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Bullying and Educational Attainment in LGB Australians

Student: Abdallah Almomani

Student ID number: 558453

Supervisor: Dinand Webbink

Second assessor: Elisabeth Leduc

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The views stated in this thesis are those of the author and not necessarily those of the supervisor, second assessor, Erasmus School of Economics or Erasmus University Rotterdam.

Abstract

This paper investigates whether frequent bullying experienced in childhood and adolescence by lesbian, gay and bisexual (LGB) individuals drives their higher educational attainment compared to straight people. Using Australian Twin Registry data from a 1992 survey of identical and fraternal twins, this study employs twin fixed effects regression analysis and finds that LGB individuals are more bullied in their childhood and adolescence and obtain higher levels of education in their adulthood than their straight counterparts.

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I. Introduction

This research aims to investigate whether lesbian, gay and bisexual (LGB¹) people, who are at a higher risk of childhood and adolescent bullying, achieve higher levels of educational attainment than straight people. By utilizing the same dataset used by Plug et al. (2014), I wish to complement their findings by investigating why the LGB twins in their sample have higher educational attainment than their straight twins. I hope that my findings will contribute to enriching the scarce existing literature on the relationship between bullying experienced by sexual minorities in their childhood and adolescence and their educational attainment in adulthood.

Such findings can provide valuable insights for academics, educators, social service agencies and policymakers and can contribute to the rapidly growing body of literature on LGBTIA+ issues. It is essential that there is awareness that LGB people are more likely to have experienced hostile environments at school, university and the workplace (Henrickson,

¹ This study focuses only on gay, lesbian and bisexual (LGB) people and not the wider LGBTQIA+ community due to the type of available data, which is based on a survey from 1992 where the only sexual identity options were straight, bisexual or homosexual (gay or lesbian).

2007) and that negative experiences in childhood and adolescence can have an impact upon psychological wellbeing in later life (Rivers, 2001).

Although this study finds that LGB people achieve higher educational attainment than straight people despite (or possibly *because* of) having experienced more bullying in their childhood and adolescence should not take away from the severity of the long-term consequences of bullying, including mental health issues. Achieving higher educational credentials as a survival mechanism should not be seen as a positive consequence of bullying. In fact, LGB individuals who were bullied in childhood and adolescence and resorted to obtaining higher educational attainment as a response may well remain negatively affected in other aspects of their life, despite having higher credentials. This study's findings suggest that being bullied in childhood and adolescence is a threat to mental, physical or emotional safety for LGB individuals. Therefore, policy implications would include the need to develop and strengthen support systems that foster resilience, mental health, and well-being among LGB individuals, particularly in their childhood. This research may contribute to laying down the groundwork for research into the psychology of education as a risk mitigation measure, particularly for sexual minorities.

The remainder of this article proceeds as follows. Section II provides an overview of the existing literature and the motivation behind this study. Section III describes the data used in this research. Section IV introduces the empirical methodology. Section V presents the results of this study. Section VI highlights the conclusions of this study.

II. Literature Review

Bullying and educational attainment

There are several existing studies which find that bullying has adverse effects on various aspects of the bullied individual's life, including their educational attainment. Looking at a sample of individuals drawn from the British National Child Development Study, Brown and Taylor (2007) explore the effect of bullying at school on educational attainment. Their empirical findings suggest that school bullying has an adverse effect on human capital accumulation both at and beyond school. They find that the impact of bullying on educational attainment at age 16 is similar in magnitude to class size effects, but in contrast to class size effects, the adverse influence of bullying on educational attainment

remains during adulthood. They find that being a victim of school bullying impinges on labour market earnings later in life.

Using data from two different studies and applying ordinary least squares (OLS) and propensity score matching techniques, Ponzo (2013) investigates the determinants and the effect of being a victim of school bullying on educational achievement for Italian students enrolled at the fourth and eighth grade levels. The empirical findings suggest that being a victim of school bullying has a considerable negative effect on student performance at both the fourth- and the eighth-grade levels. Furthermore, Halliday et al. (2021) find through a systematic review of 28 studies and examining only longitudinal data that bullying victims experience negative psychosocial and academic outcomes, including increased depression and anxiety, increased peer rejection, poorer school performance and school connectedness, both over the short term (12 months), and up to eight years later.

Most pertinent to this research perhaps is the study by Henrickson (2007) which finds that sexual minorities in New Zealand are highly vulnerable to bullying in childhood and adolescence, and have lower secondary educational attainment compared to heterosexual people. Their findings suggest that coming out early appears to be associated with lower levels of educational attainment as a result of selection out of education due to bullying and assault. However, they find that those who “survive” high school go on to gain in their adulthood higher educational attainment than the general population. These findings are of particular relevance as the New Zealand context, a relatively mature and robust human rights environment where bullying is largely non-physical and less violent, is similar to the Australian context of this research.

Sexual minorities and educational attainment

A number of studies report higher educational attainment in adulthood for sexual minorities compared to heterosexual people (Baumle et al., 2009; Black et al., 2000; Laumann et al., 2000; Plug et al., 2014; Turner et al., 2005; Ueno et al., 2013). However, little can be found on the potential mechanisms that could be driving this difference.

Black et al. (2000) find that gay and lesbian individuals have higher educational levels than other men and women, even after they control for selection bias; it is well known that an individual’s education is correlated with his or her parents’ education, but the authors find no evidence of such a pattern. In fact, they find that the distribution of education among gays’

fathers is almost identical to that among other men's fathers, confirming that the gay men in their sample in fact accumulate more education than other men. However, they were not able to run similar analysis for women due to small sample sizes.

