Published in final edited form as:

Alcohol Clin Exp Res. 2018 December ; 42(12): 2394–2402. doi:10.1111/acer.13894.

Sex Differences in Peer Selection and Socialization for Alcohol Use from Adolescence to Young Adulthood and the Influence of Marital and Parental Status

Michael Windle, PhD and Rebecca C. Windle, MSW

Department of Behavioral Sciences and Health Education, Emory University

Abstract

Background: Peer selection and socialization influences for alcohol and other substance use have been a prominent area of research especially, though not exclusively, across adolescence. This study used four-wave prospective data from 1004 young adults to evaluate selection and socialization influences for young adults' alcohol use and friends' alcohol use from late adolescence to later young adulthood, and incorporated the time-varying predictors of marital and parental status. In addition, sex differences in peer selection and socialization processes were tested.

Methods: Participants were recruited from high schools, and assessments were based on self-reports initially collected in adolescence (at age 17.0 yrs.) via paper-and-pencil surveys and in young adulthood at ages 23.8, 29.8, and 33.5 years via computer-based individual interviews (CAPI and ACASI). Initial sampling included a 76% participation rate and the retention rate was 83%. Cross-lagged panel regression (CLPR) models were used to evaluate hypotheses about peer selection and socialization.

Results: Findings indicated that friend selection processes were stronger than socialization processes across adolescence to young adulthood. Adopting marital and (especially) parental roles was negatively associated with young adults' alcohol use and percentage of friends using alcohol, and the magnitude of these relationships was stronger and more consistent for females.

Conclusions: These findings indicated that across the adolescence-to-young adulthood transition, peer selection processes were more influential than peer socialization. Marital and parental roles were associated with both lower young adult alcohol use and a lower percentage of friends using alcohol, with stronger role-related effects for females relative to males.

Keywords

Adolescent-young adult transition; Alcohol peer selection; Alcohol peer socialization; Marriage; Parenthood; Sex differences

*Correspondence may be sent to Michael Windle at the Department of Behavioral Sciences and Health Education, Emory University, 1518 Clifton Road NE Atlanta, GA 30322, mwindle@emory.edu.

Introduction

Adolescents and young adults are similar to their friends and peers in the use of substances such as alcohol. Indeed, the association between adolescents' and young adults' substance use and that of their peers is quite substantial and robust (Andrews et al., 2002; Borsari & Carey, 2001; Patrick et al., 2016). Research findings have supported both selection and socialization influences as interpersonal processes contributing to individual and peer substance use similarity (Burk et al., 2012; Curran et al., 1997; White et al., 2008). The process of selection occurs when individuals select friends and peers who are similar to themselves on particular characteristics (e.g., age, sex, substance use; Kandel, 1985). Socialization influences operate via social processes (e.g., perceived substance-use norms, offers of alcohol, role modeling) occurring within the peer group that result in members' behaviors becoming more similar across time (Borsari & Carey, 2001). Note that the current study focused exclusively on peer selection and socialization and does not include a focus on romantic dyad selection (e.g., assortative mating).

Peer selection and socialization have largely, but not exclusively, focused on the adolescent years (Curran et al., 1997; Leung et al., 2014), with limited additional research extending to young adulthood (Labouvie, 1996; Samek et al., 2016; Van Ryzin et al., 2012). The peer selection and socialization literature has utilized a cross-lagged statistical modeling approach that concentrates on the two mechanisms of selection and socialization within the peer context (Samek et al., 2016). According to this statistical model, selection and socialization effects are represented by the cross-lagged pathways, with the pathway from young adults' drinking to peer drinking representing selection effects and the pathway from peer drinking to young adults' drinking representing socialization effects. Cross-lagged modeling provides for the simultaneous estimation of selection and socialization pathways.

Peer selection and socialization influences vary contingent on the developmental phase of the lifespan, with both selection and socialization mechanisms being significant during adolescence (Curran et al., 1997; Leung et al., 2014), but selection mechanisms becoming more dominant in young adulthood (Leonard & Mudar, 2003; Samek et al., 2016). For example, Burk et al. (2012) reported that both peer selection and socialization effects were present from early- to late-adolescence, with peer socialization influences becoming especially prominent in middle and later adolescence. However, Samek et al. reported that selection effects were more prominent in young adulthood. Findings regarding the increasing prominence of selection processes in young adulthood relative to childhood and adolescence are consistent with prior developmental theorizing which suggests that active, constructive, niche-picking processes characterize the young adult transition as individuals select into environments that are more consonant with their genetic make-up and life history (i.e., prior experiences). As such, young adults are more active in selecting their social environments (e.g., spouses, significant others, friends) and shaping, within limits, their social worlds and activities (Lerner, 1982; Scarr & McCartney, 1983).

The peer selection and socialization literature has provided important knowledge that explains, at least in part, the substantial similarity between adolescents' and young adults' substance use and that of their friends and peers. A related, but distinct, area of research

focuses on “maturing-out” of substance use during the young adult years. The adolescent-to-young adult transition is a period in the life-span when alcohol and other substance use and misuse tends to increase in emergent adulthood (18–23 years) and then decreases in later young adulthood (Bachman et al., 1997; 2002). There are several hypothesized mechanisms by which maturing-out occurs. For example, role incompatibility theory (Yamaguchi & Kandel, 1985) proposes that assuming adult roles (e.g., marriage, parenthood) and their associated responsibilities and activities is incompatible with substance use (especially problematic use) and thus results in a reduction (maturing-out) of such use. In addition to mechanisms associated with role incompatibility, researchers have also theorized that changes in personality development may be associated with psychosocial maturing-out which also yields a reduction in substance use during the developmental period of young adulthood (Lee & Sher, 2017; Lee et al., 2015; Littlefield et al., 2009). This research has provided additional support that changes in social roles are associated with decreases in problem-drinking, and that personality and changes in personality (e.g., increases in conscientiousness) are likewise associated with such decreases (Lee & Sher, 2017; Littlefield et al., 2009).

