



ELSEVIER

Contents lists available at ScienceDirect

## Drug and Alcohol Dependence

journal homepage: [www.elsevier.com/locate/drugalcdep](http://www.elsevier.com/locate/drugalcdep)

Full length article

# Effects of familial and non-familial warmth during childhood and adolescence on sexual-orientation disparities in alcohol use trajectories and disorder during emerging adulthood



Robert W.S. Coulter<sup>a,b,c,d,\*</sup>, Hee-Jin Jun<sup>e</sup>, Nhan Truong<sup>e</sup>, Christina Mair<sup>a</sup>, Nina Markovic<sup>b,f</sup>,  
M. Reuel Friedman<sup>b,g</sup>, Anthony J. Silvestre<sup>b,g</sup>, Ron Stall<sup>a,b</sup>, Heather L. Corliss<sup>e,h</sup>

<sup>a</sup> Department of Behavioral and Community Health Sciences, Graduate School of Public Health, University of Pittsburgh, 130 De Soto Street, Pittsburgh, PA, 15261, USA

<sup>b</sup> Center for LGBT Health Research, Graduate School of Public Health, University of Pittsburgh, 130 DeSoto Street, Pittsburgh, PA, 15261 USA

<sup>c</sup> Division of Adolescent and Young Adult Medicine, Children's Hospital of Pittsburgh of UPMC, 3414 Fifth Ave, Pittsburgh, PA, 15213 USA

<sup>d</sup> Clinical and Translational Science Institute, School of Medicine, University of Pittsburgh, 3550 Terrace Street, Pittsburgh, PA, 15261 USA

<sup>e</sup> Division of Health Promotion and Behavioral Science, Graduate School of Public Health, San Diego State University, 9245 Sky Park Court, Suite 100, San Diego, CA, 92123 USA

<sup>f</sup> Department of Dental Public Health, School of Dental Medicine, University of Pittsburgh, 3501 Terrace Street, Pittsburgh, PA, 15261 USA

<sup>g</sup> Department of Infectious Diseases and Microbiology, Graduate School of Public Health, University of Pittsburgh, 3520 Fifth Avenue, Pittsburgh, PA, 15261 USA

<sup>h</sup> Channing Division of Network Medicine, Brigham and Women's Hospital, 181 Longwood Avenue, Boston, MA, 02115, USA

## ARTICLE INFO

## Keywords:

Cohort study  
Sexual orientation  
Alcohol use trajectories  
Alcohol use disorders  
Emerging adulthood

## ABSTRACT

**Background:** We investigated sexual-orientation differences in typologies of self-reported familial and non-familial warmth in childhood (before age 11) and adolescence (ages 11–17); and tested whether warmth explained sexual minority emerging adults' (ages 18–25) heightened odds of having heavier alcohol use trajectories (AUTs) and heightened risk for past-year alcohol use disorder (AUD) compared to completely heterosexuals.

**Methods:** Using self-reported data from the U.S.-based Growing Up Today Study cohort, latent class analyses identified typologies of familial and non-familial warmth during childhood and adolescence. Multivariable regression models tested our objectives.

**Results:** Six warmth classes emerged, including: High-High (i.e., high familial and high non-familial warmth, respectively); High-Moderate; Moderate-Moderate; Moderate-Occasional; Occasional-Occasional; and Low-Low. Among women, sexual minorities had higher odds than completely heterosexuals of being in the Moderate-Moderate, Moderate-Occasional, and Occasional-Occasional versus the High-High warmth class. There were no significant associations between sexual orientation and warmth classes for men. Lower warmth classes were generally associated with greater past-year AUD, and mediated heightened disparities in AUD for sexual minority women versus completely heterosexual women (4.3% mediated), but not among men. Warmth classes were generally unassociated with AUTs, and did not mediate sexual-orientation differences in AUTs.

**Conclusions:** Lower warmth was associated with greater alcohol-related problems, but not alcohol use itself. Warmth explained a small proportion of AUD disparities for sexual minority women—but not for men.

## 1. Introduction

Sexual minority (e.g., gay/lesbian, bisexual, and mostly heterosexual) emerging adults (i.e., aged 18–25 years) are at greater risk for alcohol use, heavy alcohol use trajectories, and alcohol use disorder than their heterosexual peers, especially among women (Corliss et al., 2008; Coulter et al., 2018, 2016; Eisenberg and Wechsler, 2003; Goldberg et al., 2013). Studies on the mechanisms of these disparities

have largely focused on risk factors (e.g., bullying victimization), and much less attention has been given to protective factors (Kidd et al., 2018). Therefore, the current study will focus on the potential protective factor of warmth, and whether warmth serves as a mechanism (i.e., mediator) in the production of sexual-orientation disparities in alcohol use trajectories and alcohol use disorder.

\* Corresponding author at: Department of Behavioral and Community Health Sciences, Graduate School of Public Health, University of Pittsburgh 6129 Public Health Building, 130 De Soto Street, Pittsburgh, Pennsylvania, 15261, USA.

E-mail address: [robert.ws.coulter@pitt.edu](mailto:robert.ws.coulter@pitt.edu) (R.W.S. Coulter).

<https://doi.org/10.1016/j.drugalcdep.2019.107643>

Received 20 November 2018; Received in revised form 28 August 2019; Accepted 29 August 2019

Available online 18 October 2019

0376-8716/ © 2019 Elsevier B.V. All rights reserved.

### 1.1. Warmth and sexual orientation

Warmth refers to demonstrations and expressions of praise, closeness, love, and affection (Amato, 1990; Zhou et al., 2002), and can be provided by adult family members (e.g., parents) as well as non-family members (e.g., teachers, community leaders). The presence of warmth from adults is associated with healthy child and adolescent development as shown in both empirical research (Kincaid et al., 2012; Resnick et al., 1997; Williamson et al., 2017; Yap and Jorm, 2015) and theory (e.g., social development model; Hawkins and Weis, 1985).

Certain youth populations may experience less warmth than others. Based on the theories of minority stress and stigma as a fundamental cause of health (Hatzenbuehler et al., 2013; Meyer, 2003), sexual minority youth (SMY) are hypothesized to be less likely to experience warmth than heterosexual youth because SMY's sexual orientation is often stigmatized. Empirical research found mixed results for sexual-orientation differences in familial warmth: most studies show that SMY report lower familial warmth than do heterosexual youth (Eisenberg and Resnick, 2006; Needham and Austin, 2010; Pearson and Wilkinson, 2013; Power et al., 2015; Stone et al., 2014); but other research found no differences in familial warmth by sexual orientation (Johnson et al., 2011; Martin-Storey and Crosnoe, 2012). Additionally, research suggests that boys report receiving less warmth (i.e., maternal affection) than girls (Murphy et al., 2010; Rosario et al., 2014a, b), and gender may modify the association between sexual orientation and familial warmth: one study found the presence of sexual-orientation disparities in parental closeness for girls, but not for boys (Fish and Russell, 2018).

Non-familial warmth is also associated with positive outcomes, such as self-esteem (Hurd et al., 2018; Snapp et al., 2015; Watson et al., 2019). However, few studies have examined sexual-orientation differences in non-familial warmth. Nevertheless, existing studies show that the presence of non-familial warmth is lower among SMY than heterosexual youth (Eisenberg and Resnick, 2006; Stone et al., 2014). Studies on both non-familial and familial warmth often only examine sexual-orientation differences in warmth from a single developmental period (i.e., adolescence)—and childhood warmth is often unexamined, despite warmth being known to vary across time (e.g., maternal warmth usually decreases from childhood to adolescence; Trentacosta et al., 2011; Wang et al., 2011).

To provide a more comprehensive view of warmth, it is worth identifying typologies of people with unique patterns of familial and non-familial warmth (e.g., low familial and low non-familial warmth), and whether there are sexual-orientation differences in memberships to these warmth typologies. One way to examine sexual-orientation differences in both familial and non-familial warmth is to use a combination of person-centered approaches (e.g., latent class analysis) and variable-centered approaches (e.g., regression analyses). Person-centered approaches can classify similar types of individuals into unique subgroups, which are unable to be captured by a single variable or scale (Howard and Hoffman, 2018). These approaches, including latent class analyses, can create emergent subgroup populations based on patterns derived from many variables (Howard and Hoffman, 2018). Therefore, person-centered approaches can be particularly useful for examining typologies of both familial and non-familial warmth across both childhood and adolescence. Subsequently, these person-centered approaches can be combined with variable-centered approaches (e.g., regression) to examine the associations between variables (Murdock and Miller, 2003), such as how sexual orientation is associated with different warmth typologies. Using a combination of person-centered and variable-centered approaches can increase our knowledge about how sexual orientation is related to warmth typologies, which can be based on multiple variables such as familial and non-familial warmth in both childhood and adolescence.