Ueno et al. (2012) focus on sexual contact (rather than identity) as an indicator of sexual orientation in an attempt to explain why sexual minorities and heterosexuals vary in the level of success in educational attainment, differing from previous studies which treated sexual orientation as a static trait. They find that women who report same-sex contact obtain lower educational degrees than those without such contact regardless of its timing and continuity, and that men who report their first same-sex contact in young adulthood obtain higher degrees than others. While these findings extend the educational attainment literature, the authors acknowledge that there is a need to incorporate the existing knowledge on sexuality-linked stigma, self-exploratory behaviours, emotional consequences of sexual development, and gender socialization in order to better understand the underlying mechanisms causing differences in education attainment for sexual minorities compared to straight people.

Looking at Australian identical twins where one twin is straight and the other is gay, lesbian or bisexual, Plug et al. (2014) find that sexual minorities have higher levels of schooling and sort into more tolerant (towards sexual minorities) occupations, suggesting that sexual minorities may go to a university more often than their straight twin siblings to avoid working in more prejudiced occupations. Similarly, and using two large national surveys in the United States in 1986 and 1992, Hewitt (1995) aims to understand the socioeconomic position of gay men and to what extent their position is a result of discrimination. The author finds that sexual minorities may seek high credentials to counterbalance discrimination in the labour market.

Additionally, Becker et al. (2020) find that while there were no pre-WWII differences in educational attainment, Poles with a family history of forced migration are significantly more educated today than other Poles. While this study is not related to sexual minorities, it suggests that when put at a disadvantage, people seem to resort to educational attainment as a way to offset the disadvantage. These studies seem to suggest that when economic, physical, or mental safety is perceived to be threatened, people might resort to obtaining higher levels of schooling in order to offset such a threat.

The mixed findings in the literature about the impact of sexual orientation on educational attainment indicate that such effects are context specific, and that each context warrants its own focused study. This research, therefore, aims to contribute to the literature by shedding light on the impact of being bullied in childhood and adolescence on educational attainment in adulthood for LGB people in Australia.

III. Data

The data used in this study come from a 1992 sex survey of twins enrolled in the Australian National Health and Medical Research Council Twin Registry. The data from this survey contain detailed information on a large sample of 4,903 identical and fraternal twins aged 19-52 years. The extensive survey contains questions on sexual orientation, childhood and adolescent behaviour and experiences, including bullying, as well as educational attainment². The survey comes in two versions; one for men and one for women, and both versions have the same structure but some of the questions are different.

As Table 1 below shows, there are three types of questions in the survey that ask whether a person was bullied in childhood and adolescence: the first type has three answer options ranging from “never” to “often”, the second type has four answer options ranging from “never” to “yes, many times” and the third type has four answer options ranging from “never” to “constantly”. It is important to note that the men’s questionnaire has four questions about being bullied in childhood and adolescence while the women’s questionnaire has only one such question.

In the existing literature on bullying, there generally seem to be two approaches for creating a variable for having been bullied. The first approach is a threshold approach where a cut-off is chosen whereby answers above the threshold are considered to indicate that a person was bullied and answers below the threshold indicate that the person was not bullied. This approach results in a binary bullying variable. The second approach is a weighted approach where answer options are assigned different weights based on severity or frequency. For instance, assigning a higher weight to “yes, many times” compared to “yes, several times”. This weighted approach would result in an index of the frequency of bullying. Since the answer options for all three types of bullying questions in the survey are not aligned (neither in the number of answer options nor in the frequency), using the second (weighted)

² See the annex for these survey questions.

approach would require many assumptions. Therefore, the main bullying measure used in this research is the first (threshold) approach. A binary bullying binary variable is created using the threshold approach to indicate whether a respondent was *frequently* bullied in their childhood or not. Only respondents who answered with at least one of the highest frequency options (“often”, “yes, many times” or “constantly”) in any of the bullying questions (shown in Table 1 and the annex) are considered to have been frequently bullied during their childhood and adolescence for the purpose of this research. The ‘Robustness checks’ subsection in the ‘Results’ section presents results based on three variations of the bullying measure: the weighted approach and two variations of the threshold approach.

Table 1			
Survey questions related to being bullied in childhood and adolescence used to construct the bullying measure			
Question	Answer options	LGB respondents	Straight respondents
Women’s questionnaire			
As a child, did you have the reputation of a “tomboy”?	Never	24	1,135
	Occasionally	32	1,174
	Often	45	556
Men’s questionnaire			
As a child (before the age of 13), were you ever bullied or pushed around by another boy of about your own age?	Never	18	410
	Yes, once or a few times	53	867
	Yes, several times	25	205
	Yes, many times	14	93
	Do not recall	2	89
When you were a child, did you ever avoid a boy or a group of boys your own age because you were afraid of being teased or harassed?	Never	18	599
	Yes, once or a few times	50	769
	Yes, several times	23	160
	Yes, many times	15	72
	Do not recall	6	65
When you were a child, were you ever ridiculed by other boys your own age for your performance in team sports?	Never	28	791
	Rarely	54	733
	Frequently	17	92
	Constantly	4	12
	Did not play team sports as a child	9	31
As a child, did you have the reputation of a “sissy”?	Never	48	1,390
	Occasionally	44	257
	Often	20	16
Note: This table provides the five questions in the survey that are used to construct the bullying variable, with a tabulation of response options and frequency.			

In this research, both identical and fraternal twins are included in the analysis. However, the focus of this study is on identical twins in order to obtain a cleaner twin fixed effects estimation because identical twins share the same DNA and are therefore similar in many ways, making for stronger inference. As shown in Table 2, of the 4,834 individual twins who responded to the sexual orientation question, 2,287 were identical twins and 2,548 were fraternal twins. 88 of the identical twins and 127 of the fraternal twins identified as LGB, making a total of 215 identical and fraternal twins who identified as LGB³.

Of the 4,903 individuals in the dataset, 3,728 are part of an identifiable twin pair, and therefore, those were possible to match with their twin through a twin pair identifier variable. This means that there are 1,864 twin pairs. Of those, there are 1,723 pairs where both twins are straight, 12 pairs where both twins are LGB, and 129 “mixed” pairs where one twin is LGB and the other is straight. Of the 129 “mixed” pairs, 74 pairs (or 29 percent) include an LGB twin that was frequently bullied in childhood and adolescence.