Study Goals and Hypotheses

In the current study, we adopted aspects both of the peer selection and socialization literature and of the maturing-out literature to extend research in two ways. First, we lengthened the developmental window to investigate peer selection and socialization effects from adolescence through young adulthood rather than restricting analyses to adolescence. Utilizing prospective data collected from a community sample at four waves of assessment spanning late adolescence through young adulthood (mean ages of 17.0, 23.8, 28.9, and 33.5 years), we employed a cross-lagged panel regression (CLPR) model to test the strength of selection and socialization effects between young adults’ alcohol use and their friends’ alcohol use (we refer to this as Model 1). Based on previous research (Samek et al., 2016), we hypothesized that selection effects would be statistically significant across young adulthood and that socialization effects would be small or non-significant.

Sex differences.—While there has been a limited number of studies that have tested for peer selection and socialization effects across young adulthood, even fewer have investigated sex differences in these effects. Findings from these studies have been mixed in that some have found no or minimal sex differences in peer selection and socialization processes (Haller et al., 2010; Labouvie, 1996; Samek et al., 2016; White et al., 2008), whereas others have found sex differences (Andrews et al., 2002; Bullers et al., 2001; Leonard & Mudar, 2003). For example, while not an exclusively young adult sample (i.e., the sample ranged in age from 21 to 87 years), Bullers et al. utilized a cross-lagged model with two data points and tested for sex differences in peer selection and socialization pathways. They reported that selection effects were stronger than socialization effects for both men and women, and that selection effects were somewhat stronger for women relative to men. Leonard and Mudar found that husbands’ alcohol involvement (but not wives’ alcohol involvement) at the time of marriage was a significant predictor of both husbands’ and wives’ perceptions of peers’ drinking at the first anniversary, but peers’ drinking behaviors did not predict husbands’ or wives’ drinking behaviors one year later (i.e., there were significant peer

selection effects for husbands but not wives and there were not significant peer socialization effects on husbands' or wives' drinking). As such, in the current study, we tested for sex differences in peer selection and socialization effects but had no *a priori* hypotheses.

A second goal of the study addresses issues related to the maturing-out literature. That is, previous research has indicated that individuals reduce their personal alcohol involvement when they marry and have children (Bachman et al., 1997; 2002; Chilcoat & Breslau, 1996; Kandel & Raveis, 1989; Labouvie, 1996; Staff et al., 2010), and that becoming married and parenthood are associated with decreases in the number of friends who drink alcohol and in the number of friends who are heavy drinkers (Bachman et al., 2002; Leonard & Mudar, 2003). As such, in a second CLPR model (Model 2), we included marital and parental status as time-varying covariates (TVCs) from ages 23.5 to 33.5 years. We hypothesized that being married and having children would be associated with lower levels of young adults' alcohol use and with fewer friends using alcohol. (Note that we focused on role *status* rather than role *transitions* because of the five-year interval between waves of measurement, which may contribute to different timing in marriage and parenting--e.g., from a few months for some to almost five years for others--and thus introduce heterogeneity into their effects on alcohol use and peer drinking; also, our sample sizes were too small to capture low rate transitions, such as divorce and remarriage).

Sex differences.—Both women and men reduce their alcohol involvement when they marry and have children, although the extent of these reductions may vary by sex. Bachman et al. (1998) reported that, for women, there was a substantial decrease in the frequency of alcohol use around the time of marriage but that this decline was not evident for men. However, for both men and women in marital dyads, reductions in *heavy* drinking were evident. Furthermore, they found that associations between parenthood and the frequency of alcohol use were significant and negative for both men and women, and other studies have similarly found that becoming a parent is associated with reductions in substance use for both sexes (Kandel & Raveis, 1989; Labouvie, 1996; Staff et al., 2010). In terms of sex differences and changes in the number of alcohol-using friends, Leonard and Mudar (2003) found that across the first year of marriage both husbands and wives reported decreases in the number of their drinking friends and, for husbands, in the number of their heavy drinking peers. Based on these findings, we hypothesized that positive marital and parental role status would be associated with lower levels of alcohol use for both males and females, but that these associations would be somewhat stronger and more consistent for females relative to males. With the exception of the one-year follow-up findings on marital dyads and alcohol using friends by Leonard and Mudar, we were unable to locate other articles that addressed the issue of sex differences for longer marriage intervals and for parenthood in relation to the number of alcohol-using friends; hence, we tested for these differences but had no *a priori* hypotheses.

Materials and Methods

Participants and Procedures

The data were collected as part of a multi-wave panel design focused on risk factors and alcohol and other substance use among 1205 teens during the high-school years, with four waves of assessment at six-month intervals (i.e., W1-W4) occurring from 1988–1990 (for details, see Windle & Wiesner, 2004). Survey data were collected within the adolescents' high-school settings and the student participation rate was 76%. The sample consisted of high-school sophomores (52%) and juniors (48%) recruited from two homogeneous suburban public high-school districts (a total of three high schools) in Western New York. The average age of the respondents at W1 was 15.54 years ($SD=0.66$), 98% were White, and 50.8% were females. Sample retention across the first four waves of measurement was uniformly high, in excess of 90%.