### 1.2. Warmth and alcohol use trajectories/disorder

Warmth can benefit youth in multiple ways: warmth can assist youth in developing healthy coping mechanisms and self-regulation (i.e., guiding one's own cognitive, emotional, and behavioral processes to achieve goals), as well as decreasing their pro-substance use norms (e.g., social approval of substance use), thereby reducing consumption of alcohol (Donaldson et al., 2016; Eiden et al., 2009, 2007). Cross-sectional studies of adolescents show that having familial and non-familial warmth is associated with lower alcohol use (Calafat et al., 2014; Johnson and Pandina, 1991; Kelly et al., 2011; Latendresse et al., 2008; Mogro-Wilson, 2013; Mongro-Wilson, 2007; Resnick et al., 1997; Vazsonyi et al., 2015). However, during emerging adulthood, cross-sectional analyses found mixed results for the associations between familial warmth and alcohol use: one study found null associations (Cleveland et al., 2014), and another found protective associations only for certain subgroups (Luk et al., 2015). Furthermore, longitudinal studies found that familial and non-familial warmth from earlier periods in the life-course were associated with lower alcohol use in later periods, including emerging adulthood (Donaldson et al., 2016; Eiden et al., 2016; McNeely and Falci, 2004). Yet, it remains unknown whether familial and non-familial warmth in childhood and adolescence are associated with alcohol use trajectories (AUTs; i.e., alcohol use over time) throughout emerging adulthood. No studies to our knowledge have examined how simultaneously having low familial and low non-familial warmth during early periods of the life course may work together to increase the risk of heavy AUTs later in life. If having lower warmth in both areas simultaneously are associated with heavier AUTs, then interventions that increase all types of warmth during childhood and adolescence (which currently do not exist; Coulter et al., 2019) may reduce the likelihood of having heavy AUTs throughout emerging adulthood. Such interventions may also reduce the many short- and long-term negative consequences of chronic moderate and heavy alcohol use.

A common sequela of heavy alcohol use is the development of an alcohol use disorder (AUD; e.g., abuse or dependence; Chassin et al., 2004; Nelson et al., 2015; Sher et al., 2004). However, few studies have examined the effects of warmth on AUD. One study found that low maternal warmth during adolescence was associated with increased odds of having comorbidity of AUD and mental health disorders at age 21 years (Salom et al., 2015). Yet most studies found that familial warmth was not associated with AUD or AUD-comorbidity in adolescence (Barnow et al., 2002; Greenfield et al., 2016) and emerging adulthood (Salom et al., 2016). However, previous studies have examined the effects of familial warmth from a single time period on AUD, thereby limiting knowledge about how warmth from multiple contexts (e.g., familial and non-familial) and during earlier time periods (e.g., childhood and adolescence) are associated with AUD in emerging adulthood. Such a study would provide a richer description of how warmth from earlier periods is associated with AUD in emerging adulthood.

Research has shown that sexual minority emerging adults evidence greater risk of alcohol use, heavy AUTs, and AUD than their heterosexual peers, especially among women (Corliss et al., 2008; Coulter et al., 2018, 2016; Eisenberg and Wechsler, 2003; Goldberg et al., 2013). These differences may be partially explained by SMY having lower warmth than heterosexuals during childhood and adolescence. Support for this hypothesis would suggest that increasing warmth for SMY would mitigate sexual-orientation disparities in AUTs and AUD, thereby informing future intervention studies and prevention efforts.

#### 1.3. The current study

This paper sought to address the aforementioned gaps in research on warmth and alcohol outcomes across the first three decades of the life-course using data from the Growing Up Today Study. First, we

estimated latent classes of self-reported familial and non-familial warmth during childhood and adolescence. We hypothesized there would be different warmth classes characterized by high and low warmth. Second, we tested for sexual-orientation differences in warmth class memberships, and whether these differences varied by gender. We hypothesized that sexual minority populations would be more likely to be members of classes exemplifying less warmth, and these differences would be larger among girls. Third, we examined the effects of warmth classes on sexual-orientation differences in AUTs and AUD in emerging adulthood, and tested whether warmth classes mediated the sexual-orientation disparities in AUTs and AUD in emerging adulthood. We hypothesized that lower warmth classes would be associated with heavier AUTs and greater risk of AUD, and that warmth classes would mediate the sexual-orientation differences in AUTs and AUD.

## 2. Methods

We used data from the Growing Up Today Study (GUTS), a longitudinal cohort study. In 1996, GUTS enrolled 16,875 participants aged 9–14 years who were children of participants in the Nurses' Health Study II—which is a cohort of 116,430 female registered nurses from 14 U.S. states begun in 1989. GUTS participants completed surveys, originally on an annual basis and every 2–3 years from 2001–2010. Additional GUTS information is reported elsewhere (Corliss et al., 2008; Field et al., 1999). The current study included participants who provided information on sexual orientation and at least 1 of the 4 familial or non-familial warmth items, measured in the 2007 survey wave when participants' average age was 22.7 years (range: 19–27 years). Our analytic sample included 9095 participants (5783 women; 3312 men), representing 53.9% of the cohort. Brigham and Women's Hospital Institutional Review Board approved this study.

### 2.1. Measurements

Warmth was assessed on the 2007 questionnaire with 4 items adapted from the Childhood Trauma Questionnaire (CTQ; Bernstein et al., 1994, 2003). The original CTQ item assessed familial warmth, and GUTS added a similar item to assess non-familial warmth. GUTS adapted the items to assess 2 developmental periods—childhood (before age 11 years) and adolescence (11–17 years of age). For example, we assessed childhood familial warmth using the following question: “When you were a child (before age 11), how often did someone in your family make you feel that you were important or special?” We modified this item to measure childhood non-familial warmth (by stating “someone who was NOT a family member”), teenage familial warmth (by stating “when you were a teenager (ages 11–17)”), and teenage non-familial warmth. We ordinally coded all 4 items' response options: never; rarely; sometimes; often; and very often.

Sexual orientation was assessed at each survey wave from 1999–2010: “Which one of the following best describes your feelings?” Response options included: completely heterosexual (attracted to persons of the opposite sex); mostly heterosexual; bisexual (equally attracted to men and women); mostly homosexual; completely homosexual (gay/lesbian, attracted to persons of the same sex); and unsure. We classified sexual orientation based on participants' most recent report. Like prior research (Corliss et al., 2008), we removed participants who were “unsure” of their sexual orientation because of small sample size ( $n = 6$ ). For our primary analyses, we combined completely homosexual, mostly homosexual, bisexual, and mostly heterosexual into a single group (henceforth referred to as sexual minority) to increase statistical powers. Secondarily, we conducted analyses using a variable that highlights the subgroups of sexual minorities (results located in the appendices).

AUT classes were derived using longitudinal latent class analyses (LLCA; Coulter et al., 2018). We conducted LLCA on data from the emerging adulthood period (18–25 years) with past-year average

frequency of drinking, past-year average quantity of drinking per episode, and past-year frequency of binge drinking. Six AUT classes emerged for women, and five emerged for men: these included heavy, moderate, escalation-to-moderately-heavy, light (for women only), legal (drinking onset at age 21), and non-drinkers.

Probable past-year AUD was assessed in 2010 (when participants' mean age was 25.3 years) with items assessing symptoms based on the DSM-IV (American Psychiatric Association, 1994), as adapted by the National Survey on Drug Use and Health (U.S. Department of Health and Human Services, 2009). The DSM-IV described two distinct disorders, alcohol abuse and alcohol dependence, which were present in 9.9% and 10.2% of participants, respectively. If participants had alcohol abuse or dependence, we coded them as having a probable AUD (producing a binary variable). We based this on extant research (Cochran et al., 2007; Hatzenbuehler et al., 2009) and because the DSM-5 (American Psychiatric Association, 2013) combines abuse and dependence into one solitary disorder.

Demographics included: gender (natal female versus male; measured at baseline); race/ethnicity (White vs. non-White; measured at baseline); region of residence (West vs. Midwest, Southwest, and Northeast; measured in 2007); and age in years (calculated based on participant's birthdate and date of the 2007 questionnaire return). Covariates included lifetime college attendance (any college attendance versus none; measured in 2010) and lifetime pregnancy (yes/no) for women (measured prospectively from 1999 to 2010). For covariates, we used the missing indicator method (Horton and Kleinman, 2007), permitting analysis of all available data and preservation of statistical power.

### 2.2. Analyses

#### 2.2.1. Warmth classes

Following Masyn's guidelines (2013), we used a classify-analyze approach to characterize latent classes of familial and non-familial warmth and estimate independent and dependent variables associated with these classes. First, we estimated warmth classes using latent class analysis in Mplus version 7.2 (Los Angeles, CA), which is a person-centered approach that allows for the estimation of subgroups who differ across multiple indicators of warmth. We selected latent class (instead of latent profile) analysis because our variables were ordinal and skewed. We estimated the unconditional model with the 4 ordinal warmth variables using the robust maximum likelihood estimator (Muthén and Shedden, 1999; Yuan and Bentler, 2000). We used the complex survey analysis procedure to account for non-independence of familial clusters (Muthén and Muthén, 1998–2012).

We estimated 1- through 8-class solution models. To determine the best-fitting number of classes, we examined the Akaike Information Criterion (AIC), Bayesian Information Criterion (BIC), the Bayes Factor (BF), the correct model probability (cmP), and the Vuong-Lo-Mendell-Rubin adjusted likelihood ratio test (VLMR LRT; Kass and Raftery, 1995; Masyn, 2013; Muthén and Muthén, 1998–2012; Nylund et al., 2007). We considered the best fitting model to have a low BIC, a significant improvement in fit over the previous model (based on VLMR LRT), and the highest interpretative validity (Masyn, 2013; Muthén and Shedden, 1999; Nylund et al., 2007). We examined entropy, and considered good latent class separation and assignment as classes with average posterior probabilities > 0.7 and odds of correct classification > 5 (Masyn, 2013; Nagin, 2005). We examined class patterns separately by gender but results were conceptually similar (results available upon request); therefore, we reported results from the total sample. We assigned participants to the class for which they had the highest posterior probability of membership.