When comparing LGB to straight respondents, three things are clear from Table 2. First, LGB twins have a higher average for the number of years of education than straight twins, whether we look at identical twins only or all twins. LGB identical twins completed an average of 12.84 years of education compared to 12.33 years for straight identical twins, and all LGB twins completed an average of 12.70 years compared to 12.33 for all straight twins. Second, LGB twins were bullied in their childhood and adolescence more than straight twins, whether we look at identical twins only or all twins. Around 33 percent of LGB identical twins were frequently bullied in their childhood and adolescence compared to only 14 percent of straight identical twins, and 36 percent of all LGB twins were frequently bullied in childhood compared to only 15 percent of all straight twins. Third, there does not seem to be a difference in childhood health between LGB and straight twins, whether we consider identical twins only or all twins.

Similarly, when comparing male to female respondents, three things are clear from Table 2. First, men have a higher average for the number of years of education than women; LGB men have 12.75 years of education on average compared to 12.65 years for LGB women, and straight men have 12.64 years of education on average, compared to 12.15 years for straight women. Second, a higher percentage of women was bullied compared to men; 44

³ The percentage of respondents to this anonymous survey that identified as LGB is 4.4% which is lower than the range of percentages of LGB people in existing studies. This could be due to the fact that the survey was carried out in 1992 when stigma against sexual minorities was more severe than present day.

percent of LGB women were bullied compared to 29 percent of LGB men, and 19 percent of straight women were bullied compared to only 8 percent of straight men. Third, there does not seem to be a difference in childhood health between men and women.

Table 2
Descriptive Statistics

	<u>Identical Twins</u>		<u>All Twins</u>		<u>Male</u>		<u>Female</u>	
	LGB	Straight	LGB	Straight	LGB	Straight	LGB	Straight
Number of twins (individuals) who responded to the sexual orientation question	88	2,199	215	4,620	112	1,682	103	2,938
Average years of education (standard deviations in parentheses)	12.84 (0.27)	12.33 (0.05)	12.70 (0.16)	12.33 (0.03)	12.75 (0.22)	12.64 (0.05)	12.65 (0.24)	12.15 (0.04)
Was bullied in childhood and adolescence (percentages in parentheses)*	29 (33%)	313 (14%)	78 (36%)	692 (15%)	33 (29%)	136 (8%)	45 (44%)	556 (19%)
Was sickly in childhood (percentages in parentheses)	14 (16%)	368 (17%)	37 (17%)	785 (17%)	20 (18%)	272 (16%)	17 (17%)	513 (17%)

* The binary bullying variable is constructed so that only respondents who selected the answer that reflects the highest intensity/frequency of bullying (“yes, many time”, “constantly” or “often”) for at least one of the bullying questions are counted as “yes” (having a value of 1 in this bullying variable).

IV. Methodology

The empirical methodology for this study is twin fixed effects regression analysis. Identical twins share virtually the same genetic makeup, which means they have similar inherited traits and predispositions, in addition to a similar upbringing and childhood environment. Identical twins might therefore be said to have the same ability, so the idea is that if both identical twins are assumed to have the same ability, then we can remove it from the equation and only look at the differences between the twins. Such differences between identical twins can come from their unique experiences, such as being bullied in childhood for example. Fixed effects regression analysis helps address this issue by including individual-specific fixed effects in the model. In the context of identical twins, these fixed

effects account for unobserved factors that are common to both twins, such as DNA or shared family background. By doing so, fixed effects regression effectively eliminates the influence of these constant factors from the estimation, focusing instead on within-pair differences (Angrist & Pischke, 2014).

The availability of detailed data on identical twins provides a suitable context for a fixed effects model that controls for unobserved factors and focuses on within-pair differences, allowing for more robust conclusions about the effects of an individual twin's unique experiences.

The empirical strategy of this research is comprised of three specifications. The first one aims to investigate the relationship between being LGB and educational attainment, with educational attainment as the dependant variable. The second specification aims to unpack the relationship between being LGB and being a victim of bullying, with bullying as the dependent variable. The third specification looks at the joint effect of being LGB and being a victim of bullying in childhood and adolescence on educational attainment, which is the dependent variable.

LGB and educational attainment

The impact of being LGB on educational attainment is estimated using the following equation:

$$Education_{ij} = \alpha + \gamma LGB_{ij} + \psi Female_{ij} + \theta X_{ij} + \tau T_{ij} + \varepsilon_{ij}$$

where $Education_{ij}$ is the number of years of schooling for individual i in twin pair j ; LGB_{ij} is a binary variable equal to 1 if individual i identifies as LGB, and 0 otherwise; $Female_{ij}$ is a binary variable equal to 1 if individual i is female and equal to 0 if male; X_{ij} represents a binary control variable (health in childhood⁴) equal to 1 if individual i was often sick in childhood and 0 otherwise; T_{ij} is a twin pair fixed effects, which account for unobserved time-invariant characteristics shared by twins in the dataset. α , γ , ψ , θ , and τ are coefficients to be estimated. ε_{ij} represents the error term capturing unobserved factors and random variation. The coefficient of interest is γ , which captures the effect of having been bullied in childhood and adolescence on educational attainment.

⁴ See the survey's health questions in the annex.

LGB and bullying

The effect of being LGB on the probability of being frequently bullied in childhood and adolescence is estimated using the following logistic regression equation:

$$Bullied_{ij} = \alpha + \beta LGB_{ij} + \psi Female_{ij} + \theta X_{ij} + \tau T_{ij} + \varepsilon_{ij}$$

where $Bullied_{ij}$ is a binary variable equal to 1 if individual i was frequently bullied in childhood and adolescence, and 0 otherwise; LGB_{ij} is a binary variable equal to 1 if individual i identifies as LGB, and 0 if they identify as straight; $Female_{ij}$ is a binary variable equal to 1 if individual i is female and equal to 0 if male; X_{ij} represents a binary control variable (health in childhood) equal to 1 if individual i was often sick in childhood and 0 otherwise; T_{ij} is a twin pair fixed effects, which account for unobserved time-invariant characteristics shared by twins in the dataset. α , β , ψ , θ , and τ are coefficients to be estimated. ε_{ij} represents the error term capturing unobserved factors and random variation. The coefficient of interest is β , which captures the change in probability of being a bullying victim in childhood and adolescence if the individual is LGB.