There was an approximately seven-year gap between the W4 assessment in adolescence and the W5 data collection that occurred when the average age of the young adults was 23.8 years, and then five-year gaps between W6 (age=28.9 years) and W7 (age=33.5 years). Participants were paid \$40 to complete a computer-assisted personal interview that lasted approximately 2 hours. At all waves of the study, informed consent was used and confidentiality was assured with a U.S. Department of Health and Human Services Certificate of Confidentiality. This study was reviewed and approved by the Institutional Review Board of the University at Buffalo.

In the current study, we used data from Wave 4 to Wave 7 for 1004 participants, and 53% were females. For inclusion in the current study, these subjects had to have participated at least once during adolescence and at least once during young adulthood. Using data collected during adolescence, attrition analyses were conducted for those participants in the current study ($n=1004$) and those who did not meet inclusion criteria ($n=201$). A chi-square test indicated that significantly more females (86.4%) than males (78.8%) were included in the study (χ^2 with 1 $df=12.30$, $p<.001$). Because males and females differ on a number of the adolescent variables used in the attrition analyses, these analyses were conducted separately for males and females. One-way ANOVAS were conducted for each sex group for 14 variables: three sociodemographic variables (family income, number of children in the family, and primary caregiver's highest educational attainment), family cohesion, percentage of alcohol- and drug-using friends, respectively, past month use of tobacco, alcohol, marijuana, and other illicit drug use, frequency of binge drinking, delinquency, depressive symptoms, and number of stressful life events in the last six-months. Of these 28 comparisons (14 for each of the sex groups), only two were statistically significant. For males, primary caregiver's educational level was lower for the non-included group ($ES=.22$); for females, delinquency was higher for the non-included group ($ES=.42$). The other 26 comparisons indicated no significant group differences. Based on these findings, we concluded that attrition bias was minimal for the included and non-included groups.

Measures

Sociodemographic Data.—During the adolescent phase of the study, primary caregivers were asked a series of questions about their yearly income and level of education. From W5–W7, young adults responded to marital and parental status questions. At each wave of assessment, marital status was coded as *0=not married* and *1=married*. Parental status was coded as *0=no children* and *1=children*. In a prior college-based sample (Lee et al., 2015), marital and parental status were combined to form one variable because of concerns over multicollinearity ($r=.65-.79$ across waves); however, in our sample the correlations between these two variables for Waves 5, 6, and 7 were .36, .47, and .51, and the conceptual distinctions between these statuses were deemed important.

Quantity-Frequency Index (QFI).—From W1–W7, QFI of alcohol use was derived from questions related to the quantity and frequency with which participants consumed various types of alcohol (beer, wine, hard liquor) in the past six months. After applying standard conversion formulas (see Armor and Polich, 1982) for the average amount of ethanol in each of the various beverage types (with .5 ounces of ethanol equal to one drink), we obtained a measure of the average ounces of absolute alcohol consumed per day over the past six months.

Adolescent/Young Adult Reports of the Number of Alcohol-Using Friends.—At Wave 4, adolescents were requested to indicate the number of persons they considered close friends and were then requested to indicate how many of these close friends drank alcohol. At Waves 5–7, young adults were asked to indicate the number of persons they considered close friends and were then requested to indicate how many of these close friends drank alcohol regularly. In young adulthood, we asked about the number of *regularly*-drinking friends because alcohol use during adolescence is illegal in contrast to young adulthood. We therefore reasoned that alcohol use may be a more sporadic activity in adolescence and a more regular activity in young adulthood. Percentage scores were calculated by dividing the number of close-drinking friends by the total number of close friends and multiplying by 100, with a possible range of 0% to 100%. Note that participants were the reporters of their friends' alcohol use rather than their friends' self-reports of their own alcohol use. As such, this is a measure of participants' perceptions of the number of their friends who use alcohol. For purposes of brevity, we specify "friends' alcohol use" rather than "perceived friends' alcohol use" throughout this article.

Statistical Analyses

The primary data analytic method used to test the multi-wave data was a cross-lagged panel regression (CLPR) statistical model to test invariance modeling across sex groups (also referred to as simultaneous group modeling; Byrne et al., 1989; Millsap, 2011; Windle et al., 2010) for the two models evaluated. In brief, this form of modeling includes specifying an unconstrained model (across sex groups) in which specified model parameters are freely estimated and then a constrained model whereby equality constraints for model parameters are constrained to equivalence across groups. A chi-square difference test is used to compare the model fit of the unconstrained and constrained models to determine if there is invariance across parameter estimates across sex groups. If the chi-square difference test is not

significant, this indicates the invariance of parameters across groups; if the chi-square difference test is significant, this indicates that the hypothesis of full invariance of model parameters across groups is not supported and, guided by modification indexes and theoretical considerations, some equality constraints are relaxed. If the modified model yields a non-significant chi-square difference test (relative to the fit of the unconstrained model), this indicates a partially homogeneous, partially heterogeneous solution (Byrne et al., 1989).

In this study, we used this modeling to determine the fit of two separate CLPR models across sex groups. For both applications, we specified both unconstrained and constrained models and then revised models based on the chi-square difference test, with parameters freed determined by modification indexes and subsequent one-degree of freedom Wald test statistics. The initial constrained model included equality constraints across all model parameters (including the exogenous socioeconomic predictors and the time-varying covariates); for all models, covariances were estimated among the TVCs and were constrained to equivalence across groups in the constrained models.

Missing values were estimated via multiple imputation (MI) methods available in Mplus (Muthén & Muthén, 2009–2017) which was used for subsequent analyses. Missing data were estimated for about 17% of the data (ranging from 0 to 21% across each of the variables). The MI approach facilitated the maximum likelihood estimation of continuous and categorical (e.g., marital status; parental status) variables. The number of imputed data sets for the MI method was 10, the Gibbs sampler was the algorithm used for the Markov Chain Monte Carlo chains, and the maximum number of iterations for the hypothesized model was 2000.