#### 2.2.2. Differences in warmth class membership

We used chi-square tests accounting for familial clusters (Rao and Scott, 1984) in SAS version 9.4 (Cary, NC) to examine the bivariate

associations of warmth classes with sexual orientation. We used multinomial logistic regression models to examine sexual-orientation differences in warmth class membership, controlling for demographics, using generalized estimating equations (GEE) to account for familial clusters. We added sexual-orientation-by-gender interaction terms to test effect modification of sexual orientation by gender.

2.2.3. Associations with AUTs and AUD

We engaged in a two-step model building process to examine whether warmth mediates sexual-orientation differences in AUTs and AUD. The first model contained the main effects of sexual orientation on the outcome (controlling for demographics and covariates); and the second model added warmth class as an independent variable to the first model. When warmth was significantly associated with sexual orientation and the outcome, we conducted a formal test of mediation using the %MEDIATE macro (Hertzmark et al., 2012). We stratified analyses by gender because AUTs differ by gender (Coulter et al., 2018) and sexual-orientation disparities in AUD are larger for women than men (Goldberg et al., 2013).

For AUTs, multinomial logistic regression models tested the associations with trajectory class membership, controlling for demographics and covariates, using GEE. Reference groups in the models were non-drinkers (versus other trajectory classes). For the binary AUD variable, we fit modified Poisson regression models (Zou, 2004) with GEE.

3. Results

Table 1 describes the sample composition by gender and sexual orientation. Table 2 shows the results of latent class analyses for the warmth variables. We selected the 6-class model based on interpretability and the fit indices. There was significant improvement in model fit from the 5- to 6-class model, but a non-significant improvement from the 6- to 7-class model. The final model had highest entropy, good separation, and adequate class assignment.

Fig. 1 depicts the 6 latent classes of warmth. Classes included: high familial and high non-familial warmth (henceforth, High-High); high familial and moderate non-familial warmth (henceforth, High-Moderate); moderate familial and moderate non-familial warmth (henceforth, Moderate-Moderate); moderate familial and occasional non-familial warmth (henceforth, Moderate-Occasional); occasional familial and occasional non-familial warmth (henceforth, Occasional-Occasional); and low familial and low non-familial warmth (henceforth, Low-Low).

3.1. Differences in warmth class membership

Table 3 shows the unadjusted percentages of membership in each warmth class by sexual orientation for women and men separately. In a multivariable model including the main effects of gender and sexual orientation on warmth class membership (adjusting for demographics) showed that men had higher odds than women of being in the High-Moderate (OR = 1.45; p < 0.001), Moderate-Moderate (OR = 1.93; p < 0.001), Moderate-Occasional (OR = 3.15; p < 0.001), Occasional-Occasional (OR = 2.64; p < 0.001), and Low-Low (OR = 1.94; p < 0.001) warmth classes versus the High-High warmth class (results not shown). Multivariable models including gender-by-sexual-orientation interactions showed that all of the interaction effects were statistically significant with sexual-orientation differences in warmth class membership being smaller for men than women (ORs range: 0.43-0.64; all p-values < 0.05; results not shown). Therefore, we present final models stratified by gender.

Among women (Table 4), sexual minorities had higher odds than completely heterosexuals of being in the Moderate-Moderate, Moderate-Occasional, and Occasional-Occasional warmth classes than the High-High warmth class. Among men, there were no significant differences in warmth class memberships for sexual minorities compared

**Table 1**  
Characteristics of the sample by sexual orientation, stratified by gender: Growing Up Today Study.

	Sexual Orientation		Sexual Minority		p
	Completely Heterosexual				
	n	(%)	n	(%)	
<b>WOMEN</b>					
Total, row percentage	4,642	(80.3)	1141	(19.7)	
<b>Race/ethnicity</b>					
White	4,362	(94.0)	1042	(91.3)	0.004
Non-White	280	(6.0)	99	(8.7)	
<b>Region</b>					
West	708	(15.3)	235	(20.6)	< .001
Midwest	1,634	(35.2)	312	(27.3)	
South	793	(17.1)	193	(16.9)	
Northeast	1,507	(32.5)	401	(35.1)	
<b>College Attendance</b>					
Never Attended	95	(2.4)	46	(4.9)	0.001
Attended	3,859	(97.6)	902	(95.2)	
<b>Lifetime Pregnancy</b>					
No	3,158	(78.8)	748	(76.7)	0.163
Yes	849	(21.2)	227	(23.3)	
Age, mean (sd)	22.7	(1.7)	22.7	(1.7)	0.602
<b>MEN</b>					
Total, row percentage	2,930	(88.5)	382	(11.5)	
<b>Race/ethnicity</b>					
White	2748	(93.8)	337	(88.2)	0.001
Non-White	182	(6.2)	45	(11.8)	
<b>Region</b>					
West	498	(17.0)	76	(19.9)	0.205
Midwest	1,036	(35.4)	115	(30.1)	
South	434	(14.8)	61	(16.0)	
Northeast	962	(32.8)	130	(34.0)	
<b>College Attendance</b>					
Never Attended	85	(4.0)	9	(2.9)	0.322
Attended	2,058	(96.0)	299	(97.1)	
Age, mean (sd)	22.6	(1.7)	22.6	(1.7)	0.583

Note. Column percentages are presented throughout the table except where noted. P-values were derived using Rao-Scott chi-squared tests for categorical variables and univariable models with generalized estimating equations for age, both of which adjusted for sibling clusters. Missing data for college attendance and pregnancy were excluded from this table, including the Rao-Scott chi-squared tests. sd = standard deviation. Sexual orientation was based on participants' last self-report from 1999 to 2010, wherein sexual minority includes mostly heterosexuals, bisexuals, and gays/lesbians; gender and race/ethnicity were assessed in 1996 at baseline; region was assessed in 2007; college attendance was assessed in 2010; lifetime pregnancy was assessed prospectively from 1999 to 2010; age was assessed in 2007.

with completely heterosexual men.

3.2. Unadjusted associations with AUTs and AUD

Table 5 shows the unadjusted percentages depicting associations of sexual orientation and warmth on AUTs and past-year AUD stratified by gender. Sexual orientation was significantly associated with AUTs and AUD. Warmth was significantly associated with AUD but not AUTs.

3.3. Multivariable models for AUTs

Among women, sexual minorities had higher odds than completely heterosexual participants of being heavy, moderate, escalation-to-moderately-heavy, and light drinkers versus non-drinkers (Table 6; Model 1). Warmth classes were not significantly associated with AUTs (Model 2; controlling for sexual orientation, demographics, and covariates), thereby not mediating sexual-orientation differences in AUTs for women.

Among men, sexual minorities had higher odds than completely

**Table 2**

Class enumeration fit indices and qualities for latent class analyses for familial and non-familial warmth during childhood and adolescence among total sample: Growing Up Today Study.

Classes	Free parameters	Log-Likelihood	AIC	BIC	SSA-BIC	$\chi^2$ model fit	$\chi^2$ df	$\chi^2$ p-value	Entropy	BF	cmP	AWE	VLMR LRT p-value
1	16	-46,607	93,246	93,360	93,310	10,123.11	600	< 0.001	n/a	< 1	0.00	93,554	n/a
2	33	-40,254	80,575	80,810	80,705	7,680.45	583	< 0.001	0.889	< 1	0.00	81,209	< 0.001
3	50	-37,879	75,857	76,213	76,054	6,079.23	571	< 0.001	0.849	< 1	0.00	76,820	< 0.001
4	67	-36,923	73,979	74,456	74,243	5,052.32	555	< 0.001	0.852	< 1	0.00	75,269	< 0.001
5	84	-35,939	72,047	72,644	72,377	4,505.35	538	< 0.001	0.908	< 1	0.00	73,662	< 0.001
<b>6</b>	<b>101</b>	<b>-35,336</b>	<b>70,874</b>	<b>71,592</b>	<b>71,271</b>	<b>3,662.29</b>	<b>520</b>	<b>&lt; 0.001</b>	<b>0.932</b>	<b>&lt; 1</b>	<b>0.00</b>	<b>72,816</b>	<b>&lt; 0.001</b>
7	118	-35,066	70,368	71,208	70,833	3,212.82	503	< 0.001	0.907	< 1	0.00	72,637	0.764
8	135	-34,832	69,935	70,895	70,466	2,658.99	486	< 0.001	0.908	n/a	1.00	72,530	0.760

Note. Models were estimated with a sample of 5786 women and 3316 men. Warmth was assessed in 2007. Boldface indicates the model we selected. AIC = Akaike information criterion; BIC = Bayesian information criterion; SSA-BIC = Sample size-adjusted Bayesian information criterion; BF = Bayes factor; cmP = Correct model probability; AWE = Approximate weight of evidence criterion; VLMR LRT = Vuong-Lo-Mendell-Rubin likelihood ratio test; df = degrees of freedom; n/a = not applicable. Bootstrap Likelihood Ratio Test could not be estimated because we employed the COMPLEX command in Mplus to adjust for non-independence within sibling clusters.