Joint effect of bullying and LGB on educational attainment

The impact of being frequently bullied in childhood and adolescence on the educational attainment of LGB individuals is estimated using the following equation:

$$Education_{ij} = \alpha + \beta LGB_{ij} + \gamma Bullied_{ij} + \delta LGB_{ij} * Bullied_{ij} + \psi Female_{ij} + \theta X_{ij} + \tau T_{ij} + \varepsilon_{ij}$$

where $Education_{ij}$ is the number of years of schooling for individual i in twin pair j ; LGB_{ij} is a binary variable equal to 1 if individual i identifies as LGB, and 0 if they identify as straight; $Bullied_{ij}$ is a binary variable equal to 1 if individual i was frequently bullied in childhood and adolescence, and 0 otherwise; $LGB_{ij} * Bullied_{ij}$ is the interaction term between LGB and $Bullied$, capturing the joint effect of being LGB and experiencing frequent bullying in childhood and adolescence; $Female_{ij}$ is a binary variable equal to 1 if individual i is female and equal to 0 if male; X_{ij} represents a binary control variable (health in childhood) equal to 1 if individual i was often sick in childhood and 0 otherwise; T_{ij} is a twin pair fixed effects, which account for unobserved time-invariant characteristics shared by twins in the dataset. α , β , γ , δ , ψ , θ , and τ are coefficients to be estimated. ε_{ij} represents the error term capturing unobserved factors and random variation. The coefficients of interest are β and δ . β captures

the average difference in educational attainment between LGB and straight individuals, while δ captures the differential effect of childhood bullying on educational attainment between LGB and straight individuals. Interpreting δ , a coefficient of an interaction term, is to be done by considering the sign and magnitude. A positive coefficient suggests a synergistic effect, indicating that the joint impact of the two interacting variables, *LGB* and *Bullied*, is greater than the sum of their individual effects.

V. Results

Table 3 below presents OLS estimates in columns 1, 3 and 5 and fixed effects (FE) estimates in columns 2, 4 and 6 for the effect of being LGB on educational attainment. Estimates in the first row show that LGB twins have higher educational attainment than their straight twins. Of particular interest is the identical twins fixed effects estimate of 0.988, which is statistically significant at the 1 percent level, indicating that LGB identical twins have almost a year more of schooling than straight twins. The second row indicates that women have lower educational attainment than men, with OLS estimates for identical, fraternal and all twins being statistically significant.

When looking at identical, the fixed effects estimate does not capture the difference between men and women because identical twins are both always of the same sex – either both male or both female, so the fixed effects estimate is not able to capture a difference that is attributed to sex. In the third row, the OLS estimates are statistically significant and indicate that individuals who were often sick in childhood have less schooling than individuals who did not have health issues in childhood, which seems intuitive since being sick often could hinder educational achievement.

Table 3
OLS and fixed effects (FE) estimates for the effects of being LGB on educational attainment

	Identical Twins		Fraternal Twins		All Twins	
	OLS (1)	FE (2)	OLS (3)	FE (4)	OLS (5)	FE (6)
LGB (identifies as lesbian, gay or bisexual)	0.392 (0.288)	0.988 (0.332)***	0.239 (0.211)	0.390 (0.260)	0.297 (0.171)*	0.671 (0.210)***
Female	- 0.743 (0.124)***	Omitted	- 0.242 (0.096)**	0.148 (0.132)	- 0.467 (0.077)***	0.154 (0.132)
Sickly (was often sick in childhood)	- 0.318 (0.137)**	- 0.240 (0.159)	- 0.218 (0.122)*	- 0.040 (0.151)	- 0.274 (0.091)**	- 0.135 (0.110)
Sample size	2,225	2,225	2,478	2,478	4,703	4,703
R ²	0.027	0.004	0.005	0.000	0.013	0.000

Notes: The dependant variable is educational attainment measured by the number of years of education. Odd columns report OLS estimates. Even columns report twin fixed-effects estimates. Robust standard errors in parentheses. The variable 'Female' is omitted in identical twins FE estimation because identical twins are either both male or both female.

* Significant at the 10% level.

** Significant at the 5% level.

*** Significant at the 1% level.

Table 4 below presents logistic regression estimates, with and without fixed effects, for the effect of being LGB on the probability of getting frequently bullied in childhood and adolescence. In the first row, all estimates are positive and statistically significant at the 1 percent level, indicating that being LGB increases the odds of getting frequently bullied. The fixed effects estimate for identical twins, which is 1.709, indicates an LGB identical twin has 1.709 times the odds of a straight identical twin of getting bullied in childhood and adolescence. In other words, an LGB person has 71 percent more odds of getting bullied in childhood and adolescence. Estimates in the second row of Table 4 are also all statistically significant, indicating that women are more likely to be bullied than men. Estimates in the third row similarly indicate that those who were often sick in childhood are more likely to be bullied.