Results

The correlation matrix for the CLPR models is provided in Table 1, along with the means and standard deviations of each variable at the bottom of the table. Also presented in Table 1 is the percentage of young adults who were married and were parents at W5 to W7. As indicated in the table, at W5 .24 (or 24%) of young adult women were married and .15 (or 15%) of young adult men were married. Percentages of women and men who were parents at W5 were .22 (22%) and .18 (18%), respectively. As would be expected, the percentages of young adults who married and had children increased from W5 to W7.

Cross-Lagged Panel Regression (CLPR) Model 1 (see Figure 1). The CLPR was specified as an unconstrained simultaneous group model across sex groups. For this model specification, none of the estimated parameters across sex groups was constrained to equivalence; rather, they were estimated freely for each sex group. The fit statistics for this model indicated that the data fit the model well [χ^2 with 48 df =150.87, RMSEA =.065 (.054-.077); CFI=.950; SRMR=.049]. We then specified a constrained simultaneous group model in which all estimated parameters were constrained to equivalence across sex groups. The model fit statistics for this specification were modestly lower than desired to reflect adequate model fit [χ^2 with 64 df =185.76, RMSEA =.062 (.051-.072); CFI=.941; SRMR=.075], and the chi-square difference test between the unconstrained and constrained models indicated that the

full (or complete) invariance of the specified equality constraints across sex groups was not tenable (χ^2 with 16 $df=34.892$, $p < .01$).

An analysis of modification indexes and the relative magnitude of differences of parameter estimates between sex groups from the unconstrained model resulted in the freeing of two parameters that corresponded to the relative strength of the stability parameter estimates for young adults' alcohol use between W5 and W6, and W6 and W7. We freed the cross-group equality constraints for these two parameters and model fit was significantly better [χ^2 with 62 $df=169.93$, RMSEA =.059 (.048-.070); CFI=.947; SRMR=.055], and the chi-square difference test between this revised model and the unconstrained model was not significant (χ^2 with 14 $df=19.061$, $p > .05$); furthermore, single degree of freedom Wald Test statistics also indicated that sex groups differed for these two estimates ($p < .001$). Hence, sex-group parameter estimates were invariant across all but the two stability estimates for young adults' alcohol use; in these two instances, stability estimates were highly significant for both sex groups, but the estimates for males were higher, reflecting higher stability of alcohol use for males relative to females. The findings for this revised model are presented in Figure 1. At each wave, the model strongly supported the role of selection effects in that young adults' levels of alcohol use significantly predicted the percent of alcohol-using friends. In contrast, socialization effects were non-significant at all waves. Furthermore, no sex differences were indicated for selection and socialization effects.

Cross-Lagged Panel Regression Model with Time-varying Covariates (CLPR/TVCs; Model 2) (See Figure 2). The CLPR/TVC model followed the specification provided in Figure 1, but added two time-varying predictors of young adults' marital and parental role statuses at W5-W7. The two predictors at each wave were marital status (0, 1=Yes) and parental status (0, 1=Yes). Similar to the previous simultaneous group modeling approach, an unconstrained simultaneous group model across sex groups was specified initially. The fit statistics for this model indicated the adequacy of the specified model [χ^2 with 120 $df=336.99$, RMSEA =.060 (.052-.068); CFI=.895; SRMR=.055]. Then, a constrained simultaneous group model was specified in which estimated parameters were constrained to equivalence across sex groups. The fit statistics for this model were somewhat lower than desired [χ^2 with 148 $df=404.40$, RMSEA =.059 (.052-.068); CFI=.875; SRMR=.070], and the chi-square difference test between the unconstrained and constrained models indicated that the full (or complete) invariance of the specified equality constraints across sex groups was not tenable (χ^2 with 28 $df=67.407$, $p < .001$).

An analysis of modification indexes and the relative magnitude of differences between sex groups from the unconstrained model resulted in the freeing of five parameters. Two of these parameters corresponded to the alcohol stability estimates indicated in Model 1 and the other three corresponded to constraints associated with the TVCs. We freed the cross-group equality constraints for these five parameters and model fit was significantly better [χ^2 with 143 $df=364.55$, RMSEA =.056 (.049-.063); CFI=.892; SRMR=.071], and the chi-square difference test between this revised model and the unconstrained model was not significant (χ^2 with 23 $df=27.56$, $p > .05$). Furthermore, single degree of freedom Wald Test statistics also indicated that sex groups differed for these five estimates ($p < .001$). Hence, across sex groups, parameter estimates were invariant across all the specified parameter estimates

except the two stability estimates for young adults' alcohol use (W5-W6 and W6-W7), and three parameter estimates corresponding to the time-varying predictors of marital status and parental status. The three time-varying estimates that were statistically significant and differed across sex groups were: marital status to friends' alcohol use at W6; parental role status to alcohol use at W7; and parental role status to friends' alcohol use at W7. For these three time-varying predictors, estimates for females were of higher magnitude than for males, indicating that parental role status at W7 was associated with lower female alcohol use and a lower percentage of alcohol-using friends. Marital status also differed significantly across sex groups at W6, with females reporting a lower percentage of alcohol-using friends relative to males. As with Model 1, at each wave, Model 2 strongly supported the role of selection effects in that young adults' levels of alcohol use significantly predicted the percent of alcohol-using friends. In contrast, socialization effects were non-significant at all waves. Furthermore, no sex differences were indicated for selection and socialization effects.