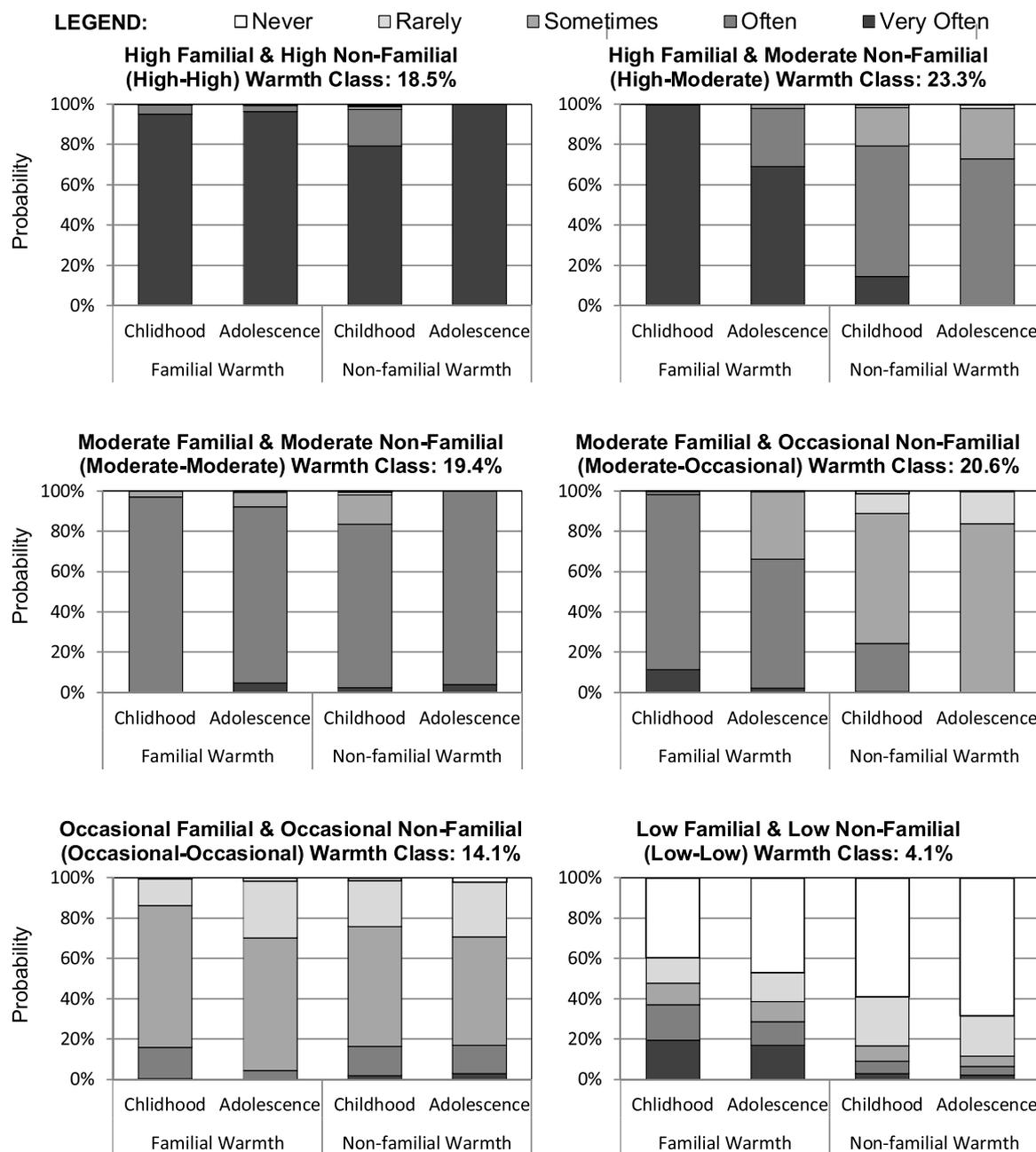


Fig. 1. Latent class analysis profile plots for familial and non-familial warmth in childhood and adolescence: Growing Up Today Study.

**Table 3**  
Bivariate associations between sexual orientation and warmth classes, stratified by gender: Growing Up Today Study.

	Warmth Classes												
	High Familial & High Non-Familial (High-High)		High Familial & Moderate Non-Familial (High-Moderate)		Moderate Familial & Moderate Non-Familial (Moderate-Moderate)		Moderate Familial & Occasional Non-Familial (Moderate-Occasional)		Occasional Familial & Occasional Non-Familial (Occasional-Occasional)		Low Familial & Low Non-Familial (Low-Low)		
	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)	p
<b>WOMEN</b>													
<b>Total</b>	1,285	(22.2)	1466	(25.4)	1109	(19.2)	966	(16.7)	726	(12.6)	231	(4.0)	
<b>Sexual Orientation</b>													
Completely Heterosexual	1098	(23.7)	1218	(26.2)	888	(19.1)	729	(15.7)	515	(11.1)	194	(4.2)	< .001
Sexual Minority	187	(16.4)	248	(21.7)	221	(19.4)	237	(20.8)	211	(18.5)	37	(3.2)	
<b>MEN</b>													
<b>Total</b>	401	(12.1)	657	(19.8)	651	(19.6)	906	(27.4)	556	(16.8)	141	(4.3)	
<b>Sexual Orientation</b>													
Completely Heterosexual	352	(12.0)	599	(20.4)	576	(19.7)	803	(27.4)	468	(16.0)	132	(4.5)	0.002
Sexual Minority	49	(12.8)	58	(15.2)	75	(19.6)	103	(27.0)	88	(23.0)	9	(2.4)	

Note. Row percentages are presented throughout the table. P-values were derived using Rao-Scott chi-squared tests adjusting for sibling clusters. Sexual orientation was based on participants' last self-report from 1999 to 2010, wherein sexual minority includes mostly heterosexuals, bisexuals, and gays/lesbians; gender was assessed in 1996 at baseline; warmth was assessed in 2007.

heterosexual participants of being heavy, moderate, and escalation-to-moderately-heavy drinkers versus non-drinkers (Table 6; Model 3). A few warmth classes were significantly associated with AUTs (Model 4). Men in the High-Moderate warmth class had higher odds than men in the High-High warmth class of being heavy drinkers versus non-drinkers. Men in the Moderate-Occasional warmth class had higher odds than men in High-High warmth class of being heavy, moderate, and escalation-to-moderately-heavy drinkers versus non-drinkers. However, warmth did not mediate sexual-orientation differences in AUTs because the sexual-orientation effects were not attenuated from Models 3 to 4.

3.4. Multivariable models for AUD

Among women, sexual minorities were 2.03 times more likely than completely heterosexual participants to meet criteria for probable AUD (Table 7; Model 1). Moderate-Occasional, Occasional-Occasional, and Low-Low warmth classes were 1.44–1.56 times more likely to report probable AUD than High-High warmth class participants (Model 2). Warmth classes mediated sexual-orientation differences in AUD for

sexual minorities compared to completely heterosexuals (mediated proportion = 4.3%; p-values = 0.003). After controlling for warmth classes, sexual minority women remained more likely than completely heterosexual women to evidence AUD (Model 2).

Among men, sexual minorities were 1.46 times more likely than completely heterosexual participants to meet criteria for probable AUD in 2010 (Table 7; Model 1). Moderate-Moderate and Moderate-Occasional warmth classes were 1.30–1.32 times more likely to report probable AUD than High-High warmth class participants (Model 2). Warmth classes did not significantly mediate sexual-orientation differences in AUD for men. After controlling for warmth classes, sexual minority men remained more likely than completely heterosexual men to evidence AUD (Model 2).

4. Discussion

We found distinct typologies of familial and non-familial warmth across childhood and adolescence, and membership in these typologies differed by sexual orientation. Our study adds unique contributions to

**Table 4**  
Results of multinomial logistic regression models testing sexual-orientation differences in warmth class memberships, stratified by gender: Growing Up Today Study.

	High-Moderate		Moderate-Moderate		Moderate-Occasional		Occasional-Occasional		Low-Low	
	versus		versus		versus		versus		versus	
	High-High Warmth Class		High-High Warmth Class		High-High Warmth Class		High-High Warmth Class		High-High Warmth Class	
	OR (95% CI)	p	OR (95% CI)	p	OR (95% CI)	p	OR (95% CI)	p	OR (95% CI)	p
<b>WOMEN</b>										
<b>Sexual Orientation</b>										
Completely Heterosexual	1.00 (referent)		1.00 (referent)		1.00 (referent)		1.00 (referent)		1.00 (referent)	
Sexual Minority	1.18 (0.96, 1.46)	0.107	<b>1.48 (1.20, 1.84)</b>	< .001	<b>1.92 (1.55, 2.38)</b>	< .001	<b>2.36 (1.88, 2.95)</b>	< .001	1.12 (0.76, 1.64)	0.571
<b>MEN</b>										
<b>Sexual Orientation</b>										
Completely Heterosexual	1.00 (referent)		1.00 (referent)		1.00 (referent)		1.00 (referent)		1.00 (referent)	
Sexual Minority	0.71 (0.47, 1.06)	0.096	0.94 (0.64, 1.38)	0.754	0.93 (0.65, 1.33)	0.676	1.34 (0.92, 1.96)	0.126	0.48 (0.23, 1.01)	0.053

Note. Boldface indicates statistical significance (p < 0.05). Models were estimated with samples of 5783 women and 3312 men. Models adjusted for race/ethnicity (assessed in 1996 at baseline), age (assessed in 2007), and region (assessed in 2007). Sexual orientation was based on participants' last self-report from 1999 to 2010, wherein sexual minority includes mostly heterosexuals, bisexuals, and gays/lesbians; gender was assessed in 1996 at baseline; warmth was assessed in 2007. High-High = High familial & high non-familial warmth; High-Moderate = High familial & moderate non-familial warmth; Moderate-Moderate = Moderate familial & moderate non-familial warmth; Moderate-Occasional = Moderate familial & occasional non-familial warmth; Occasional-Occasional = Occasional familial & occasional non-familial warmth; Low-Low = low familial & low non-familial warmth; OR = odds ratio; CI = confidence interval.