Table 4
Logistic regression estimates for the effects of being LGB on the probability of getting bullied

	Identical Twins		Fraternal Twins		All Twins	
	No Fixed Effects (1)	Fixed Effects (2)	No Fixed Effects (3)	Fixed Effects (4)	No Fixed Effects (5)	Fixed Effects (6)
LGB (identifies as lesbian, gay or bisexual)	1.195 (0.240)***	1.709 (0.369)***	1.483 (0.214)***	1.519 (0.218)***	1.360 (0.157)***	1.643 (0.198)***
Female	0.611 (0.157)***	0.854 (0.213)***	1.216 (0.133)***	1.239 (0.140)***	0.936 (0.102)***	1.125 (0.119)***
Sickly (was often sick in childhood)	0.317 (0.151)**	0.362 (0.209)*	0.179 (0.145)	0.178 (0.143)	0.233 (0.104)**	0.236 (0.121)*
Sample size	2,287	2,287	2,548	2,548	4,835	4,835

Notes: The dependant variable 'Bullied' is a binary variable that equals 1 if the individual was frequently bullied in childhood and adolescence and equals 0 if otherwise. Odd columns report logistic regression estimates without fixed effects. Even columns report logistic regression with twin fixed-effects estimates. Robust standard errors in parentheses.

* Significant at the 10% level.

** Significant at the 5% level.

*** Significant at the 1% level.

Table 5 below presents ordinary least squares (OLS) estimates in columns 1, 3 and 5 and fixed effects estimates in columns 2, 4 and 6 for the effects of being LGB and having been frequently bullied in childhood and adolescence on educational attainment for identical, fraternal and all twins. Estimates in the first row indicate that being LGB slightly increases the number of schooling years, but not significantly, except when looking at all twins (identical and fraternal combined), where the estimate is significant at the 10 percent level. Estimates in the second row are not statistically significant, indicating that having been bullied in childhood on its own does not seem to affect educational attainment. What might be of particular interest is the fixed effects estimate for the interaction term (between being LGB and having been frequently bullied in childhood and adolescence) for identical twins in the third row (1.332), which is significant at the 5 percent level. It indicates that being LGB *and* having been bullied in childhood and adolescence increase the number of years of schooling by 1.3 years on average. These estimates suggest that being LGB on average increases the amount of schooling an individual attains but not significantly. However, when that person was also frequently bullied in childhood and adolescence, the effect becomes statistically significant, meaning that being LGB on its own does not drive extra schooling, but when the LGB person is bullied in childhood and adolescence, it possibly does. In other

words, the difference in educational attainment within twin pairs is larger when the LGB twin has experienced bullying.

The fourth row of Table 5 indicates that women have lower educational attainment than men, with OLS estimates for identical, fraternal and all twins being statistically significant. When looking at identical, the fixed effects estimate does not capture the difference between men and women because identical twins are both always of the same sex – either both male or both female, so the fixed effects estimate is not able to capture a difference that is attributed to sex. The fifth row indicates that being often sick in childhood has a statistically significant negative effect on educational attainment if we look at OLS estimates, which seems intuitive as poor health could act as an obstacle in the pursuit of education. However, fixed effects estimates, which allow for stronger inference, are not statistically significant, suggesting that being sickly in childhood does not necessarily affect educational attainment.

Table 5
OLS and fixed effects estimates for the effects of being LGB and having been bullied in childhood and adolescence on educational attainment

	<u>Identical Twins</u>		<u>Fraternal Twins</u>		<u>All Twins</u>	
	OLS (1)	FE (2)	OLS (3)	FE (4)	OLS (5)	FE (6)
LGB (identifies as lesbian, gay or bisexual)	- 0.100 (0.322)	0.461 (0.338)	0.155 (0.278)	0.349 (0.290)	.052 (0.210)	0.396 (0.221)*
Bullied (was bullied in childhood)	0.173 (0.145)	0.216 (0.178)	0.044 (0.130)	-0.015 (0.173)	0.121 (0.097)	0.074 (0.125)
LGB*Bullied (interaction term)	1.346 (0.599)**	1.332 (0.603)**	0.192 (0.429)	0.106 (0.533)	0.593 (0.351)*	0.666 (0.409)
Female	- 0.770 (0.125)***	Omitted	- 0.249 (0.098)**	0.150 (0.134)	- 0.485 (0.078)***	0.142 (0.133)
Sickly (was often sick in childhood)	- 0.319 (0.136)**	- 0.235 (0.158)	- 0.220 (0.122)*	- 0.041 (0.151)	- 0.278 (0.091)***	- 0.135 (0.110)
Sample size	2,225	2,225	2,478	2,478	4,703	4,703
R ²	0.031	0.007	0.005	0.000	0.014	0.000

Notes: The dependant variable is educational attainment measured by the number of years of education. The independent variable of interest is the interaction term. Odd columns report OLS estimates. Even columns report twin fixed-effects estimates. Robust standard errors in parentheses. The variable 'Female' is omitted in identical twins FE estimation because identical twins are either both male or both female.

* Significant at the 10% level.

** Significant at the 5% level.

*** Significant at the 1% level.

Heterogeneity analysis

This sub-section investigates whether there are differences by age or by socioeconomic background. Given that both age and socioeconomic background are shared between both twins in a pair, the analysis in this section only includes OLS, without twin fixed effects. In the survey, there is a question where the respondent is asked to state their age⁵. Respondent ages range from 19 to 52 years, so the age variable simply includes respondent ages. As for socioeconomic background, there is a question that asks the respondent to describe their social status⁶. Therefore, a socioeconomic background variable already exists in the dataset where it equals 1 if the selected answer is “working class”, equals 2 if the selected answer is “middle class” and equals 3 if the selected answer is “upper class”.

Table 6 below presents estimates based on OLS regressions, similar to those in Table 5, but with the age and socioeconomic background variables included. Naturally, the results are similar in magnitude, sign and statistical significant to the results in Table 5. What is notable is that the joint effect of being LGB and having been bullied in childhood and adolescence remains positive and statistically significant, as in Table 5, and that the two newly added variables, age and socioeconomic background, also have statistically significant estimates.

The age estimate for all twins (-0.018) is negative, and statistically significant at the 1 percent level. It indicates that an additional year of age is correlated with a slightly lower level of educational attainment. While this may seem economically insignificant, it becomes economically significant if the comparison is done between generations rather than a difference of one year only. This estimate suggests that older generations of LGB people who experienced frequent bullying in their childhood and adolescence have lower levels of educational attainment than the younger generations of LGB people who experience bullying in their childhood and adolescence. It is possible that the older generations experienced different, and likely more severe, types of bullying and discrimination that substantially hindered their educational prospects more than it did to the younger generations. This could possibly be due to the fact that discrimination against sexual minorities was more prevalent and widely accepted in previous decades.