Ancillary analyses

An alternative way of modeling transitions in social roles (e.g., from unmarried to married; from not being a parent to being a parent) in the maturing-out literature (Lee & Sher, 2017) has been to model these transitions as possible mediators proposing, for example, that changes in marital status may mediate the relationships between personality characteristics and reduced problem-drinking. Consistent with this perspective on modeling social roles as mediators of the associations between alcohol use and friends' alcohol use, we modeled marital and parental roles as mediators of both peer drinking-to-drinking effects and drinking-to-peer drinking effects. (Note that in our models, alcohol use, not problem-drinking, was the alcohol phenotype.) In our models, across waves, neither marital status nor parental role status mediated the associations between alcohol use and friends' alcohol use. These findings are consistent with past findings that have failed to show what might be referred to as role selection effects (Yamaguchi & Kandel, 1985) and mediation findings reported by Lee et al. (2015).

Discussion

This study tested two CLPR models related to peer selection and socialization, with the second model incorporating time-varying role status variables of marital and parental roles. Sex differences were investigated for each of these models. Findings for each model are discussed below.

Peer Selection and Socialization for Alcohol Use from Adolescence to Young Adulthood (Model 1)

The first goal of this study was to expand the age range to investigate peer selection and socialization processes from adolescence to young adulthood. Based on previous research (Labouvie, 1996; Samek et al. 2016), we hypothesized that peer selection effects would be significant from late adolescence to later young adulthood and this hypothesis was supported in that young adults' alcohol use was a significant predictor of the percent of alcohol-using friends during this segment of the life-span; furthermore, socialization effects were not significant. These findings are consistent with previous research (Labouvie, 1996; Samek et

al., 2016) in indicating that selection processes, including peer selection, become more prominent in young adulthood as individuals exhibit greater agency in shaping their environments. Selection processes may occur not only for alcohol use, but also for other characteristics (e.g., age, education, personality, religiosity) that may foster lower (or higher) levels of alcohol and other substance use. Developmental theorists (Lerner, 1982; Scarr & McCartney, 1983) describe these movements toward niche-picking and constructing social environments as age-normative, as individuals begin forming stable life structures away from their homes of origin and toward their own identities and new social roles.

Sex differences.—Our tests for sex differences of peer selection and socialization indicated that there were no significant differences in peer selection and socialization for males and females; selection effects and not socialization effects were dominant across sex groups. Findings for sex differences in peer selection and socialization during young adulthood have been mixed, with some research indicating no sex differences (Haller et al., 2010; Labouvie, 1996; Samek et al., 2016; White et al., 2008) and other research indicating the existence of sex differences (Andrews et al., 2002; Bullers et al., 2001; Leonard & Mudar, 2003). Findings from the current study suggest that young adult men and women are similar in selecting peers that are compatible with their own alcohol use.

The only sex differences for the initial peer selection and socialization model related to the higher stability of alcohol use for males across Waves 5–6 and Waves 6–7. While the parameter estimates indicated considerable stability of alcohol use for both males and females, stability was significantly higher for males; this finding is consistent with other research (Harford, 1993). Sex differences related to the lower stability of alcohol use for females could be attributable to a range of events (e.g., pregnancy and child-care responsibilities) that differentially influence men and women during this period of the life-span (Ethen et al., 2009; Marchetta et al., 2012; Pew Research Center, 2015).

Peer Selection and Socialization: Addition of Marital and Parental Role Status (Model 2)

The second study goal was to elaborate on the initial peer selection and socialization model by including marital and parental role status variables as time-varying covariates. Consistent with previous research (Chilcoat & Breslau, 1996; Kandel & Raveis, 1989; Leonard & Mudar, 2003), results from the current study indicated positive marital and parental role status was associated with lower levels for both young adults' alcohol use and the percent of alcohol-using friends across young adulthood. Research has suggested that selection (Leonard & Mudar, 2003) and differential association (Labouvie, 1996) processes as they relate to alcohol use become more prominent than socialization processes when young adults marry and have children. The reasoning behind these findings is that, as young adults transition to marriage and parenthood, they reduce the range of social contexts and activities (e.g., going to bars; drinking after playing basketball or softball) where drinking and drinking with friends occurs and begin to associate selectively with other young adults who are similar with regard to marriage and parenting (e.g., moving away from single friends and toward other newly-married couples; joining a new-parent support group). Hence, even though reductions in alcohol use and percentage of friends using alcohol decrease among those assuming the adult roles of marriage and parenthood, selection effects continue to be

influential and may function by selecting others with similar marital and parental demands and social norms that include reduced alcohol use.

Sex differences.—We hypothesized that positive marital and parental role status would be associated with lower levels of alcohol use for both males and females, and that these associations would be stronger and more consistent for females. In general, this hypothesis was supported and was consistent with current research (Arnett, 1998; Bachman et al., 1997; 2002). Additionally, we had no hypotheses related to sex differences in the strength of the association between marital and parental roles and the percent of friends using alcohol due to a lack of research in this area. Our findings indicated that the strength of the associations between marital and parental status and friends' alcohol use at W6, and between parental status and alcohol use and friends' alcohol use at W7 indicated stronger negative associations for women relative to men.

These sex differences may be attributable, in part, to contextual factors that differ for males and females as they transition to normative young adult social roles. For example, findings from studies of parenting (Bianchi, 2011; Parker & Wang, 2013) suggest increases in parenting demands, changes in social networks, and dual (or multiple) role demands that are more impactful (e.g., lower quality of life, loss of sleep) for women than men. Furthermore, in the current sample, employment differences across sex groups were evident in that, at W7, 12% of females identified as full-time homemakers relative to 1% of males, and 96% of males identified as employed full-time relative to 57% of females. Findings from the Pew Research Center (2015) indicated that, even when both marital partners work full-time, mothers typically do more parenting tasks than fathers. As such, these findings suggest that changes in personal and social domains are greater for young women relative to young men, as young mothers assume more child-care responsibilities.

