	0.34	0.16
	SEM	0.43	0.08
Total Peripheral Resistance (TPR)	*M*	361.73*	227.52
	SEM	171.92	184.84

Note. Means indicated with *, differ from zero (i.e., baseline), $p < .05$; means indicated with ** differ significantly from zero, $p < .001$.

Table 3.

Correlations among variables

	TP		HR		PEP		CO		TPR
	Gay	Het	Gay	Het	Gay	Het	Gay	Het	
TP									
HR	-.46*	.29							
PEP	-.14	.05	-.25	-.31					
CO	-.21	-.35	.37	-.08	-.57**	.16			
TPR	.19	.50*	-.11	.19	.36	.18	-.64**	-.41	

Note. TP = task performance; Gay = gay condition; Het = heterosexual condition

*$p < .05$, **$p < .01$.

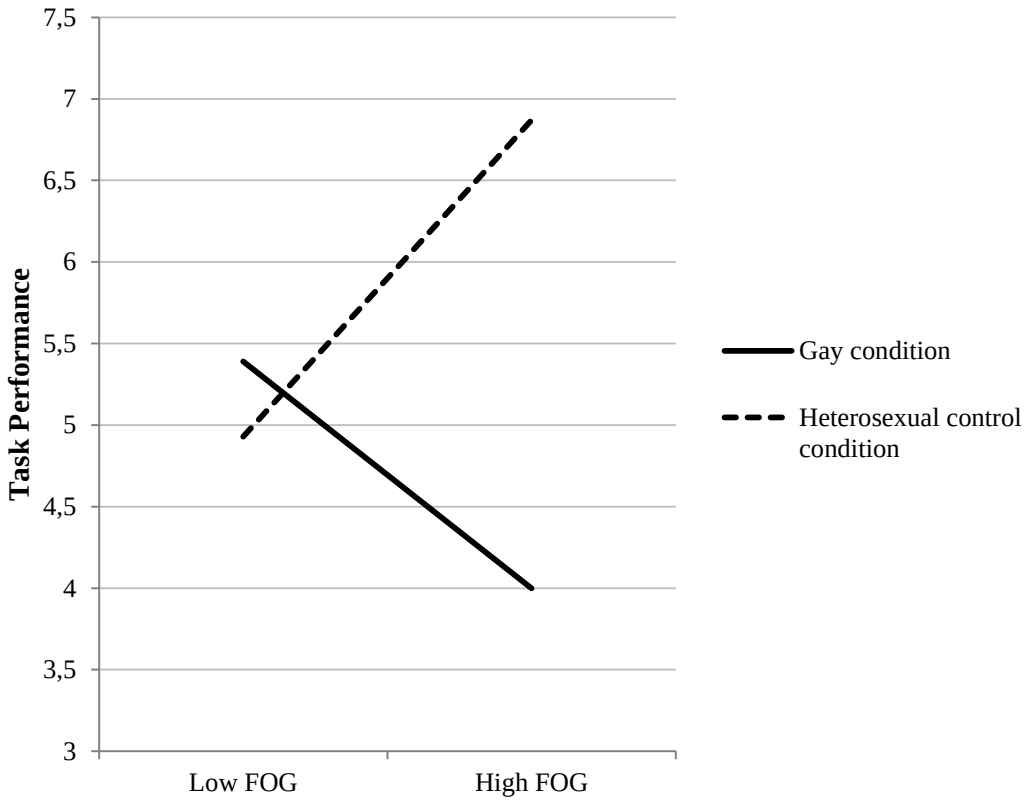

Figure 1. Mean task performance plotted as a function of sexual orientation condition and misclassification concerns (fear of being perceived as gay). FOG = fear of being perceived as gay.