⁵ See the annex for the age question.

⁶ See the annex for the social class question.

The socioeconomic background estimate for all twins (1.621) is positive and statistically significant at the 1 percent level. It indicates that moving up from one socioeconomic level to the next increases educational attainment by more than a year and a half. This is economically significant since the average number of years of education is 12.34, meaning that an increase of 1.6 years is an increase of around 13 percent. This is in line with many existing studies that show that a family's socioeconomic background is highly correlated with the educational attainment of its members.

Table 6
OLS estimates for the effects of being LGB and having been bullied in childhood and adolescence on educational attainment, with age and socioeconomic variables added

	<u>Identical Twins</u>	<u>Fraternal Twins</u>	<u>All Twins</u>
	(1)	(2)	(3)
LGB (identifies as lesbian, gay or bisexual)	0.066 (0.318)	0.038 (0.274)	0.053 (0.207)
Bullied (was bullied in childhood)	0.204 (0.137)	0.077 (0.126)	0.150 (0.093)
LGB*Bullied (interaction term)	1.036 (0.605)*	0.350 (0.422)	0.582 (0.347)*
Female	- 0.663 (0.114)***	- 0.296 (0.093)***	- 0.469 (0.072)***
Sickly (was often sick in childhood)	- 0.188 (0.129)	- 0.150 (0.117)	- 0.177 (0.087)**
Age	- 0.020 (0.007)***	- 0.016 (0.007)**	- 0.018 (0.005)***
Socioeconomic background	1.621 (0.102)***	1.454 (0.092)*	1.543 (0.068)***
Sample size	2,206	2,449	4,655
R ²	0.137	0.098	0.115

Notes: The dependant variable is educational attainment measured by the number of years of education. The independent variable of interest in general is the interaction term, but in this table, age and socioeconomic background are also of interest. All estimates are OLS. Robust standard errors in parentheses.

* Significant at the 10% level.

** Significant at the 5% level.

*** Significant at the 1% level.

Given that there are arguably differences in the experiences of bisexual men and women compared to gays and lesbians (Roberts, 2015), additional OLS and fixed effects

regressions were run. They are not reported as there were no statistically significant differences.

Robustness Checks

The binary bullying variable used in the analyses so far was constructed so that only those who responded with the most extreme answers (“yes, many time”, “always”, or “often”) to any of the bullying questions are considered to have been bullied during their childhood and adolescence (binary bullying variable = 1). In order to assess the robustness of the findings and the extent to which they are influenced by variations in the underlying data, this section includes the same regressions run previously but using three different variations of the bullying variable, in order to see how the results in Table 5 change. The first variation of the bullying variable is created by considering anyone who answered “yes” to any of the bullying questions to have been bullied in their childhood. In this variation, all answers other than “never” or “do not remember” are considered as “yes” (and therefore the bullying variable equals 1). The second variation is similar but considers anyone who answered any of the bullying questions with the most severe *or* moderate answers (“yes, several times”, “yes, many times”, “frequently”, “constantly”, “occasionally”, and “often”) as having been bullied. In this variation, all answers other than “never”, “do not remember”, “rarely”, “yes, once or a few times” are considered as “yes” (and therefore the bullying variable equals 1). The third variation is a bullying index which takes the average of the answers to the bullying questions, where answers that indicate higher intensity of bullying are given higher weights.

Bullying variable variation 1

Table 7 below presents the results of the same analysis run in Table 5, but with the bullying variable constructed differently, where respondents with at least one “yes” answer to at least one bullying question are considered to have been bullied in childhood and adolescence. While the coefficient of the bullying variable for identical twins (is statistically significant at the 10 percent level, the coefficient of the interaction term for identical twins is no longer statistically significant as was the case in Table 5. This suggests that bullying in childhood has a significant effect on educational attainment for LGB individuals only when the bullying was frequent.

Table 7
OLS and fixed effects estimates for the effects of being LGB and having been bullied in childhood and adolescence on educational attainment, using the first variation of the bullying variable

	<u>Identical Twins</u>		<u>Fraternal Twins</u>		<u>All Twins</u>	
	OLS (1)	FE (2)	OLS (3)	FE (4)	OLS (5)	FE (6)
LGB (identifies as lesbian, gay or bisexual)	0.562 (0.666)	0.810 (0.814)	0.156 (0.553)	0.370 (0.529)	0.344 (0.429)	0.552 (0.458)
Bullied (was bullied in childhood)	0.212 (0.121)*	0.149 (0.133)	0.131 (0.104)	0.008 (0.136)	0.170 (0.080)**	0.076 (0.096)
LGB*Bullied (interaction term)	- 0.239 (0.736)	0.195 (0.858)	0.085 (0.592)	0.024 (0.574)	- 0.080 (0.465)	0.139 (0.490)
Female	- 0.694 (0.127)***	Omitted	-0.210 (0.098)	0.150 (0.136)	- 0.427 (0.079)***	0.172 (0.134)
Sickly (was often sick in childhood)	- 0.327 (0.137)**	- 0.240 (0.159)	-0.222 (0.122)	-.040 (0.152)	- 0.281 (0.091)***	- 0.137 (0.110)
Sample size	2,225	2,225	2,478	2,478	4,703	4,703
R ²	0.029	0.007	0.006	0.000	0.014	0.000

Notes: This table presents the results when using the first variation of the bullying measure, which is created by considering anyone who answered “yes” to any of the bullying questions to have been bullied in their childhood. In this variation, all answers other than “never” or “do not remember” are considered as “yes” (and therefore the bullying variable is equal to 1). The dependant variable is educational attainment measured by the number of years of education. The independent variable of interest is the interaction term. Odd columns report OLS estimates. Even columns report twin fixed-effects estimates. Robust standard errors in parentheses. The variable ‘Female’ is omitted in identical twins FE estimation because identical twins are either both male or both female.