Future Directions

Although our findings support sex differences for the relationships between marital and parental status and alcohol use and friends' alcohol use, the dynamics and clinical significance of these findings await future inquiry. Needed is additional research on sex differences with more complete measurement protocols (e.g., social network analyses including roles of parents, siblings, friends and their involvement and impact on parental role demands that differ for young adult mothers and fathers; features of the shared post-marriage environment such as family engagement in church or other social activity venues) and research designs (e.g., shorter term panel designs; daily diary studies) that are better equipped to identify critical mediators and moderators of these unfolding processes across the course of marriage and parenthood (Derrick & Leonard, 2016). The critical mediators and moderators then may serve as targets of intervention studies.

There is also a need for future research on role transitions and peer selection and socialization in young adulthood that focus on alternative family structures (e.g., single parent families) and the timing of marriage that may be influential in understanding the underlying developmental processes. For example, some research (Bachman et al., 1997; Labouvie, 1996) has suggested that marriage and parenthood during early young adulthood

(ages 20–22 yrs.) is not associated with reductions in substance use, possibly because the assumption of these social roles in early young adulthood are “off-time” and therefore these young adults have a limited peer network (e.g., a shortage of other married couples at that younger age) from which to select similar peers and friends. Little, Handley, Leuthe, and Chassin (2009) also reported that alcohol use decreased in young adulthood among those with normative-aged parenthood, but actually increased among those adolescents with developmentally-early parenthood. Hence, our model findings regarding peer selection and socialization may be quite different for an early young adult age group who have married and/or become parents. There is also a need in the peer selection and socialization literature extended to young adulthood to expand the scope of substances investigated to include tobacco, marijuana, and other substance use, as well as clinical phenotypes (e.g., problem drinking, substance disorders). Finally, findings from peer selection and socialization research on adolescents have been used typically to develop interventions that focus on modifying peer norms (Bosari & Carey, 2001; Leung et al., 2014). Our findings and those of others (Labouvie, 1996; Samek et al. 2016) suggest that in young adulthood selection mechanisms are more prominent than socialization mechanisms; interventions may need to focus more on self-regulatory strategies and decision-making among marital couples to foster optimal peer selection that may limit deleterious effects of heavy alcohol (and other) substance use with peers.

Study Limitations and Conclusions

It is important to recognize some of the limitations of our study. First, the sample was primarily Caucasian and middle-class; thus, the findings may not generalize to other racial/ethnic groups or across a broader SES spectrum. Second, the measures relied upon self-report by the participants and mono-method bias may have influenced the findings. More specifically, observed relationships between young adults’ reports of their own alcohol use and the number of their friends using alcohol may have inflated the cross-lagged relationships between these constructs. Third, we do not know if friends’ drinking patterns changed across time or if the composition of friends within the social network changed. Such information would help to illuminate the interpersonal processes by which changes in social network drinking occur as young adults marry and become parents. Fourth, the difference in measurement of percentage of friends using alcohol at Wave 4 and percentage of friends who were regular drinkers at Waves 5–7 may have reduced the magnitude of effects from adolescence (Wave 4) to Wave 5. Fifth, omitted variables (e.g., quality of the marital relationship; personality constructs that may impact both drinking behaviors and friendship choices) in future research may contribute to a better understanding of peer selection and socialization processes as young adults transition to the social roles of marriage and parenthood.

Despite these limitations, our findings provide support for the importance of selection processes and age normative role changes in marriage and parenthood on young adults’ alcohol use and friends’ alcohol use from adolescence through later young adulthood. The findings also indicated sex differences in the influence of marital and parental roles on alcohol use and alcohol-using networks, thereby fostering potential linkages to the larger

parent and family literature in identifying underlying selection and socialization processes that may ultimately facilitate targeted preventive interventions.

ACKNOWLEDGEMENTS

This research was supported by National Institute on Alcoholism and Alcohol Abuse Grant Numbers R01AA023826 and K05AA021143. The contents are solely the responsibility of the authors and do not necessarily represent the official views of the National Institutes of Health.

