

Article

Nick Martin's Contributions to Human Sexuality Research

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Abstract

Genetic research into human sexuality was scarce at the end of last century. In 1992 Nick developed a 12-page questionnaire to send to twins to investigate the underpinnings of sexuality. The questionnaire included items about sexual orientation, sociosexuality and sexual behavior, and was completed by almost 5000 twins. The resulting data, unique at the time, has been used to investigate many previously unexamined research questions. Here we describe how Nick's questionnaire contributed to our understanding of human sexuality and how we got involved in this endeavor.

Keywords: Sex; sexuality; questionnaire; sexual orientation

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Nick Martin does not fear taking risks, he does not bend to criticism, he can be bold, and he does not strive to be politically correct. This may have made him some enemies over his career, but it has also won him admiration and respect and has stood him far out from the crowd.

Unlike many other scientists, Nick does not shun controversial research topics. In 1992, he — with Michael Bailey — developed a questionnaire to send out to twins to investigate the underpinnings of sexuality. Before then, little genetic research had been done on human sexuality, probably in part because of squeamishness and decorum on the part of the scientific community. That did not hold Nick back. The 12-page questionnaire contained general items about the participants' background, personality, family composition, handedness and so on, but also very personal questions about their sexual behavior, including items about sexual orientation, sociosexuality, and sexual behavior (e.g., 'How many times have you done the following?: Sexual intercourse, entering vagina from rear'). Despite the sensitive nature of the questionnaire, it was completed by almost 5000 twins. To ensure participants' anonymity, thus minimizing the threat of discomfort and dishonest answers, Nick and Michael came up with a solution whereby the twins were asked to agree on a 10-digit number that they would each enter on the top of their questionnaires. In this way, questionnaires could not be related to individual twins but twin pairs could be matched up. (Unfortunately, this also meant that the data could not be matched with their genotype data years later.) Of all the twins who were asked to participate, 27% explicitly refused, 19% initially agreed but subsequently did not return the consent forms, and 52% explicitly consented (Dunne et al., 1997). There were some small differences between twins who participated and those who did not, suggesting that results of the questionnaire may slightly

overestimate sexual liberalism, activity, and adversity (Dunne et al., 1997). Those who responded had higher education levels, scored higher on novelty seeking, were less conservative (both on voting preferences and on sexual attitudes), and attended church less often. Responders also showed higher prevalence of depression, alcohol dependence, conduct disorder, and reported an earlier age at sexual intercourse, and higher rates of sexual abuse (Dunne et al., 1997). While 27% of the approached twins may have been put off by the invitation, the actual participation rate of more than 50% was not bad at all.

Once the data were collected, they were used to investigate many interesting research questions, and this is where we (Brendan and Karin) come in. In 2007, when Karin wanted to do a research internship abroad for her master's degree, Dorret Boomsma suggested she go to Brisbane to work with Nick. Initially Karin wanted to work on something to do with substance use, but Nick convinced her to work on the sex questionnaire that had not been used much. Karin was happy to work on a topic that was a bit more distinctive, so 'sex and genetics' it was, and she never regretted that choice — just looking at the descriptive statistics was already interesting. In the meantime, Brendan had been plugging away at a multivariate twin model of EEG data for almost a year when Karin told him about the existence of the sex questionnaire. For Brendan this questionnaire triggered his genuine interest in research and launched a career in which he applied genetics methodology to questions about human mating and how it relates to the evolution of human nature.

With the data from the sex questionnaire Nick, Brendan, Karin and others explored genetic influences on various interesting traits. This yielded the first clear evidence of heritability of sexual orientation (Baile, Dunne et al., 2000), the female orgasm (Dawood et al., 2005), homophobia (Verweij et al., 2008), sociosexuality (Bailey, Kirk et al., 2000), and risky sexual behavior (Verweij et al., 2009; Zietsch et al., 2010).

We also used the twin data to look into potential evolutionary explanations of the maintenance of homosexuality in the

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population, which many see as a Darwinian paradox (Zietsch et al., 2008). We found evidence that psychologically masculine females and feminine men are more likely to be nonheterosexual, but when heterosexual, they have more opposite-sex sexual partners. We showed that these relationships are partly due to genetic influences common to each trait. We also found a trend for heterosexuals with a nonheterosexual twin to have more opposite-sex partners than do heterosexual twin pairs. These results suggest that genes predisposing to homosexuality may confer a mating advantage in heterosexuals, which could help explain the evolution and maintenance of homosexuality in the population. Notably, at the moment we are re-investigating this hypothesis using genome-wide genotype data.

In two other studies we looked at the association between sexual orientation and personality and mental health (Zietsch et al., 2011, 2012). Previous research indicated that homosexuals and bisexuals are, on average, at greater risk for psychiatric problems than heterosexuals, potentially because of prejudice often experienced by nonheterosexuals. We tested whether apparent sexual orientation differences in psychiatric vulnerability simply mirrored sex differences in personality traits, that is, nonheterosexual males having elevated neuroticism scores as females do, and nonheterosexual females having elevated psychoticism scores as males do. Our results contradicted this, with nonheterosexual men and women scoring significantly higher on both neuroticism and psychoticism than their heterosexual counterparts, suggesting an overall elevation of psychiatric risk in nonheterosexuals (as neuroticism and psychoticism are positively associated with psychiatric disorders). We also found significant genetic correlations of sexual orientation with neuroticism and psychoticism, but no corresponding environmental correlations (Zietsch et al., 2011). Similarly, in a subsequent paper (Zietsch et al., 2012) we showed that nonheterosexual men and women had elevated rates of lifetime depression and that genetic factors accounted for a majority (60%) of the correlation between sexual orientation and depression. In addition, childhood sexual abuse and risky family environment were significant predictors of both sexual orientation and depression, further contributing to their correlation. These findings do not mean that antigay prejudice has no effect on psychiatric vulnerability in nonheterosexuals, but they do suggest there is more to the story.

For a paper on testing evolutionary theories of female orgasm, we worked with renowned evolutionist Geoffrey Miller, whom Nick recruited to the department for a sabbatical. Geoffrey's book *The Mating Mind* (Miller, 2000) was one of Brendan's inspirations for getting into evolutionary psychology, so it was a fantastic opportunity to work together. We found that the female orgasm data did not fit any of the existing adaptive theories, leaving us stuck with the question: Why does it exist? Like many of the most interesting questions, we still do not know the answer — despite several subsequent papers from Brendan using other approaches and datasets — but with Nick's help and support, these questions have at least been raised to the status of deserving serious inquiry with serious data, and we are sure as the answers come in it will be in no small part thanks to Nick.

On a broader level, Nick has obviously meant a lot to the field of behavioral genetics. His pioneering papers, mentorship, vision of how science should be performed, large data collection and generosity in sharing these data, as well as his encouragement of collaboration and open science have played a defining role in the field. On a personal level, Nick has meant a lot to Karin's and Brendan's careers. He encouraged us to pursue our genuine interests, and from the start of our PhD he gave us the freedom to develop our own research questions and approaches. He stimulated us to work hard, to collaborate with others, and to not shy away from the hard questions. The way he mentored us was stimulating and greatly contributed to us becoming independent scientists. Brendan, Karin and Nick still share the interest in investigating biological factors in human sexuality and research questions that can be off-road. Brendan and Karin both still very happily collaborate with Nick on various projects. Nick's continuing motivation and dedication to keep doing research and his sincere interest in genetics are unparalleled, and we hope he will keep up the good work for many more years to come.

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