**Table 5**  
Alcohol use trajectories and disorders by sexual orientation and warmth classes, stratified by gender: Growing Up Today Study.

	Alcohol Use Trajectory Classes from Ages 18-25						Alcohol Use Disorder		
	Non-Drinkers %	Heavy Drinkers %	Moderate Drinkers %	Legal Drinkers %	Escalation-to-Moderately-Heavy Drinkers %	Light Drinkers %	p	Past-Year Prevalence %	p
<b>WOMEN</b>									
<b>Total</b>	7.4	22.9	31.3	11.0	10.4	17.0		16.8	
<b>Sexual Orientation</b>									
Completely Heterosexual	8.2	21.6	30.9	12.0	10.3	17.0	< .001	14.0	< .001
Sexual Minority	4.1	28.1	33.2	6.8	10.8	17.0		28.3	
<b>Warmth Classes</b>									
High-High	7.7	23.4	30.5	10.8	9.6	18.0	0.207	13.5	< .001
High-Moderate	6.8	23.5	32.0	10.0	11.9	15.8		15.6	
Moderate-Moderate	6.7	22.7	32.5	13.3	9.9	14.9		15.0	
Moderate-Occasional	7.9	21.1	32.6	10.6	10.2	17.5		20.5	
Occasional-Occasional	8.7	22.2	29.1	10.4	10.0	19.6		22.4	
Low-Low	7.4	26.5	27.4	10.0	9.6	19.1		19.7	
<b>MEN</b>									
<b>Total</b>	9.2	35.3	25.4	16.6	13.5			27.3	
<b>Sexual Orientation</b>									
Completely Heterosexual	9.8	35.8	23.9	16.9	13.6		< .001	25.8	< .001
Sexual Minority	4.7	31.3	36.8	14.2	12.9			37.8	
<b>Warmth Classes</b>									
High-High	11.5	31.8	24.0	19.5	13.3		0.288	23.4	0.010
High-Moderate	9.0	36.9	26.5	15.0	12.7			24.7	
Moderate-Moderate	9.2	34.5	25.8	16.7	13.8			30.8	
Moderate-Occasional	7.4	38.1	24.1	16.1	14.4			30.7	
Occasional-Occasional	10.3	30.9	27.5	17.9	13.4			26.0	
Low-Low	11.4	40.4	22.7	13.5	12.1			17.1	

Note. Row percentages are presented throughout the table. Univariable p-values were derived using Rao-Scott chi-squared tests adjusting for sibling clusters. Sexual orientation was based on participants' last self-report from 1999 to 2010, wherein sexual minority includes mostly heterosexuals, bisexuals, and gays/lesbians; gender was assessed in 1996 at baseline; warmth was assessed in 2007; alcohol use trajectories were derived using longitudinal latent class analyses from participants' past-year alcohol frequency, quantity, and heavy episodic drinking from 2003 to 2010 when they were aged 18–25 years (the light drinker class only emerged among women); past-year alcohol use disorder was assessed in 2010. For alcohol use trajectories, we analyzed data from 5764 women and 3284 men. For alcohol use disorder, we analyzed data from 4620 women and 2158 men. High-High = High familial & high non-familial warmth; High-Moderate = High familial & moderate non-familial warmth; Moderate-Moderate = Moderate familial & moderate non-familial warmth; Moderate-Occasional = Moderate familial & occasional non-familial warmth; Occasional-Occasional = Occasional familial & occasional non-familial warmth; Low-Low = low familial & low non-familial warmth.

the literature by simultaneously examining latent classes of warmth from familial and non-familial contexts. Our analyses extended previous literature by formally testing gender-by-sexual orientation interactions in warmth class membership by using multivariable models. Specifically, among women, we found that several sexual minority subgroups were more likely to be in lower warmth classes compared with completely heterosexuals; among men, sexual-orientation differences in warmth were minimal. These results align with the bivariate results from prior research that shows that sexual-orientation differences in warmth were slightly smaller for men than women (Eisenberg and Resnick, 2006; Needham and Austin, 2010; Pearson and Wilkinson, 2013).

Strong theoretical and empirical foundations explaining these gendered sexual-orientation differences in warmth are lacking. Nevertheless, because SMY are stigmatized (Hatzenbuehler et al., 2013; Herek, 1988), SMY may experience lower familial and non-familial warmth. Why this pattern may be stronger among women than among men remains unknown and under-theorized. Nevertheless, these differences are likely derived from bidirectional gender-specific processes involving both child-level factors (e.g., gender nonconformity) and adult-level factors (e.g., attitudes towards gay/lesbian and bisexual populations; Rosario, 2015; Rosario et al., 2014a, b). Since a constellation of factors likely influences these findings, qualitative research with youth and adults using grounded theory may help illuminate knowledge about existing gendered sexual-orientation differences in warmth.

Our study also found that warmth during childhood and adolescence was significantly associated with AUD—but not AUTs—in emerging adulthood. Alcohol use is highest in emerging adulthood

(Centers for Disease Control and Prevention, 2015), and heavy and moderate drinking trajectories are normative during this developmental period (Coulter et al., 2018). Our results suggest that emerging adults will engage in heavy and moderate AUTs regardless of warmth provided in earlier periods. On the other hand, lower warmth was positively associated with probable AUD. Though our study's findings of negative associations between warmth and AUD confirm some research (Salom et al., 2015), it contradicts others (e.g., Greenfield et al., 2016). However, our study was unique in that it examined AUD as an outcome separate from other comorbidities (e.g., mental health disorders) and assessed warmth across multiple time periods, which may explain our novel findings.

Additionally, warmth explained a small albeit statistically significant proportion of the sexual-orientation differences in AUD for women—but not for men. This has implications for future epidemiologic and intervention research. Future research can examine whether warmth serves as a resiliency factor (Herrick et al., 2014; Masten, 2013) that buffers the numerous minority stressors faced by SMY, thereby reducing their risk of having problematic alcohol use despite facing adversity. In light of our current findings, though, interventions that aim to reduce sexual-orientation disparities in AUTs or AUD may focus on increasing warmth, but additional targets will also be needed.

There are limitations to our study. GUTS participants were not randomly sampled from the U.S., were primarily non-Hispanic White, and children of Nurses' Health Study II participants; therefore, our results may not generalize to more racially, ethnically, socio-economically, or globally diverse populations. Our study may be prone to recall bias. On average, participants were 23 years of age when they reported on warmth from childhood and adolescence, but previous

**Table 6**  
Results of multinomial logistic regression models testing the associations of sexual orientation and warmth classes on longitudinal alcohol use trajectories, stratified by gender: Growing Up Today Study.

Alcohol Use Trajectories (Referent = Non-drinkers)														
Heavy drinkers			Moderate drinkers			Legal drinkers			Escalation-to-Moderately-Heavy drinkers			Light drinkers		
OR (95% CI)	P		OR (95% CI)	P		OR (95% CI)	P		OR (95% CI)	P		OR (95% CI)	P	
<b>WOMEN</b>														
<b>Model 1: Controlling for Demographics</b>														
Sexual Orientation (Referent = Completely Heterosexual)														
Sexual Minority	<b>2.65 (1.89, 3.70)</b>	< .001				1.13 (0.76, 1.67)	0.547		<b>2.11 (1.46, 3.04)</b>	< .001		<b>2.01 (1.42, 2.84)</b>	< .001	
<b>Model 2: Controlling for Demographics and Warmth Classes</b>														
Sexual Orientation (Referent = Completely Heterosexual)														
Sexual Minority	<b>2.76 (1.97, 3.86)</b>	< .001				1.14 (0.77, 1.70)	0.500		<b>2.17 (1.50, 3.14)</b>	< .001		<b>2.04 (1.44, 2.89)</b>	< .001	
<b>Warmth Classes (Referent = High-High)</b>														
High-Moderate	1.11 (0.80, 1.53)	0.530				1.04 (0.73, 1.50)	0.814		1.39 (0.96, 1.99)	0.079		0.98 (0.70, 1.37)	0.891	
Moderate-Moderate	1.04 (0.73, 1.47)	0.844				1.39 (0.95, 2.04)	0.092		1.12 (0.75, 1.68)	0.574		0.90 (0.63, 1.30)	0.583	
Moderate-Occasional	0.79 (0.56, 1.13)	0.200				0.96 (0.65, 1.43)	0.840		0.98 (0.65, 1.47)	0.917		0.89 (0.62, 1.28)	0.519	
Occasional-Occasional	0.74 (0.50, 1.08)	0.121				0.84 (0.55, 1.30)	0.439		0.85 (0.55, 1.32)	0.468		0.87 (0.59, 1.29)	0.502	
Low-Low	1.11 (0.62, 2.00)	0.725				0.93 (0.47, 1.84)	0.836		0.98 (0.49, 1.95)	0.955		1.06 (0.57, 1.95)	0.861	
<b>MEN</b>														
<b>Model 3: Controlling for Demographics</b>														
Sexual Orientation (Referent = Completely Heterosexual)														
Sexual Minority	<b>1.84 (1.10, 3.09)</b>	0.020				1.71 (0.98, 2.97)	0.059		<b>1.94 (1.11, 3.41)</b>	0.021				
<b>Model 4: Controlling for Demographics and Warmth Classes</b>														
Sexual Orientation (Referent = Completely Heterosexual)														
Sexual Minority	<b>1.89 (1.13, 3.18)</b>	0.016				1.69 (0.97, 2.95)	0.0640		<b>1.95 (1.11, 3.45)</b>	0.021				
<b>Warmth Classes (Referent = High-High)</b>														
High-Moderate	<b>1.58 (1.01, 2.46)</b>	0.044				1.01 (0.62, 1.63)	0.977		1.29 (0.77, 2.16)	0.338				
Moderate-Moderate	1.42 (0.90, 2.22)	0.128				1.08 (0.66, 1.75)	0.762		1.32 (0.78, 2.23)	0.299				
Moderate-Occasional	<b>2.00 (1.29, 3.11)</b>	0.002				1.35 (0.84, 2.16)	0.214		<b>1.82 (1.10, 3.01)</b>	0.019				
Occasional-Occasional	1.12 (0.71, 1.79)	0.622				1.06 (0.64, 1.73)	0.830		1.19 (0.70, 2.03)	0.523				
Low-Low	1.32 (0.69, 2.54)	0.402				0.72 (0.34, 1.52)	0.385		0.95 (0.43, 2.09)	0.904				

