This is a post-peer reviewed, pre- copy edited version of an article published in
Substance Use & Misuse

Reference
Aresi, G., Moore, S., Berridge, D., & Marta, E. (in press). A longitudinal study of European students' alcohol use and related behaviours as they travel abroad to study. *Substance Use & Misuse*. doi: 10.1080/10826084.2019.1567787

Available at (once published online)
https://doi.org/10.1080/10826084.2019.1567787

A longitudinal study of European students' alcohol use and related behaviours as they travel abroad to study.

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Role of funding sources

The present research study is funded by the European Foundation for Alcohol Research (ERAB; EA 14 11), which is an independent foundation that awards alcohol-related research after an independent scientific evaluation (peer reviewed), with guarantee of completely independent scientific expression (in accordance with the Dublin Principles). ERAB had no role in the study design, collection, analysis or interpretation of the data, writing the manuscript, or the decision to submit the paper for publication. SCM also acknowledges support from the Economic and Social Research Council, the Medical Research Council and Alcohol Research UK to the ELAStiC Project (ES/L015471/1). The research was further supported by DECIPHer, a UKCRC Public Health Research Centre of Excellence, which receives funding from the British Heart Foundation, Cancer Research UK, Medical Research Council, the Welsh Government and the Wellcome Trust (WT087640MA), under the auspices of the UK Clinical Research Collaboration.

Contributors

GA, SM and EM designed the study and wrote the protocol. GA conducted the statistical analysis with the supervision of DM. GA wrote the first draft of the manuscript and all authors contributed to and have approved the final manuscript.

Disclosure of interest

The author(s) report no conflict of interest.

Acknowledgements

We thank Valentina Ferrari (Università Cattolica del Sacro Cuore, Italy) for her contribution to the pilot study data analysis and Dr Yu-Chiao Wang for proof reading an early version of the manuscript.

A longitudinal study of European students' alcohol use and related behaviours as they travel abroad to study.

Abstract

Background Travelling away from home can be associated with fewer limits on behaviour, particularly for students who participate in exchange programmes.

Aims To examine the effects of eight moderators on change in alcohol use and related negative outcomes, drug use and unprotected sexual behaviour in European study abroad students before, during and after their time abroad.

Methods A three wave (before departure, while abroad, and after their return) longitudinal design collecting data on the frequency and volume of alcohol consumed, heavy episodic drinking, alcohol-related outcomes, drug use and unprotected casual sex.

Results The baseline survey was completed by 1,145 students participating in one or two semester exchange programmes (67.5% spent up to a semester abroad), of which 906 participated in two or more waves, representing 42 and 33 countries of origin and destination respectively. Mean age was 22.2 years (*SD* = 2.28) and 72.7% were female. Students increased the amount of alcohol consumed by 35% (*B* = 0.32; 95% CI 0.287 to 0.349) and experienced more alcohol-related consequences (*B* = 0.15; 95% CI 0.089 to 0.219) during the study abroad experience, though levels fell below pre-departure levels when they returned home. Factors related to greater alcohol use while abroad include pre-departure expectations about alcohol use during the study abroad experience, psychological adjustment to the host country, academic involvement, and host country living costs. No statistically meaningful change in drug use and unprotected sexual behaviour was observed.

Conclusions Studying abroad exposes European students to additional time-limited alcohol-related health risks.

Keywords: Alcohol; Drug use; Unprotected casual sex; Study abroad; Erasmus programme; University students; Longitudinal design

A longitudinal study of European students' alcohol use and related behaviours as they travel abroad to study.

Introduction

Studying in a foreign country is an opportunity that an increasing number of European students are pursuing (European Commission, 2015). It is estimated that the number of study abroad students (SASs) in higher education rose from 2.1 million in 2000 to 4.5 million in 2012 worldwide and will continue to grow (OECD, 2014). Europe hosts a large proportion of these students (1.6 million). Over the last few years, there has been a dramatic increase in the number of those participating in exchange programmes (credit mobility) like the Erasmus Student Mobility for Studies Action (Van Mol, 2016): the number of students participating in this programme only has increased from a few thousand in 1987 to over 270,000 in 2013/2014 (European Commission, 2015). While there are benefits to studying overseas there are also possible risks that may be exacerbated through a lack of familiarity with the language and customs of their host country (Hummer, Pedersen, Mirza, & Labrie, 2010). There is evidence that heavy-drinking students tend to self-select into study abroad exchange programmes (Pedersen, LaBrie, Hummer, Larimer, & Lee, 2010), and results of longitudinal studies conducted on samples of North American and Italian SASs indicate that students drink heavily, consuming up to twice as much alcohol during their study abroad experience compared to pre-departure levels (Aresi, Fattori, Pozzi, & Moore, 2018; Aresi, Moore, & Marta, 2016b).

Only one study assessed students' alcohol use when they return back home and demonstrates consumption returned to pre-departure levels (Pedersen, Larimer, & Lee, 2010). Little is known, however, about how changes in SASs' alcohol use as they transition abroad and return home correspond with any change in the harms that they experience; such as injury, violence and sexual assault. No study has yet addressed changes in other risk behaviours such as illicit drug use and

unprotected casual sex (Marcantonio, Jozkowski, Angelone, & Joppa, 2018). Moreover, previous studies were almost exclusively restricted to U.S. nationals, and it is not known whether findings generalize to European SASs.

The more general literature on young people who travel abroad to study describes mechanisms that may give rise to changes in alcohol use. These include being male (Aresi et al., 2016b), travelling to a country with more relaxed sanctions on alcohol use and in particular travelling from a country where alcohol use is prohibited for young people (e.g. US) to a country where it is allowed (Pedersen, Larimer, et al., 2010). Even though European university students are unaffected by minimum drinking age laws (which are 18 years and older in most European countries), we also know that problematic alcohol involvement tends to peak in the early 20s, and that it declines as individuals age and take on new adult responsabilities (O Malley, 2004; Substance Abuse and Mental Health Services Administration, 2014). Younger students may be more prone to heavy drinking, and it is therefore important to understand age differences in alcohol use among SASs. Perceptions of other students' alcohol use (descriptive norms) and their approval of alcohol use (injunctive norms) (Pedersen, LaBrie, & Hummer, 2009; Perkins, 2002) may also influence consumption. Importantly, for people who travel cross-culturally, alcohol may also be used as a means to cope with stress that may be experienced while away from home (i.e., 'social stress theory', Hummer et al., 2010; Mills & Caetano, 2012; Pedersen, Neighbors, Lee, & Larimer, 2012; Russell, Rosenthal, & Thomson, 2010). Previous studies have generally overlooked university-specific and contextual factors that may be related to increased consumption during the study abroad experience. It is not known whether SASs' alcohol use is mediated by their engagement in academic activities, their living accommodation, and host country living costs. Academic engagement and supervised living environments may in fact reduce opportunities for alcohol use (Aresi, Alfieri, Lanz, Marta, & Moore, 2017; Pedersen, Skidmore, & Aresi, 2014; Porter & Pryor,

2007; Wood, Sher, & McGowan, 2000), whereas living costs when abroad may influence opportunities to purchase alcohol by influencing alcohol affordability (Babor et al., 2010).