* Significant at the 10% level.

** Significant at the 5% level.

*** Significant at the 1% level.

Bullying variable variation 2

Table 8 below presents the results of the same analysis run in Table 5 (and Table 7), but with the bullying variable constructed differently, where respondents who answered any of the bullying questions with a moderate or severe answer are considered to have been bullied in childhood and adolescence. This means that people who rarely experienced bullying in childhood are treated the same as those who did not experience bullying at all. This is different from the analysis in the previous variation (Table 7) where those who rarely experienced bullying were still counted as bullied. While the coefficient of the bullying variable for identical twins is statistically significant at the 5 percent level, the coefficient of the interaction term for identical twins is no longer statistically significant as was the case in

Table 5. This suggests that bullying in childhood has a significant effect on educational attainment for LGB individuals only when the bullying was frequent.

Table 8 OLS and fixed effects estimates for the effects of being LGB and having been bullied in childhood and adolescence on educational attainment, using the second variation of the bullying variable						
	<u>Identical Twins</u>		<u>Fraternal Twins</u>		<u>All Twins</u>	
	OLS (1)	FE (2)	OLS (3)	FE (4)	OLS (5)	FE (6)
LGB (identifies as lesbian, gay or bisexual)	0.356 (0.364)	0.276 (0.470)	0.135 (0.431)	0.663 (0.503)	0.289 (0.285)	0.492 (0.347)
Bullied (was bullied in childhood)	0.275 (0.111)**	0.208 (0.128)	0.122 (0.099)	0.036 (0.125)	0.200 (0.074)***	0.109 (0.091)
LGB*Bullied (interaction term)	- 0.048 (0.528)	0.964 (0.610)	0.084 (0.490)	- 0.382 (0.563)	- 0.068 (0.351)	0.219 (0.415)
Female	- 0.815 (0.128)***	Omitted	- 0.277 (0.100)***	0.138 (0.136)	- 0.523 (0.080)***	0.124 (0.134)
Sickly (was often sick in childhood)	- 0.332 (0.136)**	-0.245 (0.157)	- 0.224 (0.122)*	-0.038 (0.151)	- 0.284 (0.091)***	- 0.140 (0.109)
Sample size	2,225	2,225	2,478	2,478	4,703	4,703
R ²	0.030	0.003	0.006	0.000	0.015	0.000

Notes: This table presents the results when using the second variation of the bullying measure, which considers anyone who answered any of the bullying questions with the most severe *or* moderate answers (“yes, several times”, “yes, many times”, “frequently”, “constantly”, “occasionally”, and “often”) as having been bullied. In this variation, all answers other than “never”, “do not remember”, “rarely”, “yes, once or a few times” are considered as “yes” and therefore the bullying variable equals 1. The dependant variable is educational attainment measured by the number of years of education. The independent variable of interest is the interaction term. Odd columns report OLS estimates. Even columns report twin fixed-effects estimates. Robust standard errors in parentheses. The variable ‘Female’ is omitted in identical twins FE estimation because identical twins are either both male or both female.

* Significant at the 10% level.
 ** Significant at the 5% level.
 *** Significant at the 1% level.

Bullying variable variation 3

The third variation of the bullying variable is in the form of a bullying measure where answers that indicate more frequent or intense bullying are giving higher weights, as shown in Table 9 below, and a bullying index is created as a calculation of the average of the answers to the bullying questions for each respondent.

Table 9	
Bullying answer weights used to calculate bullying index (average)	
Answer to bullying question	Weight
“Never”	0
“Yes, once or a few times” or “rarely”	1
“Occasionally”	2
“Yes, several times” or “frequently”	3
“Yes, many times” or “always” or “often”	4

Table 10 below presents the results of the same analysis run in Table 5 (and Tables 7 and 8), but with the bullying variable constructed differently. A bullying index, calculating the average of all bullying answers for each individual, is used. This is different from the analyses used in Tables 5, 7 and 8, which used a threshold approach for the bullying measure, where individuals were considered bullied or not based on a threshold, while the approach used for Table 10 is a weighted approach, where each answer option has a different weight. While the coefficient of the bullying variable for identical twins is statistically significant at the 10 percent level, the coefficient of the interaction term for identical twins is no longer statistically significant as was the case in Table 5. This suggests that being bullied in childhood and adolescence has a significant effect on educational attainment for LGB individuals only when the bullying was frequent. This is similar to the results found when using variations 1 and 2 of the bullying measure (Tables 7 and 8). Based on the main results (Table 5) and the results of the three bullying measure variations (Tables 7, 8 and 10), it is then possible to conclude that being bullied in childhood or adolescence is likely to influence educational attainment.

Table 10
OLS and fixed effects estimates for the effects of being LGB and having been bullied in childhood and adolescence on educational attainment, using the third variation of the bullying variable

	<u>Identical Twins</u>		<u>Fraternal Twins</u>		<u>All Twins</u>	
	OLS (1)	FE (2)	OLS (3)	FE (4)	OLS (5)	FE (6)
LGB (identifies as lesbian, gay or bisexual)	- 0.330 (0.542)	0.231 (0.542)	0.251 (0.492)	0.476 (0.479)	0.025 (0.359)	0.323 (0.360)
Bullied (was bullied in childhood)	0.081 (0.0420)*	0.071 (0.049)	0.044 (0.036)	0.010 (0.047)	0.064 (0.028)**	0.036 (0.035)
LGB*Bullied (interaction term)	0.287 (0.213)	0.307 (0.209)	- 0.018 (0.174)	-0.040 (0.166)	0.097 (0.134)	0.141 (0.136)
Female	- 0.735 (0.124)***	Omitted	- 0.243 (0.096)**	0.140 (0.133)	- 0.463 (0.077)***	0.144 (0.133)
Sickly (was often sick in childhood)	- 0.321 (0.137)	- 0.234 (0.161)	-0.221 (0.122)	-0.029 (0.152)	- 0.277 (0.091)	- 0.130 (0.111)
Sample size	2,217	2,217	2,472	2,472	4,689	4,689
R ²	0.030	0.007	0.005	0.000	0.014	0.000