Note. Boldface indicates statistical significance ( $p < 0.05$ ). Light drinkers were only present among women. Models were estimated with samples of 5764 women and 3284 men. All models adjusted for race/ethnicity, age, region, and lifetime college attendance. Models for women also adjusted for lifetime pregnancy. High-High = High familial & high non-familial warmth; High-Moderate = High familial & moderate non-familial warmth; Moderate-Moderate = Moderate familial & moderate non-familial warmth; Moderate-Occasional = Moderate familial & occasional non-familial warmth; Occasional-Occasional = Occasional familial & occasional non-familial warmth; Low-Low = low familial & low non-familial warmth; OR = odds ratio; CI = confidence interval.

**Table 7**  
Mediational effects of warmth classes on sexual-orientation differences in alcohol use disorder, stratified by gender: Growing Up Today Study.

	Alcohol Use Disorder				
	Model 1: Controlling for Demographics		Model 2: Model 1 + Warmth Classes		Proportion Mediated for Model 1 vs 2
	RR (95% CI)	p	RR (95% CI)	p	% (p)
<b>WOMEN</b>					
<b>Sexual orientation</b>					
Completely Heterosexual	1.00 (referent)		1.00 (referent)		
Sexual Minority	<b>2.03 (1.77, 2.32)</b>	<b>&lt; .001</b>	<b>1.97 (1.72, 2.25)</b>	<b>&lt; .001</b>	<b>4.3 (0.003)</b>
<b>Warmth Classes</b>					
High-High			1.00 (referent)		
High-Moderate			1.15 (0.94, 1.41)	0.162	
Moderate-Moderate			1.07 (0.86, 1.33)	0.543	
Moderate-Occasional			<b>1.44 (1.17, 1.77)</b>	<b>&lt; .001</b>	
Occasional-Occasional			<b>1.56 (1.25, 1.94)</b>	<b>&lt; .001</b>	
Low-Low			<b>1.48 (1.08, 2.04)</b>	<b>0.016</b>	
<b>MEN</b>					
<b>Sexual orientation</b>					
Completely Heterosexual	1.00 (referent)		1.00 (referent)		
Sexual Minority	<b>1.46 (1.23, 1.73)</b>	<b>&lt; .001</b>	<b>1.45 (1.22, 1.72)</b>	<b>&lt; .001</b>	not mediated
<b>Warmth Classes</b>					
High-High			1.00 (referent)		
High-Moderate			1.07 (0.82, 1.39)	0.631	
Moderate-Moderate			<b>1.32 (1.02, 1.71)</b>	<b>0.034</b>	
Moderate-Occasional			<b>1.30 (1.02, 1.66)</b>	<b>0.035</b>	
Occasional-Occasional			1.08 (0.81, 1.43)	0.602	
Low-Low			0.74 (0.44, 1.24)	0.250	

Note. Boldface indicates statistical significance ( $p < 0.05$ ). Models 1 and 2 were estimated with 4591 women and 2155 men. All models adjusted for race/ethnicity (assessed in 1996 at baseline), age (assessed in 2007), region (assessed in 2007), and lifetime college attendance (yes/no; assessed in 2010). Models for women also adjusted for lifetime pregnancy (yes/no; assessed prospectively from 1999 to 2010). Sexual orientation was based on participants' last self-report from 1999 to 2010, wherein sexual minority includes mostly heterosexuals, bisexuals, and gays/lesbians; gender was assessed in 1996 at baseline; warmth was assessed in 2007; alcohol use trajectories were derived using longitudinal latent class analyses from participants' past-year alcohol frequency, quantity, and heavy episodic drinking from 2003 to 2010 when they were aged 18–25 years; past-year alcohol use disorder was assessed in 2010. High-High = High familial & high non-familial warmth; High-Moderate = High familial & moderate non-familial warmth; Moderate-Moderate = Moderate familial & moderate non-familial warmth; Moderate-Occasional = Moderate familial & occasional non-familial warmth; Occasional-Occasional = Occasional familial & occasional non-familial warmth; Low-Low = low familial & low non-familial warmth; RR = relative risk; CI = confidence interval.

research has validated adult responses to childhood and adolescent experiences for other measures (Murphy et al., 2010). Attrition bias may also be present if nonresponse was differentially related to warmth, sexual orientation, AUTs, or AUD; the extent of this bias is unknown. Additionally, we measured sexual orientation using each participant's last report of sexual identity/attraction; thus, our findings may not generalize to other ways of operationalizing sexual orientation (e.g., sexual behavior, sexual orientation trajectories, extent to which one was "out"). Also, some warmth classes and sexual-orientation subgroups had small sample sizes, limiting statistical power. We measured past-year AUD using self-reported items based on the DSM-IV criteria, which was slightly revised in the DSM-5. Single items measured familial and non-familial warmth during each developmental period, which may not capture all important information (e.g., the number and kinds of people who provided warmth). We may also have residual confounding (e.g., parenthood), though we controlled for multiple confounding variables.

Overall, our paper used a life-course approach to examine how early life experiences influence health disparities for sexual minority populations later in life. Compared to completely heterosexual women, sexual minority women report having lower familial and non-familial warmth in childhood and adolescence, which mediated a small proportion of their elevated risk of AUD. However, warmth did not mediate sexual-orientation disparities in AUD for men. Warmth also had little effect on AUTs for all emerging adults. Epidemiologic research can consider the role warmth plays in combination with other factors that influence AUTs and AUD in emerging adulthood. Warmth is also protective against many other health problems, including other substance use (Resnick et al., 1997). Since these health problems also

disproportionately burden SMY (Herrick et al., 2011; Marshal et al., 2011, 2008), research can test if warmth helps to explain sexual-orientation disparities in these health areas, especially for women.

#### Role of funding source

The National Institute on Drug Abuse (awards F31DA037647 to R.W.S.C. and K01DA023610 and R01DA033974 to H.L.C.), the National Institute on Alcohol Abuse and Alcoholism (K01AA027564 to R.W.S.C.), and the National Center for Advancing Translational Sciences (TL1TR001858) of the National Institutes of Health supported this research article. We would like to thank the Growing Up Today Study participants for the information they shared. The opinions expressed in this work are those of the authors and do not necessarily represent those of the funders.

#### Contributors

Dr. Robert W.S. Coulter led the study conceptualization and design, data interpretation, and writing of the article. Dr. Coulter led the data analysis. All authors contributed to study conceptualization and design, data interpretation, and writing and editing of the article. All authors approved the final manuscript as submitted and agree to be accountable for all aspects of the work.

#### Declaration of Competing Interest

No conflict declared.

## Appendix A. Supplementary data

Supplementary material related to this article can be found, in the online version, at doi:<https://doi.org/10.1016/j.drugalcdep.2019.107643>.