The aim of the current study was to undertake the first multi-country longitudinal study of alcohol use, and related behaviours (drug use and casual sex) and harms, by young people travelling abroad to study, covering pre-departure, time abroad and their return home. The primary outcomes were the typical number of alcoholic drinks consumed each week and the number of related negative outcomes experienced. Episodes of heavy drinking and drunkenness, drug use and risky sexual behaviour were included as additional secondary outcomes. Overall, we expected SASs would drink more and therefore experience a greater number of alcohol-related consequences while abroad (Hp1a), and that any increase will return to baseline after their return home (Hp1b). Eight moderators were investigated that included gender and age, descriptive and injunctive norms relating to the period abroad, psychological adjustment to the host country, academic involvement, level of supervision in living accommodation while abroad, and perceived cost of living in the host country relative to the home country. Pre-specified hypotheses were: Male participants will show a greater increase in primary outcomes compared to female participants (Hp2a); Age will be negatively associated with outcomes increase (Hp2b); descriptive (Hp2c) and injunctive (Hp2d) norms would be positively related to increases in the primary outcome variables; psychological adjustment to the host country (Hp2e), academic involvement while abroad (Hp2f), supervision of living accommodation while abroad (Hp2g), and perceived cost of living in the host country relative to the home country (Hp2h) would be negatively related to increases in the primary outcome variables.

Methods

Ethical approval was obtained from the Human Research Ethics Committee at the [blinded for review] for all aspects of the current research. Research was conducted in accordance with the Declaration of Helsinki and informed consent was obtained from all participants.

Study design and participants

A three-wave longitudinal design with sampling undertaken at T_1 (on arrival in their host country, though assessing pre-departure behaviour), T_2 (four months through the period abroad) and T_3 (four months after returning home). Two cohorts were recruited, the first starting at the beginning of the first semester (September 2015) and the second at the beginning of the second semester (February 2016).

At T_1 approximately 1,800 SASs (across both cohorts) in 200 cities from 40 European countries were approached by representatives from an international student association[1]. This association organises welcome events and contacts SASs soon after their arrival. Only those who were contacted within the first two weeks after arrival were asked to participate in the study, to complete an online survey containing questions relevant to the month before they departed and to provide their e-mail address. Four months through their period abroad participants were emailed a link to a second survey and an invitation for the final survey was sent four months after returning home. The outcome variables (alcohol use and negative consequences, drug use and risky sexual behaviour) were measured at each wave, whereas students' perceived descriptive and injunctive norms at T_1 only, and levels of psychological adaptation in the host country at T_2 only. Participants who completed at least two surveys were offered entry into a lottery for flight vouchers as an incentive.

Inclusion criteria

Respondents' were eligible if they were participating in a study abroad programme, intended to stay abroad for a period of four months or more, and travelled from and to a European country.

Materials

The survey was developed in English and translated (and back translated for accuracy) by native speakers into Dutch, French, German, Italian, and Spanish. To ensure translated versions retained the original meaning, any incongruence between the original and each back translated English version was resolved through discussion. We used the validated version of each measure when available.

Alcohol consumption. To estimate the number of standard drinks consumed during a typical week, participants were asked to indicate the number of drinks consumed per occasion and which day(s) of a typical week of a given 30-day period they drank any alcohol. A validated drinking-day beverage-specific quantity measure (Bloomfield, Hope, & Kraus, 2013) along with a standard drink definition were used for all measures and included validated images of alcoholic beverages (containing 10g of alcohol) (Kuntsche & Labhart, 2012). Secondary analyses were conducted using the frequency of heavy episodic drinking (HED) (i.e., consuming at least four/five standard drinks for women and men in one drinking session), and the frequency of drunkenness episodes, which was defined as staggering when walking, not being able to speak properly, vomiting or an inability to recall events during the drinking session. Both HED and drunkenness items referred to the 30-day period previous to each survey

Negative consequences. The Brief Young Adult Alcohol Consequences Questionnaire (BYAACQ) (Kahler, Hustad, Barnett, Strong, & Borsari, 2008) was used to assess the number of negative

consequences participants experienced over a 30-day period. This is a 24 yes/no item scale that has demonstrated test-retest reliability over a six-week period.

Drug use and risky sexual behaviour. Respondents were asked whether they used cannabis, any other psychoactive drugs (e.g., cocaine), and had unprotected casual sex during the given 30-day period. In the case of an affirmative answer, they were asked about the frequency they engaged in each behaviour on a Likert scale (1 "never" to 7 "40 times or more").

Descriptive drinking norms. To measure pre-departure (T_1) perceptions regarding reference peers' drinking behaviour, respondents were asked to think of a typical study abroad student studying in the same host country that they were travelling to and their monthly HED frequency on a seven-point Likert scale (1 "never" to 7 "40 times or more").

Injunctive drinking norms. Three drinking-related items of the House Acceptability Questionnaire were used. The scale demonstrated both construct validity (Larimer, Irvine, Kilmer, & Marlatt, 1997) and internal consistency (Larimer, Turner, Mallett, & Geisner, 2004). Students were asked to rate the perceived acceptability of three behaviours using a Likert scale that ranged from one ("not acceptable") to seven ("very acceptable"). The behaviours were "becoming intoxicated at a party," "missing a class because you are intoxicated or hangover," and "becoming intoxicated on a weeknight".

Brief Psychological Adaptation Scale (BPAS). An eight-item scale measured students' psychological well-being as it relates to their adaptation to the host country. The scale demonstrates construct validity, structural unidimensional validity, and good internal reliability for all languages used in this study except Dutch (Demes & Geeraert, 2014). Respondents were prompted as follows: "Think about living in [host country]. In the last two weeks, how often have you felt..." to items

such as “out of place, like you don’t fit into the [host country] culture”. Participants responded to a scale from one (never) to seven (always).