References

- Andrews JA, Tildesley E, Hops H, Li F (2002) The influence of peers on young adult substance use. *Health Psychol* 21:349–357. [PubMed: 12090677]
- Armor DJ, Polich JM (1982) Measurement of alcohol consumption, in *Encyclopedic Handbook of Alcoholism* (Pattison EM, Kaufman E eds), pp. 72–80. Gardner Press, New York.
- Arnett JJ (1998) Risk behavior and family role transitions during the twenties. *J Youth Adolesc* 27:301–320.
- Bachman JG, Wadsworth KN, O'Malley PM, Johnston LD (1997). *Smoking, drinking, and drug use in young adulthood: The impacts of new freedoms and new responsibilities* Hillsdale, NJ, England: Lawrence Erlbaum Associates, Inc.
- Bachman JG, O'Malley PM, Schulenberg JE, Johnston LD, Bryant AL, & Merline AC (2002). *The decline of substance use in young adulthood: Changes in social activities, roles, and beliefs* Mahwah, NJ, US: Lawrence Erlbaum Associates Publishers.
- Bianchi SM (2011) Change and time allocation in American families. *Ann Am Acad Pol Soc Sci* 638: 21–44.
- Bosari B, Carey KB (2001) Peer influences on college drinking: A review of the research. *J Subst Abuse* 13:391–424. [PubMed: 11775073]
- Bullers S, Cooper ML, Russell M (2001) Social network drinking and adult alcohol involvement: A longitudinal exploration of the direction of influence. *Addict Behav* 26:181–199. [PubMed: 11316376]
- Burk WJ, van der Vorst H, Kerr M, Stattin H (2012) Alcohol use and friendship dynamics: Selection and socialization in early-, middle-, and late-adolescent peer networks. *J Stud Alcohol* 73:89–98.
- Byrne BM, Shavelson RJ, Muthen B (1989) Testing for the equivalence of factor covariance and mean structures: The issue of partial measurement invariance. *Psychol Bull* 105:456–466.
- Chilcoat HD, Breslau N (1996) Alcohol disorders in young adulthood: Effects of transitions into adult roles. *J Health Soc Behav* 37:339–349. [PubMed: 8997889]
- Curran PJ, Stice E, Chassin L (1997). The relation between adolescent alcohol use and peer alcohol use: A longitudinal random coefficients model. *J Consult Clin Psychol* 65:130–140. [PubMed: 9103742]
- Derrick JL, Leonard KE (2016) Substance use in committed relationships, in *The Oxford Handbook of Substance Use and Substance Use Disorders*, Vol 1 (Sher KJ ed), pp. 549–578. Oxford University Press, New York.
- Ethen MK, Ramadhani TA, Scheuerle AE, Canfield MA, Wyszynski DF, Druschel CM, Romitti PA, National Birth Defects Prevention Study (2009) Alcohol consumption by women before and during pregnancy. *Matern Child Health J* 13:274–285. [PubMed: 18317893]
- Haller M, Handley E, Chassin L, Bountress K (2010) Developmental cascades: Linking adolescent substance use, affiliation with substance use promoting peers, and academic achievement to adult substance use disorders. *Dev Psychopathol* 22:899–916. [PubMed: 20883589]
- Harford TC (1993) Stability and prevalence of drinking among young adults. *Addiction* 88:273–277. [PubMed: 8220065]
- Kandel DB (1985) On processes of peer influences in adolescent drug use: A developmental perspective. *J Adv Alcohol Subst Abuse* 4:139–163.

- Kandel DB, Raveis VH (1989) Cessation of illicit drug use in young adulthood. *Arch Gen Psychiatry* 46:109–116. [PubMed: 2913970]
- Labouvie E (1996) Maturing out of substance use: Selection and self-correction. *J Drug Issues* 26:457–476.
- Lee MR, Sher KJ (2017) “Maturing out” of binge and problem drinking. *Alcohol Res* 39 Retrieved from <https://www.arcr.niaaa.nih.gov/arcr391/article05.htm>
- Lee MR, Ellingson JM, Sher KJ (2015) Integrating social-contextual and intrapersonal mechanisms of “maturing out”: Joint influences of familial-role transitions and personality maturation on problem-drinking reductions. *Alcohol Clin Exp Res* 3:1775–1787.
- Leonard KE, Mudar P (2003) Peer and partner drinking and the transition to marriage: A longitudinal examination of selection and influence processes. *Psychol Addict Behav* 17:115–125. [PubMed: 12814275]
- Leung RK, Toumbourou JW, Hemphill SA (2014) The effect of peer influence and selection processes on adolescent alcohol use: A systematic review of longitudinal studies. *Health Psychol Rev* 8:426–457. [PubMed: 25211209]
- Lerner RM (1982) Children and adolescents as producers of their own development. *Dev Rev* 2:342–370.
- Little M, Handley E, Leuthe E, & Chassin L (2009). The impact of parenthood on alcohol consumption trajectories: Variations as a function of timing of parenthood, familial alcoholism, and gender. *Dev Psychopathol*, 21: 661–682. [PubMed: 19338703]
- Littlefield AK, Sher KJ, Wood PK (2009) Is “maturing out” of problematic alcohol involvement related to personality change? *J Abnorm Psychol* 118:360–374.
- Marchetta CM, Denny CH, Floyd RL, Cheal NE, Sniezek JE, McKnight-Eily LR (2012) Alcohol use and binge drinking among women of childbearing age – United States, 2006–2010. *Morb Mortal Wkly Rep* 61:534–538.
- Millsap RE (2011) *Statistical approaches to measurement invariance* New York, Taylor & Francis.
- Muthén LK, Muthén BO (2009–2017) *Mplus User’s Guide* 8th ed. Muthén & Muthén, Los Angeles, CA.
- Parker K, Wang W (2013) *Modern parenthood: Roles of moms and dads converge as they balance work and family* Pew Research Center, Washington, D.C. Available at <http://www.pewsocialtrends.org/2013/03/14/modern-parenthood-roles-of-moms-and-dads-converge-as-they-balance-work-and-family/> (accessed 10/6/14)
- Patrick ME, Kloska DD, Vasilenko SA, Lanza ST (2016) Perceived friends’ use as a risk factor for marijuana use across young adulthood. *Psychol Addict Behav* 30:904–914. [PubMed: 27736148]
- Pew Research Center (2015) *Raising kids and running a household: How working parents share the load* Available at http://www.pewsocialtrends.org/2015/11/04/raising-kids-and-running-a-household-how-working-parents-share-the-load/st_2015-11-04_working-parents-15. Accessed April 4, 2018.
- Samek DR, Goodman RJ, Erath SA, McGue M, Iacono WG (2016) Antisocial peer affiliation and externalizing disorders in the transition from adolescence to young adulthood: Selection versus socialization effects. *Dev Psychol* 52:813–823. [PubMed: 26914216]
- Scarr S, McCartney K (1983) How people make their own environments: A theory of genotype environment effects. *Child Dev* 54:424–435. [PubMed: 6683622]
- Staff J, Schulenberg JE, Maslowsky J, Bachman JG, O’Malley PM, Maggs JL, Johnston LD (2010) Substance use changes and social role transitions: Proximal developmental effects on ongoing trajectories from late adolescence through early adulthood. *Dev Psychopathol* 22:917–932.
- Van Ryzin MJ, Fosco GM, Dishion TJ (2012) Family and peer predictors of substance use from early adolescence to early adulthood: An 11-year prospective analysis. *Addict Behav* 37:1314–13224. [PubMed: 22958864]
- White HR, Fleming CB, Kim MJ, Catalano RF (2008) Identifying two potential mechanisms for changes in alcohol use among college-attending and non-college-attending emerging adults. *Dev Psychol* 44:1625–1639. [PubMed: 18999326]