## References

- Amato, P.R., 1990. Dimensions of the family environment as perceived by children: a multidimensional scaling analysis. *J. Marriage Fam.* 52, 613–620.
- American Psychiatric Association, 1994. *Diagnostic and Statistical Manual of Mental Disorders*, 4th ed. American Psychiatric Association, Washington, DC.
- American Psychiatric Association, 2013. *Diagnostic and Statistical Manual of Mental Disorders*, 5th ed. American Psychiatric Publishing, Arlington, VA.
- Barnow, S., Schuckit, M.A., Lucht, M., John, U., Freyberger, H.J., 2002. The importance of a positive family history of alcoholism, parental rejection and emotional warmth, behavioral problems and peer substance use for alcohol problems in teenagers: a path analysis. *J. Stud. Alcohol* 63 (3), 305–315.
- Bernstein, D.P., Fink, L., Handelsman, L., Foote, J., Lovejoy, M., Wenzel, K., Sapareto, E., Ruggiero, J., 1994. Initial reliability and validity of a new retrospective measure of child abuse and neglect. *Am. J. Psychiatry* 151 (8), 1132–1136.
- Bernstein, D.P., Stein, J.A., Newcomb, M.D., Walker, E., Pogge, D., Ahluvalia, T., Stokes, J., Handelsman, L., Medrano, M., Desmond, D., 2003. Development and validation of a brief screening version of the childhood trauma questionnaire. *Child Abuse Negl.* 27 (2), 169–190.
- Calafat, A., García, F., Juan, M., Becoña, E., Fernández-Hermida, J.R., 2014. Which parenting style is more protective against adolescent substance use? Evidence within the European context. *Drug Alcohol Depend.* 138, 185–192.
- Centers for Disease Control and Prevention, 2015. *National Center for Chronic Disease Prevention and Health Promotion, Division of Population Health. BRFSS Prevalence & Trends Data.* <https://www.cdc.gov/brfss/brfssprevalence/>.
- Chassin, L., Flora, D.B., King, K.M., 2004. Trajectories of alcohol and drug use and dependence from adolescence to adulthood: the effects of familial alcoholism and personality. *J. Abnorm. Psychol.* 113 (4), 483.
- Cleveland, M.J., Reavy, R., Mallett, K.A., Turrissi, R., White, H.R., 2014. Moderating effects of positive parenting and maternal alcohol use on emerging adults' alcohol use: does living at home matter? *Addict. Behav.* 39 (5), 869–878.
- Cochran, S.D., Mays, V.M., Alegria, M., Ortega, A.N., Takeuchi, D., 2007. Mental health and substance use disorders among Latino and Asian American lesbian, gay, and bisexual adults. *J. Consult. Clin. Psychol.* 75 (5), 785.
- Corliss, H.L., Rosario, M., Wypij, D., Fisher, L.B., Austin, S.B., 2008. Sexual orientation disparities in longitudinal alcohol use patterns among adolescents: findings from the growing up Today Study. *Arch. Pediatr. Adolesc. Med.* 162 (11), 1071–1078.
- Coulter, R.W.S., Egan, J.E., Kinsky, S., Friedman, M.R., Eckstrand, K.L., Frankeberger, J., Folb, B.L., Mair, C., Markovic, N., Silvestre, A.J., Stall, R., Miller, E., 2019. Mental health, drug, and violence interventions for sexual/gender minorities: a systematic review. *Pediatrics*.
- Coulter, R.W.S., Jun, H.J., Calzo, J.P., Truong, N.L., Mair, C., Markovic, N., Charlton, B.M., Silvestre, A.J., Stall, R., Corliss, H.L., 2018. Sexual-orientation differences in alcohol use trajectories and disorders in emerging adulthood: results from a longitudinal cohort study in the United States. *Addiction* 113 (9), 1619–1632.
- Coulter, R.W.S., Marzell, M., Saltz, R., Stall, R., Mair, C., 2016. Sexual-orientation differences in drinking patterns and drinking contexts among college students. *Drug Alcohol Depend.* 160, 197–204.
- Donaldson, C.D., Handren, L.M., Crano, W.D., 2016. The enduring impact of parents' monitoring, warmth, expectancies, and alcohol use on their children's future binge drinking and arrests: a longitudinal analysis. *Prev. Sci.* 17 (5), 606–614.
- Eiden, R.D., Colder, C., Edwards, E.P., Leonard, K.E., 2009. A longitudinal study of social competence among children of alcoholic and nonalcoholic parents: role of parental psychopathology, parental warmth, and self-regulation. *Psychol. Addict. Behav.* 23 (1), 36–46.
- Eiden, R.D., Edwards, E.P., Leonard, K.E., 2007. A conceptual model for the development of externalizing behavior problems among kindergarten children of alcoholic families: role of parenting and children's self-regulation. *Dev. Psychol.* 43 (5), 1187–1201.
- Eiden, R.D., Lessard, J., Colder, C.R., Livingston, J., Casey, M., Leonard, K.E., 2016. Developmental cascade model for adolescent substance use from infancy to late adolescence. *Dev. Psychol.* 52 (10), 1619–1633.
- Eisenberg, M., Wechsler, H., 2003. Substance use behaviors among college students with same-sex and opposite-sex experience: results from a national study. *Addict. Behav.* 28 (5), 899–913.
- Eisenberg, M.E., Resnick, M.D., 2006. Suicidality among gay, lesbian and bisexual youth: the role of protective factors. *J. Adolesc. Health* 39 (5), 662–668.
- Field, A.E., Camargo, C.A., Taylor, C.B., Berkey, C.S., Frazier, A.L., Gillman, M.W., Colditz, G.A., 1999. Overweight, weight concerns, and bulimic behaviors among girls and boys. *J. Am. Acad. Child Adolesc. Psychiatry* 38 (6), 754–760.
- Fish, J.N., Russell, S.T., 2018. Have mischievous responders misidentified sexual minority youth disparities in the National Longitudinal Study of Adolescent to Adult Health? *Arch. Sex. Behav.* 47 (4), 1053–1067.
- Goldberg, S., Strutz, K.L., Herring, A.A., Halpern, C.T., 2013. Risk of substance abuse and dependence among young adult sexual minority groups using a multidimensional measure of sexual orientation. *Public Health Rep.* 128 (3), 144.
- Greenfield, B.L., Sittner, K.J., Forbes, M.K., Walls, M.L., Whitbeck, L.B., 2016. Conduct disorder and alcohol use disorder trajectories, predictors, and outcomes for indigenous youth. *J. Am. Acad. Child Adolesc. Psychiatry* 56 (2), 133–139.
- Hatzenbuehler, M.L., Keyes, K.M., Hasin, D.S., 2009. State-level policies and psychiatric morbidity in lesbian, gay, and bisexual populations. *Am. J. Public Health* 99 (12).
- Hatzenbuehler, M.L., Phelan, J.C., Link, B.G., 2013. Stigma as a fundamental cause of population health inequalities. *Am. J. Public Health* 103 (5), 813–821.
- Hawkins, J.D., Weis, J.G., 1985. The social development model: an integrated approach to delinquency prevention. *J. Prim. Prev.* 6 (2), 793–797.
- Herek, G.M., 1988. Heterosexuals' attitudes toward lesbians and gay men: correlates and gender differences. *J. Sex Res.* 25 (4), 451–477.
- Herrick, A.L., Egan, J.E., Coulter, R.W.S., Friedman, M.R., Stall, R., 2014. Raising sexual minority youths' health levels by incorporating resiliencies into health promotion efforts. *Am. J. Public Health* 104 (2), 206–210.
- Herrick, A.L., Marshal, M.P., Smith, H.A., Suckato, G., Stall, R.D., 2011. Sex while intoxicated: a meta-analysis comparing heterosexual and sexual minority youth. *J. Adolesc. Health* 48 (3), 306–309.
- Hertzmark, E., Pazaris, M., Spiegelman, D., 2012. The SAS MEDIATE Macro. Brigham and Women's Hospital, Channing Laboratory, Boston.
- Horton, N.J., Kleinman, K.P., 2007. Much ado about nothing: a comparison of missing data methods and software to fit incomplete data regression models. *Am. Stat.* 61 (1), 79–90.
- Howard, M.C., Hoffman, M.E., 2018. Variable-centered, person-centered, and person-specific approaches: where theory meets the method. *Organ. Res. Methods* 21 (4), 846–876.
- Hurd, N.M., Albright, J., Wittrup, A., Negrete, A., Billingsley, J., 2018. Appraisal support from natural mentors, self-worth, and psychological distress: examining the experiences of underrepresented students transitioning through college. *J. Youth Adolesc.* 47 (5), 1100–1112.
- Johnson, R.M., Kidd, J.D., Dunn, E.C., Green, J.G., Corliss, H.L., Bowen, D., 2011. Associations between caregiver support, bullying, and depressive symptomatology among sexual minority and heterosexual girls: results from the 2008 Boston Youth Survey. *J. Sch. Violence* 10 (2), 185–200.
- Johnson, V., Pandina, R.J., 1991. Effects of the family environment on adolescent substance use, delinquency, and coping styles. *Am. J. Drug Alcohol Abuse* 17 (1), 71–88.
- Kass, R.E., Raftery, A.E., 1995. Bayes factors. *J. Am. Stat. Assoc.* 90 (430), 773–795.
- Kelly, A.B., Toumbourou, J.W., O'Flaherty, M., Patton, G.C., Homel, R., Connor, J.P., Williams, J., 2011. Family relationship quality and early alcohol use: evidence for gender-specific risk processes. *J. Stud. Alcohol Drugs* 72 (3), 399–407.
- Kidd, J.D., Jackman, K.B., Wolff, M., Veldhuis, C.B., Hughes, T.L., 2018. Risk and protective factors for substance use among sexual and gender minority youth: a scoping review. *Curr. Addict. Rep.* 5 (2), 158–173.
- Kincaid, C., Jones, D.J., Sterrett, E., McKee, L., 2012. A review of parenting and adolescent sexual behavior: the moderating role of gender. *Clin. Psychol. Rev.* 32 (3), 177–188.
- Latendresse, S.J., Rose, R.J., Viken, R.J., Pulkkinen, L., Kaprio, J., Dick, D.M., 2008. Parenting mechanisms in links between parents' and adolescents' alcohol use behaviors. *Alcohol. Clin. Exp. Res.* 32 (2), 322–330.
- Luk, J.W., Patock-Peckham, J.A., King, K.M., 2015. Are dimensions of parenting differentially linked to substance use across caucasian and asian american college students? *Subst. Use Misuse* 50 (10), 1360–1369.
- Marshal, M.P., Dietz, L.J., Friedman, M.S., Stall, R., Smith, H.A., McGinley, J., Thoma, B.C., Murray, P.J., D'Augelli, A.R., Brent, D.A., 2011. Suicidality and depression disparities between sexual minority and heterosexual youth: a meta-analytic review. *J. Adolesc. Health* 49 (2), 115–123.
- Marshal, M.P., Friedman, M.S., Stall, R., King, K.M., Miles, J., Gold, M.A., Bukstein, O.G., Morse, J.Q., 2008. Sexual orientation and adolescent substance use: a meta-analysis and methodological review. *Addiction* 103 (4), 546–556.
- Martin-Storey, A., Crosnoe, R., 2012. Sexual minority status, peer harassment, and adolescent depression. *J. Adolesc.* 35 (4), 1001–1011.
- Masten, A.S., 2013. Risk and resilience in development. In: Zelazo, P.D. (Ed.), *The Oxford Handbook of Developmental Psychology*. Oxford University Press, New York.
- Masyun, K.E., 2013. Latent class analysis and finite mixture modeling. In: Little, T.D. (Ed.), *The Oxford Handbook of Quantitative Methods in Psychology*. Oxford University Press, New York, NY, pp. 551–611.
- McNeely, C., Falci, C., 2004. School connectedness and the transition into and out of health-risk behavior among adolescents: a comparison of social belonging and teacher support. *J. Sch. Health* 74 (7), 284–292.
- Meyer, I.H., 2003. Prejudice, social stress, and mental health in lesbian, gay, and bisexual populations: conceptual issues and research evidence. *Psychol. Bull.* 129 (5), 674.
- Mogro-Wilson, C., 2013. Parental factors associated with Mexican adolescent alcohol use. *J. Addict.* 2013.
- Mogro-Wilson, C., 2007. The influence of parental warmth and control on Latino adolescent alcohol use. *Hisp. J. Behav. Sci.* 30 (1), 89–105.
- Murdock, T.B., Miller, A., 2003. Teachers as sources of middle school students' motivational identity: variable-centered and person-centered analytic approaches. *Elem. Sch. J.* 103 (4), 383–399.
- Murphy, E., Wickramaratne, P., Weissman, M., 2010. The stability of parental bonding reports: a 20-year follow-up. *J. Affect. Disord.* 125 (1), 307–315.
- Muthén, B., Shedden, K., 1999. Finite mixture modeling with mixture outcomes using the EM algorithm. *Biometrics* 55 (2), 463–469.
- Muthén, L., Muthén, B., 1998. 2012. *Mplus User's Guide*, seventh edition. Los Angeles, CA.
- Nagin, D., 2005. *Group-based Modeling of Development*. Harvard University Press.
- Needham, B.L., Austin, E.L., 2010. Sexual orientation, parental support, and health during the transition to young adulthood. *J. Youth Adolesc.* 39 (10), 1189–1198.
- Nelson, S.E., Van Ryzin, M.J., Dishion, T.J., 2015. Alcohol, marijuana, and tobacco use trajectories from age 12 to 24 years: demographic correlates and young adult substance use problems. *Dev. Psychopathol.* 27 (01), 253–277.