Demographics and Study Abroad Factors. At T_1 participants provided their gender, age, living accommodation in the home country, mother language(s), current area of study, country of origin and destination, and the amount of time they planned to spend abroad. At T_2 students were asked about perceptions of their host country’s living costs compared to their home country (from one, much cheaper, to five, much more expensive), the number of hours a week they usually spend studying or doing assignments (not including attending classes), as a measure of overall academic involvement in the host university, and characteristics of their place of residence to distinguish between more supervised (e.g., university dormitory) and less supervised (e.g., a shared apartment) accommodation.

Analytic Strategy

Both primary outcomes are count variables and were analysed using multi-level Poisson regression models in MLwiN 2.33 (Rasbash, Charlton, Browne, Healy, & Cameron, 2009). Markov Chain Monte Carlo (MCMC) estimation methods were used. Random intercepts were incorporated into the modelling framework to account for the hierarchical structure in the data. Level one random effects were at the within participant level (T_1, T_2 and T_3 repeated measures), nested within individual-specific level two random effects, nested within level three (students' country-of-origin and country-of-destination clusters; CoO-CoD) so allowing the inclusion of variance due to different countries of origin and destination.

The association between the number of drinks per week and the number of consequences measured with the BYAACQ were assessed in a series of models (Hox, 2010). Model one was a random

intercept model. In model two, changes in the outcome variable over time were modelled indicating time of measurement (pre-departure = 0, during the study abroad experience = 1, and post-return = 2) as a predictor with pre-departure as the reference category. In model three, covariates were included as level two (individual) predictors. In model four, interactions between time of measurement (pre-departure = 0, during the study abroad experience = 1 and post-return = 2) and all individual-level predictors were included. In order to examine cross-level interaction effects between level one (time of measurement) and level two (individual-level) predictors, continuous covariates were centered at the grand-mean (Enders & Tofighi, 2007).To consider how the quantity of alcohol consumed affected the number of alcohol-related consequences experienced, the number of consequences were modelled in a series of models that included the additional level one drinks predictor (i.e., the number of alcoholic drinks consumed weekly at the three points of assessment) (Model 2a).

Secondary analyses were run to test changes in frequency of HED, episodes of drunkenness, cannabis and other drug use, and unprotected casual sex. The distributions of these multi-categorical outcomes were skewed towards zero and were recoded into a series of binary outcomes defined as follows: ANYBEHAVIOUR = 1 if behaviour occurred otherwise 0; MUCHBEHAVIOUR = 1 if the behaviour occurred three times or more times otherwise 0. Logit models were applied to each binary outcome.

Results

The T_1 survey was completed by 1,145 students, 800 completed the T_2 survey (69.9%), and 443 completed the T_3 survey (38.7%). Participants who participated in at least two waves were included (N = 908). Those who indicate “other” as gender (N=2) were excluded from analyses. Those who abstained from alcohol at all waves (N = 42) and those participants with missing values on one or

more predictor variables (N = 221) were excluded from the analysis of alcohol outcomes, leading to a final sample of 645 for analyses of primary outcomes and alcohol misuse secondary outcomes (i.e., HED and drunkenness frequency). Conversely, given that only age and gender were included as predictors in analyses on drug use and casual unprotected sex, analyses were based on the total sample of 906 respondents. Prior to analysis, outliers in the number of drinks drunk, assessed by inspection of a boxplot for values greater than 1.5 box-lengths from the edge of the box were winsorised at three standard deviations (SD), were replaced with the next highest value of the remaining distribution (Tabachnick & Fidell, 2001).

Participants had a mean age of 22.2 years (SD = 2.28, range 18-36) and 72.7% were female, thus making the sample broadly comparable to the available data on Erasmus students (European Commission, 2015) (60.5% of the Erasmus student population are women; mean age is 23 years). The mean number of years in formal tertiary education was 3.1 (SD = 1.37). Areas of study varied with Social Science, Business and Law (37.7%) and Humanities and the Arts (20.3%) representing the most common. Students originated from 42 countries in total with Spain (14%), Germany (10.1%), Italy (9.8%), France (6.9%), the United Kingdom (6.4%) and the Netherlands (4.7%) being the most frequent. Participants travelled to 33 different countries with Spain (12.8%), Italy (9.1%), the United Kingdom (8.7%), France (7.8%), Germany (7.4%), Belgium (5.6%) and the Netherlands (5.4%) being the most frequently visited. Most students (67.5%) planned to spend up to a semester abroad (about 16 to 20 weeks), while the remainder planned to spend the entire academic year in the host country. 59.3% lived in a relatively unsupervised accommodation (i.e., a private or shared apartment), whereas the remaining lived in supervised accommodations, including university residence halls/dormitories (38.1%) or a host family or relatives (2.6%). Mean score of 5.25 (SD = .91) out maximum 7 at the BPAS shows participants were generally well-adapted to life in the host country. The measures of injunctive norms (α = 0.86) and BPAS (α = 0.84) showed good internal consistency.

Respondents (who completed at least two surveys) did not significantly differ from those who only completed one survey ($N = 236$) in terms of gender (χ^2 (1) = 0.56, $p = 0.46$), age ($t(1,142) = 1.06$, $p = 0.29$), and discipline of study (χ^2 (6) = 3.86, $p = 0.70$). There were no significant differences between follow-up completers and non-completers on pre-abroad drinking ($t(1,112) = 0.75$, $p = 0.45$) or perceptions regarding study abroad peers' drinking behaviour ($t(1,026) = 1.33$, $p = 0.19$) and approval of heavy drinking ($t(1,056) = -0.15$, $p = 0.88$). Completers and non-completers did not differ in their extent of cannabis use (χ^2 (1) = 0.06, $p = 0.80$), other drug use (χ^2 (1) = 0.77, $p = 0.38$) and in risky sexual behaviour (χ^2 (1) = 0.07, $p = 0.79$).

Factors related to change in number of drinks per week

Participants drank a mean of 12.59 ($SD = 12.35$) standard drinks per week at pre-departure, 17.06 ($SD = 16.57$) during the study abroad trip, and 8.01 ($SD = 8.88$) at post-return. Results of Models three and four only are presented in Table 1. Because of the log link function used in Poisson regression, the raw coefficients are on a log scale the exponent of which can be interpreted as a rate ratio. Model three exponentiated predictions for the number of drinks consumed in a week by gender and time of assessment are shown in Figure 1.