Notes: This table presents the results when using the third variation of the bullying measure, which is a bullying index, where answers that indicate higher intensity of bullying are given higher weights, as shown in Table 9, and the average is calculated for all bullying questions' answers to create the bullying index. The dependant variable is educational attainment measured by the number of years of education. The independent variable of interest is the interaction term. Odd columns report OLS estimates. Even columns report twin fixed-effects estimates. Robust standard errors in parentheses. The variable 'Female' is omitted in identical twins FE estimation because identical twins are either both male or both female.

* Significant at the 10% level.

** Significant at the 5% level.

*** Significant at the 1% level.

Limitations

Since LGBs constitute a relatively small portion of the sample (4.4 percent), small measurement problems could lead to errors in inference. However, the availability of such detailed data on twins, especially identical twins, allows for an informative study, nonetheless. Additionally, and as mentioned before, the variable to measure whether a person was bullied in childhood and adolescence is constructed based on questions in the survey related to being bullied in childhood and adolescence, where if a respondent answered with the highest, most severe answer (“yes, many times” or “often”) for any of the bullying questions, they are considered to have been bullied in their childhood and adolescence. The issue is that there are four such questions in the men’s questionnaire compared to only one such question in the women’s questionnaire. Therefore, it is possible that there is an

underestimation of the number of women who were bullied in childhood and adolescence – if there were more questions related to being bullied in childhood and adolescence in the women’s questionnaire, it is possible that there would be more women who would be counted as ‘bullied’ in the bullying variable.

Since the survey was conducted in 1992 when being a sexual minority was less accepted than today, the temporal validity of the results could be questioned as it is possible that some people identified themselves as straight in this anonymous survey due to fear of being discovered in one way or another, or due to internalised homophobia or homonegativity, which is the self-internalisation of perceived or experienced external homophobic beliefs (Mansergh et al., 2015).

The final limitation is related to the external validity of this study. Since the survey was conducted in Australia in 1992, there is limited generalizability as the results may not be representative of the broader population of gay, lesbian, and bisexual individuals in Australia today or in other countries.

VI. Conclusion

This study’s findings suggest that the higher educational attainment by LGB individuals compared to straight people is (at least) partially driven by the fact that LGB people are bullied more in their childhood and adolescence. Similar to the Polish population that was forcibly displaced after WWII and seemed to react to the displacement disadvantage by obtaining higher educational credentials than the population that was allowed to remain, LGB individuals resort to obtaining higher educational credentials to offset the disadvantages they disproportionately face throughout their lives.

While the findings of this study demonstrate the resilience of LGB individuals, they also highlight the long-lasting effects and magnitude of emotional scarring caused by bullying, discrimination or assault that LGB individuals endure during their lifetime, particularly in their childhood. Such adverse effects of bullying of LGB individuals warrant attention from academics, educators, social service agencies and policymakers and I hope this research contributes to shedding light on this important issue and encourages further research. In particular, research where data about bullying is collected in more detail at different stages of school life is essential to better understand how bullying affects an LGB individual’s life.

In addition, collection of more recent individual-level data over a long period of time could provide additional evidence that could advance policies protecting LGB individuals.

VII. References

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VIII. Annex: Survey questions

Educational attainment:

12. For each person listed below, indicate the highest education level completed. (Write in the number which describes each individual's education.)

<i>Primary</i> 0-7 yrs (1)	<i>High School</i> 8-10 yrs (2)	<i>High school</i> 11-12 yrs (3)	<i>Apprentice/ diploma etc</i> (4)	<i>Technical/ College</i> (5)	<i>University Degree</i> (6)	<i>University Postgrad.</i> (7)
<input type="checkbox"/> You	<input type="checkbox"/> Your twin	<input type="checkbox"/> Your mother	<input type="checkbox"/> Your father	<input type="checkbox"/> Your partner		

Health in childhood:

25. During childhood, did you have any serious or unusual health problems that lasted for a substantial part of your childhood? Yes No

26. When you were a child, did you tend to get sick more often than other children? Yes No Not sure

Bullying in childhood and adolescence:

Men's questionnaire

1. As a child (before the age of 13) were you ever bullied or pushed around by another boy of about your own age?
 Never Yes, once or a few times Yes, several times Yes, many times Do not recall

10. When you were a child, did you ever avoid a boy or group of boys your own age because you were afraid of being teased or harassed?
 Never Yes, once or a few times Yes, several times Yes, many times Do not remember

12. When you were a child, were you ever ridiculed by other boys your own age for your performance in team sports?
 Never Rarely Frequently Constantly Did not play team sports as a child

22. As a child, did you have the reputation of a "sissy"
 Often Occasionally Never

Women's questionnaire:

16. As a child, did you have the reputation of a "tomboy"
 Often Occasionally Never

Sexual orientation:

Men's questionnaire:

4. Do you consider yourself to be:

- Heterosexual (Straight) Bisexual Homosexual (Gay)

In this question, "heterosexual" means that sexually, you desire contact only with women; "bisexual" means that you desire contact with both men and women; "homosexual" means that you desire contact only with men.

Women's questionnaire:

4. Do you consider yourself to be:

- Heterosexual (Straight) Bisexual Homosexual (Lesbian or Gay)

In this question, "heterosexual" means that sexually, you desire contact only with men; "bisexual" means that you desire contact with both men and women; "homosexual" means that you desire contact only with women.

Age:

2. How old are you? _ _ years

Socioeconomic background:

11. If you were asked to describe your social class, which of these terms would you use? Working Class Middle class Upper class