- Nylund, K.L., Asparouhov, T., Muthén, B.O., 2007. Deciding on the number of classes in latent class analysis and growth mixture modeling: a Monte Carlo simulation study. *Struct. Equ. Modeling* 14 (4), 535–569.
- Pearson, J., Wilkinson, L., 2013. Family relationships and adolescent well-being: Are families equally protective for same-sex attracted youth? *J. Youth Adolesc.* 42 (3), 376–393.
- Power, J., Schofield, M.J., Farchione, D., Perlesz, A., McNair, R., Brown, R., Pitts, M., Bickerdike, A., 2015. Psychological wellbeing among same-sex attracted and heterosexual parents: role of connectedness to family and friendship networks. *Aust. N. Z. J. Fam. Ther.* 36 (3), 380–394.
- Rao, J.N., Scott, A.J., 1984. On chi-squared tests for multiway contingency tables with cell proportions estimated from survey data. *Ann. Stat.* 12 (1), 46–60.
- Resnick, M.D., Bearman, P.S., Blum, R.W., Bauman, K.E., Harris, K.M., Jones, J., Tabor, J., Beuhring, T., Sieving, R.E., Shew, M., 1997. Protecting adolescents from harm: findings from the National Longitudinal Study on Adolescent Health. *JAMA* 278 (10), 823–832.
- Rosario, M., 2015. Implications of childhood experiences for the health and adaptation of lesbian, gay, and bisexual individuals: sensitivity to developmental process in future research. *Psychol. Sex. Orientat. Gen. Divers.* 2 (3), 214–224.
- Rosario, M., Reisner, S.L., Corliss, H.L., Wypij, D., Calzo, J., Austin, S.B., 2014a. Sexual-orientation disparities in substance use in emerging adults: a function of stress and attachment paradigms. *Psychol. Addict. Behav.* 28 (3), 790–804.
- Rosario, M., Reisner, S.L., Corliss, H.L., Wypij, D., Frazier, A.L., Austin, S.B., 2014b. Disparities in depressive distress by sexual orientation in emerging adults: the roles of attachment and stress paradigms. *Arch. Sex. Behav.* 43 (5), 901–916.
- Salom, C.L., Betts, K.S., Williams, G.M., Najman, J.M., Alati, R., 2016. Predictors of comorbid polysubstance use and mental health disorders in young adults—a latent class analysis. *Addiction* 111 (1), 156–164.
- Salom, C.L., Williams, G.M., Najman, J.M., Alati, R., 2015. Familial factors associated with development of alcohol and mental health comorbidity. *Addiction* 110 (2), 248–257.
- Sher, K.J., Gotham, H.J., Watson, A.L., 2004. Trajectories of dynamic predictors of disorder: their meanings and implications. *Dev. Psychopathol.* 16 (04), 825–856.
- Snapp, S.D., Watson, R.J., Russell, S.T., Diaz, R.M., Ryan, C., 2015. Social support networks for LGBT young adults: low cost strategies for positive adjustment. *Fam. Relations* 64 (3), 420–430.
- Stone, D.M., Luo, F., Lippy, C., McIntosh, W.L., 2014. The role of social connectedness and sexual orientation in the prevention of youth suicide ideation and attempts among sexually active adolescents. *Suicide Life. Behav.*
- Trentacosta, C.J., Criss, M.M., Shaw, D.S., Lacourse, E., Hyde, L.W., Dishion, T.J., 2011. Antecedents and outcomes of joint trajectories of mother–son conflict and warmth during middle childhood and adolescence. *Child Dev.* 82 (5), 1676–1690.
- U.S. Department of Health and Human Services, 2009. Substance Abuse and Mental Health Services Administration, Office of Applied Studies. National Survey on Drug Use and Health, pp. 2010. (Accessed July 9 2013). <http://www.oas.samhsa.gov/nsduh/2k10MRB/2k10Q.pdf>.
- Vazsonyi, A.T., Harris, C., Terveer, A.M., Pagava, K., Phagava, H., Michaud, P.-A., 2015. Parallel mediation effects by sleep on the parental warmth-problem behavior links: evidence from national probability samples of Georgian and Swiss adolescents. *J. Youth Adolesc.* 44 (2), 331–345.
- Wang, M.-T., Dishion, T.J., Stormshak, E.A., Willett, J.B., 2011. Trajectories of family management practices and early adolescent behavioral outcomes. *Dev. Psychol.* 47 (5), 1324–1341.
- Watson, R.J., Grossman, A.H., Russell, S.T., 2019. Sources of social support and mental health among LGB youth. *Youth Soc.* 51 (1), 30–48.
- Williamson, V., Creswell, C., Fearon, P., Hiller, R.M., Walker, J., Halligan, S.L., 2017. The role of parenting behaviors in childhood post-traumatic stress disorder: a meta-analytic review. *Clin. Psychol. Rev.* 53, 1–13.
- Yap, M.B.H., Jorm, A.F., 2015. Parental factors associated with childhood anxiety, depression, and internalizing problems: a systematic review and meta-analysis. *J. Affect. Disord.* 175, 424–440.
- Yuan, K.H., Bentler, P.M., 2000. Three likelihood-based methods for mean and covariance structure analysis with nonnormal missing data. *Sociol. Methodol.* 30 (1), 165–200.
- Zhou, Q., Eisenberg, N., Losoya, S.H., Fabes, R.A., Reiser, M., Guthrie, I.K., Murphy, B.C., Cumberland, A.J., Shepard, S.A., 2002. The relations of parental warmth and positive expressiveness to children's empathy-related responding and social functioning: a longitudinal study. *Child Dev.* 73 (3), 893–915.
- Zou, G., 2004. A modified poisson regression approach to prospective studies with binary data. *Am. J. Epidemiol.* 159 (7), 702–706.