Figure 1

Table 1

Results of Model 2 show students significantly increased the amount of alcohol drunk during the study abroad experience ($B = 0.32$; CI 0.287, 0.349; $p < .001$; Exp. = 1.374) (Hp1a), and significantly decreased at post-return ($B = -0.36$; CI -0.418, -0.304; $p < 0.001$; Exp. = 0.697)

compared to pre-departure (Hp1b). The results of Model three show that being male, having higher perceptions regarding both study abroad peers' binge drinking behaviour (descriptive norms) and approval of heavy drinking (injunctive norms), showing better psychological adjustment, and being less academically engaged were positively associated with the number of alcoholic drinks drunk. Several significant interaction effects were found (Model four). Psychological adjustment (Hp2e) and injunctive norms (Hp2d) had an effect on the change in mean number of drinks drunk from T_1 to T_2, though in both cases in the opposite direction to what was expected (i.e., positive for the former, negative for the latter). Inspection of the associations between injunctive norms and the other predictors indicated the existence of significant collinearity with descriptive norms. This can explain the discrepancy in the level of significance of the interaction between time and injunctive norms in the absence (Model 4a not reported here) and presence (Model 4) of other predictors. As expected, academic involvement (Hp2f) and host country living costs (Hp2h) had a negative effect on the change in mean number of drinks drunk from T_1 to T_2.

Results of simple slope analyses (Aiken & West, 1991) on each of the predictors (except injunctive norms) that moderated the T_1 to T_2 change in mean number of drinks revealed that students with both high and low scores (± 1 *SD*) on the moderator variables significantly increased the number of drinks drunk during the study abroad experience. In addition, except for academic involvement (for which it was the reverse), students with higher scores demonstrated a greater increase in the number of drinks drunk during the study abroad experience compared to pre-departure compared to those with low perceptions (Table 2).

Greater age, greater academic involvement, and less supervised accommodation had a positive effect on the change in mean number of drinks drunk from T_1 to T_3, whereas being male, greater psychological adjustment, and greater host country living costs had a negative effect on the change in mean number of drinks drunk from T_1 to T_3.

Table 2

Factors related to change in number of alcohol-related negative consequences

Participants experienced a mean of 3.61 (*SD* = 3.55, range = 0–17) problems at pre-departure, 4.09 (*SD* = 3.93, range = 0–22) during the study abroad trip, and 2.61 (*SD* = 3.28, range = 0–15) at post-return. Results of Model 2 showed students suffered from a greater number of consequences during the study abroad experience (*B* = 0.15; CI 0.089, 0.219; $p < 0.001$; Exp. = 1.166), though such number significantly decreased at post-return (*B* = -0.28; CI -0.382, -0.178; $p < 0.001$; Exp. = 0.756) compared to pre-departure (Table 3). The number of drinks consumed weekly was positively associated with consequences (*B* = 0.02; CI 0.022, 0.026; $p < .001$; Exp. = 1.024). The results of Model three showed that only injunctive norms bore a positive significant association with the outcome variable. None of the interaction effects were statistically significant, except for gender where being male had a negative effect on the change in mean number of consequences from T_1 to T_3. Participants' predicted (Model 3) number of consequences in a month was exponentiated and means by gender and time of assessment are shown in Figure 2.

Figure 2

Table 3

Changes in secondary outcomes

Results of analyses on HED and drunkenness were consistent with those from primary outcomes (Table S1). Proportion of participants having engaged in HED at least once in the previous month at

each time of assessment was 70.6% at pre-departure, 76.9% during the study abroad experience, and 60.3% at post-return. The percentage of students who became drunk at least once a month were 41.6% at pre-departure, 52.9% during the study abroad experience, and 31% at post-return. In contrast, no statistically significant change from T_1 to T_2 or from T_1 to T_3 in drug use and risky sexual behaviour was found (Supplemental material Table S2).

Discussion

SASs increase their alcohol consumption and experience a greater number of alcohol-related negative consequences when they travel abroad to study. These results are consistent with single nationality studies on students from North America (Aresi, Moore, & Marta, 2016a) and Italy (Aresi et al., 2016b), and have practical significance due to the number of students who travel and are a large and growing group. No statistically meaningful changes in illicit drug use and unprotected sexual behaviour were observed, suggesting that the study abroad experience is dominated by alcohol. The effects appear to be time-limited as alcohol consumption fell to below pre-departure levels when students returned home.

Even though descriptive and injunctive norms did not predict changes in alcohol use and related consequences while abroad, as shown in previous studies (Pedersen et al., 2009), this study found injunctive norms were related to greater levels of alcohol consumption overall. This result generally overlaps with those of studies suggesting that normative beliefs are relevant for young people. In the case of SASs, most students remain segregated from the local student population and socialise in co-national or international-only groups (Brown, 2009), thus possibly accentuating the effects of beliefs by becoming a part of a cohesive and segregated group (Perkins, 2002). Additionally, social forces (e.g., motivation to socialise to avoid isolation and fit into the new environment) encourage

students to adhere to the popular social representation of study abroad students as heavy-drinking 'party-goers' (Aresi et al., 2018). Given such beliefs and attitudes are usually resistant to change (Foxcroft, Moreira, Almeida Santimano, & Smith, 2015), rather than change students' beliefs (Pedersen, Neighbors, Atkins, Lee, & Larimer, 2017) interventions might instead seek to reduce SASs' segregation, thus possibly reducing the impact of such beliefs.

Consistent with previous research (Babor et al., 2010; Porter & Pryor, 2007; Wood et al., 2000), greater academic involvement in the host country and greater host country living costs predicted lower alcohol use. Social stress theory (Mills & Caetano, 2012) suggests that greater adjustment in the host country is generally related to healthier behaviors. However, in our study, contrary to expectations, psychologically well-adjusted students consumed more alcohol and increased their consumption compared to their pre-departure levels. Mean value of psychological adaptation, as measured by the BPAS, demonstrates that most students experienced few adaptation difficulties during their study abroad experience. Notably, the BPAS asks participants to rate to what extent they were excited about being in the host country, happy with their day-to-day life, felt lonely and frustrated by adaptation difficulties, thus students may have responded based on their particular experience and expectations. In light of evidence that SASs tend to have little involvement with the culture and people of the host country (Brown, 2009; Sigalas, 2010), a well-adjusted student may be one who was successful in socialising with co-national or international peers. Therefore, given SASs are a self-selected group and the popular representation is that they are heavy-drinking party-goers (Aresi et al., 2018), better adjusted students may drink heavier and increase alcohol use to a greater extent than others. Again, alcohol interventions seeking to reduce SASs' segregation, and promote students' adjustment to the host country that doesn't involve socialization with study abroad peers only, may prove helpful.