- Windle M, Brener ND, Cuccaro P, Dittus PJ, Kanouse DE, Murray N, Wallander JL, Schuster MA (2010) Parenting predictors of early adolescent's health behaviors: Simultaneous group comparisons across sex and ethnic groups. *J Youth Adolesc* 39:594–606. [PubMed: 20422349]
- Windle M, Wiesner M (2004) Trajectories of marijuana use from adolescence to young adulthood: predictors and outcomes. *Dev Psychopathol* 16:1007–1027. [PubMed: 15704825]
- Yamaguchi K, Kandel DB (1985) On the resolution of role incompatibility: A life event history analysis of family roles and marijuana use. *Amer J Sociol* 90:1284–1325.

Figure 1.

Cross-lagged, four-wave panel regression model of young adults' alcohol use and the percent of alcohol-using friends for men and women (Model 1) (Females' parameter estimates are in parentheses)

Figure 2.

Cross-lagged, four-wave panel regression model of young adults' alcohol use and percent of alcohol-using friends with marital and parental status as time-varying covariates for men and women (Model 2) (Females' parameter estimates are in parentheses)

Table 1:

Correlation matrix.

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. W4 Parental Income	---	.44	-.06	.04	.03	.02	.03	.02	.04	.08	-.00	-.01	.05	-.11	-.13	-.05
2. W4 Parental Education	.38	---	-.02	.08	.12	.09	.00	.08	.08	.11	-.06	-.01	.02	-.14	-.12	-.11
3. W4 QFI	.05	-.01	---	.29	.26	.28	.22	.12	.09	.15	.05	.03	-.08	.18	.14	.06
4. W5 QFI	.08	.02	.41	---	.63	.53	.06	.30	.23	.26	-.27	-.27	-.25	-.11	-.17	-.20
5. W6 QFI	.05	.05	.38	.71	---	.64	.05	.22	.31	.34	-.13	-.28	-.30	-.06	-.25	-.27
6. W7 QFI	.08	.05	.38	.63	.76	---	.07	.09	.23	.44	-.08	-.20	-.32	-.02	-.12	-.30
7. W4 % Alc-Using Frds	.06	-.01	.30	.12	.16	.08	---	.07	-.00	.01	.05	.10	-.06	.03	.13	.17
8. W5 % Alc-Using Frds	.04	-.00	.17	.31	.18	.17	.18	---	.23	.16	-.12	-.06	-.08	-.10	-.13	-.08
9. W6 % Alc-Using Frds	.13	-.01	.18	.26	.30	.20	.17	.31	---	.24	-.18	-.21	-.20	-.13	-.21	-.22
10. W7 % Alc-Using Frds	.16	.14	.23	.27	.32	.40	.14	.09	.18	---	-.04	-.09	-.12	-.08	-.19	-.24
11. W5 Married	-.11	-.01	-.04	-.18	-.15	-.10	-.02	-.07	-.09	-.07	---	.32	.17	.32	.33	.26
12. W6 Married	-.03	-.08	-.07	-.23	-.23	-.20	.01	-.15	-.09	-.06	.32	---	.58	.10	.38	.49
13. W7 Married	.09	.05	-.02	-.04	-.08	-.11	.08	-.04	.04	-.01	.21	.56	---	-.03	.17	.43
14. W5 Parent	.00	-.02	.14	.03	.03	.07	.07	.06	-.06	.02	.36	.18	.11	---	.54	.35
15. W6 Parent	-.02	-.10	.13	-.08	-.13	-.02	.07	.02	-.09	-.08	.39	.47	.26	.55	---	.65
16. W7 Parent	-.00	-.08	.10	-.07	-.10	-.07	.10	-.06	-.04	-.08	.31	.60	.51	.37	.63	---
Female Mean	6.36	13.70	0.29	0.37	0.26	0.24	92.68	79.00	71.67	38.93	0.24	0.57	0.68	0.22	0.48	0.68
Female SD	1.29	1.71	0.60	0.83	0.50	0.49	26.04	40.74	45.06	33.71	0.40	0.50	0.47	0.41	0.50	0.46
Male Mean	6.29	13.67	0.48	0.69	0.56	0.52	89.81	89.17	89.00	46.83	0.15	0.55	0.72	0.18	.039	0.60
Male SD	2.51	3.70	0.88	0.91	0.72	0.63	30.25	31.07	31.34	28.68	0.39	0.74	0.85	0.38	0.63	0.77

Males: $N=471$; Females: $N=533$. Females are above the diagonal; males are below the diagonal. W4=Wave 4, W5=Wave 5, W6=Wave 6, W7=Wave 7, QFI=Quantity-Frequency Index. Parental income ranged from 1 to 8, with 1=less than \$6,000 to 8=\$55,000 or more.