The fact that drinking at post-return fell below pre-departure levels was an unexpected finding. The only study examining post-return alcohol use among SAS found students returned to pre-departure levels (Pedersen, Larimer, et al., 2010). It is unclear what factors may explain differences between European and U.S. students, though there are at least two possible explanations of reductions in alcohol use following a study abroad experience. Firstly, European SASs are often not primarily motivated to study overseas by academic interests (Aresi et al., 2017), and are generally less academically committed during the study abroad experiences than when they are in their home country (e.g., fewer classes taken because of issues in recognition of study achievements) (Teichler, 2004). Therefore, they may need to catch up as they return (e.g., taking more classes) and have less time at disposal for social and recreational activities that include drinking. Secondly, consistent with the popular social representation of study abroad experiences as a 'party' period (Aresi et al., 2018), it is possible that students consider studying abroad as the last opportunity to enjoy life with few restrictions and responsabilities, before a next phase of their life begins and they mature out of the typical young adult drinking (Järvinen & Bom, 2018; O Malley, 2004). Both explanations find some support in the result of this study, as decreases in alcohol use were greater for older students, who are both facing increasing academic demands related to the end of their university career and approaching the time when new adult responsabilities are usually taken on.

Limitations

Despite adopting methods to reduce bias, alcohol intake may have been under-reported, as is common in all self-report studies (Bloomfield et al., 2013; Del Boca & Darkes, 2003). As is typical of longitudinal observational studies, participation was subject to attrition. This might be reduced in future studies if surveys received home and host country institutional support.

Conclusion

Students who travel abroad consume more alcohol, engage in more frequent heavy drinking episodes, and experience an increase in related harms. Levels of consumption return to below pre-departure levels on their return home. Factors predicting increased alcohol use and related consequences during a study abroad experience include perceptions that the destination country is somewhere where alcohol use is acceptable and adapting well to the study abroad life. Alcohol use was attenuated when students were subject to greater academic engagement and lower alcohol affordability. Institutions that host students while abroad might consider adopting interventions to promote greater exposure to social and cultural activities that do not involve alcohol (e.g., encouraging students to socialise outside of their travel abroad cohort) (Owens & Loomes, 2010), and developing policies aimed at increasing students' academic involvement. Future research should examine whether SASs' healthy behaviors vary across students' countries of origin and destination.

Notes

[1] Blinded for review.

Acknowledgements

Blinded for review.

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Table 1.

Multilevel regression models predicting change in number of alcoholic drinks drunk at pre-departure, during study abroad experience, and at post-return.

	Model 3 *B*	*[95% CI]*	*Exp. Coefficient*	Model 4 *B*	*[95% CI]*	*Exp. Coefficient*
Fixed effects						
Constant	1.126***	[0.910, 1.342]	3.083	1.091***	[0.830, 1.352]	2.977
Time [Abroad=1]	0.318***	[0.285, 0.351]	1.374	0.262***	[0.203, 0.321]	1.300
Time [Post return=2]	-0.360***	[-0.417, -0.303]	0.698	-0.294***	[-0.396, -0.192]	0.745
Gender [Male=1]	0.317***	[0.145, 0.489]	1.373	0.306**	[0.106, 0.506]	1.358
Age[a]	0.001	[-0.044, 0.046]	1.001	-0.006	[-0.051, 0.039]	0.994
Descriptive_norms[a]	0.090*	[0.014, 0.166]	1.094	0.073	[-0.011, 0.157]	1.076
Injunctive_norms[a]	0.100**	[0.037, 0.163]	1.105	0.121**	[0.050, 0.192]	1.129
Psychological adjustment[a]	0.149**	[0.051, 0.247]	1.161	0.114*	[0.016, 0.212]	1.121
Academic involvement[a]	-0.076*	[-0.143, -0.009]	0.927	-0.077*	[-0.142, -0.012]	0.926
Accommodation	0.146	[-0.028, 0.320]	1.157	0.103	[-0.115, 0.321]	1.108
Host country living cost[a]	0.054	[-0.071, 0.179]	1.055	0.093	[-0.032, 0.218]	1.097
Time [Abroad=1] x Gender [Male=1]				0.052	[-0.019, 0.123]	1.053
Time [Post return=2] x Gender [Male=1]				-0.330***	[-0.461, -0.199]	0.719
Time [Abroad=1] x Age[a]				-0.002	[-0.018, 0.014]	0.998
Time [Post return=2] x Age[a]				0.095***	[0.064, 0.126]	1.100
Time [Abroad=1] x Descriptive_norms[a]				0.019	[-0.010, 0.048]	1.019
Time [Post return=2] x Descriptive_norms[a]				0.038	[-0.013, 0.089]	1.039
Time [Abroad=1] x Injunctive_norms[a]				-0.037**	[-0.062, -0.012]	0.964
Time [Post return=2] x Injunctive_norms[a]				0.016	[-0.029, 0.061]	1.016
Time [Abroad=1] x Psychological adjustment[a]				0.093***	[0.054, 0.132]	1.097
Time [Post return=2] x Psychological adjustment[a]				-0.145***	[-0.219, -0.071]	0.865
Time [Abroad=1] x Academic involvement[a]				-0.023*	[-0.047, 0.001]	0.977
Time [Post return=2] x Academic involvement[a]				0.132***	[0.089, 0.175]	1.141
Time [Abroad=1] x Accommodation [Less supervised=1]				0.045	[-0.022, 0.112]	1.046
Time [Post return=2] x Accommodation [Less supervised=1]				0.125*	[0.005, 0.245]	1.133
Time [Abroad=1] x Host country living cost[a]				-0.079***	[-0.108, -0.050]	0.924
Time [Post return=2] x Host country				-0.059*	[-0.116, -0.002]	0.943

living cost[a]		
Random effects		
Level: CoO-CoD clusters	3.494	3.568
Level: SubjectID	0.583	0.593
Level: TIME	1	1
Model fit (DIC)	11,129.22	10,942.93
Δ DIC from previous model	-2.709	186.293

Note. *N* = 645. CI = confidence intervals; Effects are reported as unstandardized regression coefficients; [a] The predictors are mean centred at the grand mean; *** $p < .001$ ** $p < .01$ * $p < .05$.

Table 2.

Moderator analysis of the association between time (pre-abroad to while abroad) on typical number of alcoholic beverages consumed in one week

	B	*[95% CI]*	*β*
Psychological adjustment			
Low	2.779*	[0.525, 5.034]	0.094
High	6.174***	[3.913, 8.436]	0.209
Academic involvement			
Low	5.739***	[3.497, 7.982]	0.194
High	3.138**	[0.894, 5.382]	0.106
Host country living cost			
Low	6.003***	[3.747, 8.259]	0.203
High	2.942*	[0.686, 5.199]	0.100

Note. *N* = 645. CI = confidence intervals; Effects are reported as unstandardized regression coefficients; High = 1 *SD* above the mean; Low = 1 *SD* below the mean; *** $p < .001$. ** $p < .01$. * $p < .05$.

Table 3.

Multilevel regression models predicting change in number of alcohol-related negative consequences at pre-departure, during study abroad experience, and at post-return.

	Model 3 *B*	*[95% CI]*	e^B	Model 4 *B*	*[95% CI]*	e^B
Fixed effects						
Constant	0.183	[-0.025, 0.391]	1.201	0.163	[-0.070, 0.396]	1.177
Time [Abroad=1]	-0.004	[-0.073, 0.065]	0.996	-0.017	[-0.133, 0.099]	0.983
Time [Post return=2]	-0.192***	[-0.298, -0.086]	0.825	-0.135	[-0.315, 0.045]	0.874
Drinks[a]	0.023***	[0.019, 0.027]	1.023	0.023***	[0.019, 0.027]	1.023
Gender [Male=1]	0.120	[-0.060, 0.300]	1.127	0.187	[-0.009, 0.383]	1.206
Age[a]	-0.020	[-0.059, 0.019]	0.980	-0.022	[-0.065, 0.021]	0.978
Descriptive_norms[a]	0.053	[-0.023, 0.129]	1.054	0.034	[-0.046, 0.114]	1.035
Injunctive_norms[a]	0.119***	[0.056, 0.182]	1.126	0.120***	[0.051, 0.189]	1.127
Psychological adjustment[a]	0.055	[-0.039, 0.149]	1.057	0.039	[-0.067, 0.145]	1.040
Academic involvement[a]	-0.057	[-0.120, 0.006]	0.945	-0.060	[-0.131, 0.011]	0.942
Accommodation	-0.003	[-0.179, 0.173]	0.997	-0.018	[-0.214, 0.178]	0.982
Host country living cost[a]	0.094	[-0.016, 0.204]	1.099	0.078	[-0.036, 0.192]	1.081
Time [Abroad=1] x Gender [Male=1]				-0.062	[-0.207, 0.083]	0.940
Time [Post return=2] x Gender [Male=1]				-0.249*	[-0.488, -0.010]	0.780
Time [Abroad=1] x Age[a]				0.002	[-0.031, 0.035]	1.002
Time [Post return=2] x Age[a]				0.011	[-0.046, 0.068]	1.011
Time [Abroad=1] x Descriptive_norms[a]				0.027	[-0.032, 0.086]	1.027
Time [Post return=2] x Descriptive_norms[a]				0.077	[-0.019, 0.173]	1.080
Time [Abroad=1] x Injunctive_norms[a]				0.003	[-0.052, 0.058]	1.003
Time [Post return=2] x Injunctive_norms[a]				-0.031	[-0.113, 0.051]	0.969
Time [Abroad=1] x Psychological adjustment[a]				0.065	[-0.015, 0.145]	1.067
Time [Post return=2] x Psychological adjustment[a]				-0.108	[-0.243, 0.027]	0.898
Time [Abroad=1] x Academic involvement[a]				-0.011	[-0.058, 0.036]	0.989
Time [Post return=2] x Academic involvement[a]				0.049	[-0.025, 0.123]	1.050
Time [Abroad=1] x Accommodation [Less supervised=1]				0.048	[-0.087, 0.183]	1.049
Time [Post return=2] x Accommodation [Less supervised=1]				0.001	[-0.219, 0.221]	1.001

Time [Abroad=1] x Host country living cost[a]		0.016	[-0.047, 0.079]	1.016
Time [Post return=2] x Host country living cost[a]		0.014	[-0.090, 0.118]	1.014
Random effects				
Level: CoO-CoD clusters	1.801	1.809		
Level: SubjectID	0.376	0.378		
Level: TIME	1	1		
Model fit (DIC)	5,359.359	5369.896		
Δ DIC from previous model	6.822	-10.537		

Note. *N* = 645. CI = confidence intervals; Effects are reported as unstandardized regression coefficients; [a]The predictors are mean centred at the grand mean; *** $p < .001$. ** $p < .01$. * $p < .05$.

Figure 1. Means predicted number of drinks consumed in one week by gender and time of assessment. Error bars represent ±2 standard errors.

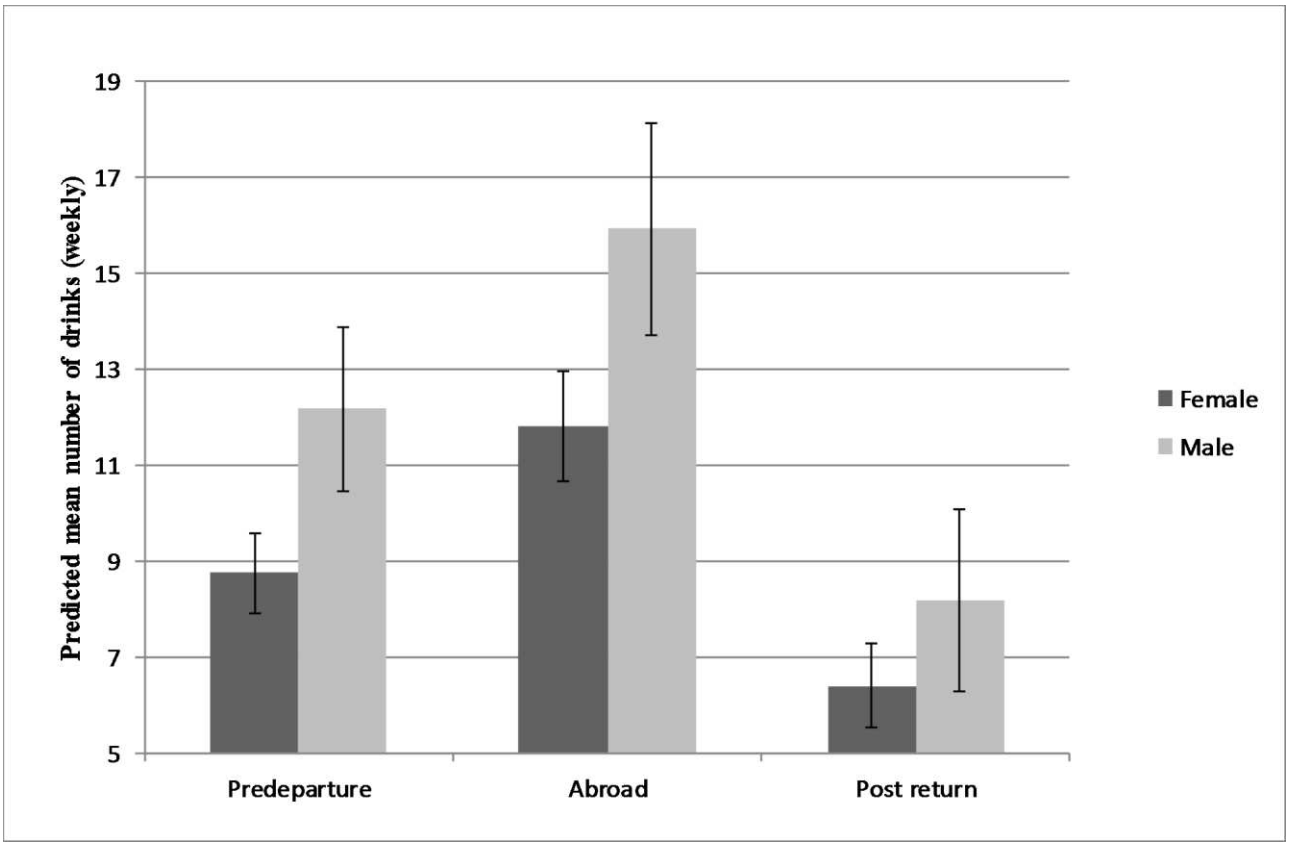

Figure 2. Mean predicted number of alcohol-related negative consequences in one month by gender and time of assessment. Error bars represent ±2 standard errors.

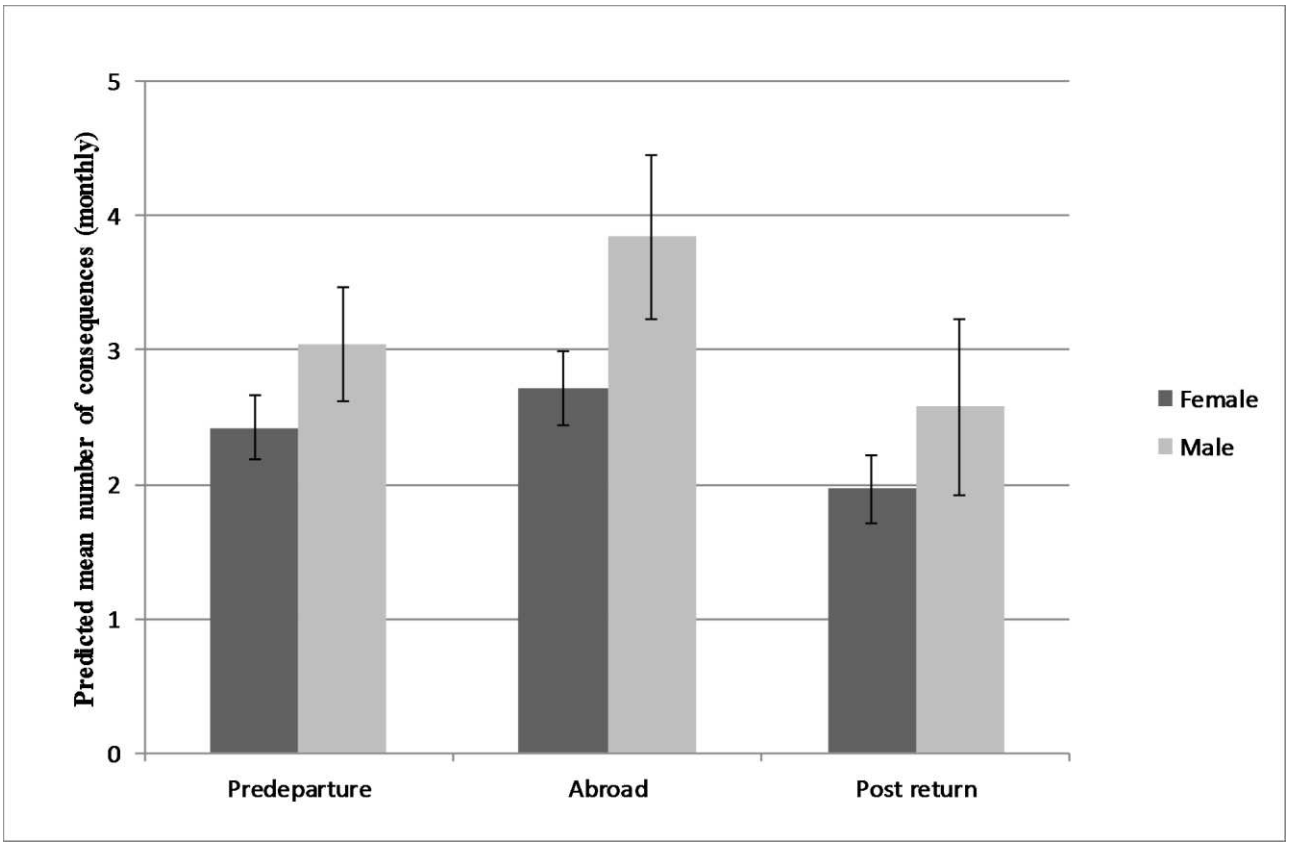

Table S1.

Multilevel regression models predicting change in HED and drunkenness engagement and frequency at pre-departure, during study abroad experience, and at post-return.

	Model 3 *B*	*[95% CI]*	Model 4 *B*	*[95% CI]*
HED (ANYBEHAVIOUR)				
Constant	0.669**	[0.252, 1.086]	0.583**	[0.169, 0.997]
Time [Abroad=1]	0.503**	[0.154, 0.852]	0.606**	[0.204, 1.008]
Time [Post return=2]	-0.255	[-0.700, 0.190]	-0.059	[-0.563, 0.445]
Gender [Male=1]	0.062	[-0.408, 0.532]	0.441	[-0.186, 1.068]
Age[a]	-0.083	[-0.179, 0.013]	-0.154	[-0.279, -0.029]
Time [Abroad=1] x Gender [Male=1]			-0.540	[-1.338, 0.258]
Time [Post return=2] x Gender [Male=1]			-0.822	[-1.853, 0.209]
Time [Abroad=1] x Age[a]			0.136	[-0.015, 0.287]
Time [Post return=2] x Age[a]			0.063	[-0.141, 0.267]
HED (MUCHBEHAVIOUR)				
Constant	-1.240***	[-1.616, -0.864]	-1.396***	[-1.800, -0.992]
Time [Abroad=1]	0.736***	[0.403, 1.069]	0.892***	[0.498, 1.286]
Time [Post return=2]	-0.792**	[-1.274, -0.310]	-0.427	[-0.980, 0.126]
Gender [Male=1]	0.374	[-0.083, 0.831]	0.792*	[0.175, 1.409]
Age[a]	-0.178**	[-0.282, -0.074]	-0.137	[-0.280, 0.006]
Time [Abroad=1] x Gender [Male=1]			-0.466	[-1.211, 0.279]
Time [Post return=2] x Gender [Male=1]			-1.444*	[-2.612, -0.276]
Time [Abroad=1] x Age[a]			-0.121	[-0.284, 0.042]
Time [Post return=2] x Age[a]			0.041	[-0.208, 0.290]
Drunkeness (ANYBEHAVIOUR)				
Constant	-1.191***	[-1.559, -0.823]	-1.229***	[-1.627, -0.831]
Time [Abroad=1]	0.685***	[0.358, 1.012]	0.594**	[0.204, 0.984]
Time [Post return=2]	-0.317	[-0.770, 0.136]	-0.020	[-0.541, 0.501]
Gender [Male=1]	0.236	[-0.215, 0.687]	0.269	[-0.341, 0.879]
Age[a]	-0.108*	[-0.206, -0.010]	-0.164*	[-0.299, -0.029]
Time [Abroad=1] x Gender [Male=1]			0.398	[-0.321, 1.117]
Time [Post return=2] x Gender [Male=1]			-1.284*	[-2.382, -0.186]
Time [Abroad=1] x Age[a]			0.015	[-0.140, 0.170]
Time [Post return=2] x Age[a]			0.283*	[0.065, 0.501]
Drunkeness (MUCHBEHAVIOUR)				

Constant	-3.748***	[-4.571, -2.925]	-4.021***	[-4.856, -3.186]
Time [Abroad=1]	0.848**	[0.334, 1.362]	1.031**	[0.380, 1.682]
Time [Post return=2]	0.109	[-0.628, 0.846]	0.240	[-0.715, 1.195]
Gender [Male=1]	0.303	[-0.326, 0.932]	0.664	[-0.296, 1.624]
Age[a]	-0.223*	[-0.380, -0.066]	-0.209	[-0.446, 0.028]
Time [Abroad=1] x Gender [Male=1]			-0.491	[-1.600, 0.618]
Time [Post return=2] x Gender [Male=1]			-0.640	[-2.318, 1.038]
Time [Abroad=1] x Age[a]			-0.034	[-0.310, 0.242]
Time [Post return=2] x Age[a]			-0.117	[-0.583, 0.349]

Note. N = 643. CI = confidence intervals; Effects are reported as unstandardized regression coefficients; [a]The predictors are mean centred; *** $p < .001$. ** $p < .01$. * $p < .05$.

Table S2.

Multilevel regression models predicting change in risky sex, cannabis use and frequency at pre-departure, during study abroad experience, and at post-return.

	Model 3 *B*	*[95% CI]*	Model 4 *B*	*[95% CI]*
Cannabis (ANYBEHAVIOUR)				
Constant	-3.679***	[-4.381, -2.977]	-4.006***	[-4.743, -3.269]
Time [Abroad=1]	0.141	[-0.300, 0.582]	0.224	[-0.339, 0.787]
Time [Post return=2]	-0.235	[-0.786, 0.316]	0.264	[-0.424, 0.952]
Gender [Male=1]	0.995**	[0.358, 1.632]	1.419**	[0.568, 2.270]
Age[a]	-0.124	[-0.265 ,0.017]	-0.242*	[-0.450, -0.034]
Time [Abroad=1] x Gender [Male=1]			-0.171	[-1.141, 0.799]
Time [Post return=2] x Gender [Male=1]			-1.519*	[-2.791, -0.247]
Time [Abroad=1] x Age[a]			0.051	[-0.178, 0.280]
Time [Post return=2] x Age[a]			0.387**	[0.097, 0.677]
Cannabis (MUCHBEHAVIOUR)				
Constant	-7.527***	[-9.646, -5.408]	-8.631***	[-12.006, -5.256]
Time [Abroad=1]	0.513	[-0.259, 1.285]	0.459	[-0.666 ,1.584]
Time [Post return=2]	-0.872	[-1.964, 0.220]	-0.185	[-1.651,1.281]
Gender [Male=1]	1.462*	[0.215, 2.709]	1.713	[-0.092, 3.518]
Age[a]	-0.496**	[-0.859, -0.133]	-0.652	[-1.220, -0.084]
Time [Abroad=1] x Gender [Male=1]			0.415	[-1.325, 2.155]
Time [Post return=2] x Gender [Male=1]			-1.934	[-4.707, 0.839]
Time [Abroad=1] x Age[a]			0.042	[-0.509, 0.593]
Time [Post return=2] x Age[a]			0.350	[-0.407, 1.107]
Risky sex (ANYBEHAVIOUR)				
Constant	-3.836	[-4.569, -3.103]	-4.097	[-4.922, -3.272]
Time [Abroad=1]	0.189	[-0.336, 0.714]	0.106	[-0.523, 0.735]
Time [Post return=2]	0.477	[-0.115, 1.069]	0.636	[-0.093, 1.365]
Gender [Male=1]	0.018	[-0.619, 0.655]	0.076	[-0.871, 1.023]
Age[a]	0.000	[-0.131, 0.131]	-0.002	[-0.200, 0.196]
Time [Abroad=1] x Gender [Male=1]			0.265	[-0.919, 1.449]
Time [Post return=2] x Gender [Male=1]			-0.691	[-2.116, 0.734]
Time [Abroad=1] x Age[a]			0.054	[-0.185, 0.293]
Time [Post return=2] x Age[a]			-0.210	[-0.553, 0.133]

Note. $N = 904$. Effects are reported as unstandardized regression coefficients; [a]The predictors are mean centred; *** $p < .001$. ** $p < .01$. * $p < .05$.