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Family affluence as a protective or risk factor for adolescent drunkenness in different countries and the role drinking motives play

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ABSTRACT

Aims: Previous research has shown mixed results (positive, negative or no effects) regarding socio-economic disparities in adolescent drunkenness. This study investigates whether family affluence is differently associated with frequency of adolescent drunkenness in traditional countries, at a later diffusion of innovation adopter stage according to the Theory of Diffusions of Innovations by Rogers (2003), compared with more progressive countries at a more advanced stage. Furthermore, we investigated as to whether differences in this association can be explained by differences in adolescent drinking motives.

Methods: This study used data from the 2009/2010 survey of the Health Behaviour in School-aged Children (HBSC) study, including 25,566 alcohol-using adolescents aged 11–19 years old from 11 European countries. The Global Innovativeness Index was used to classify countries in progressive or more traditional countries. Multilevel regression analyses and structural equation modelling were conducted.

Findings: In traditional countries, family affluence showed a positive association with adolescent frequency of drunkenness. A higher endorsement of social (drinking to celebrate an event) and enhancement motives (drinking to increase moods) by adolescents with a higher family affluence mediated this positive association between family affluence and frequency of drunkenness. In progressive countries, family affluence was negatively associated with frequency of drunkenness. In these countries, a higher endorsement of coping drinking motives by adolescents with a lower family affluence mediated this association.

Conclusion: A country's diffusion of innovation stage (i.e., traditional vs. progressive) seems to shape the direction of the association between family affluence and adolescent drunkenness including the psychological pathways that explain these socio-economic inequalities. This is most likely due to a quicker and smoother adoption of the new 'low drunkenness norms' ('it is not cool to drink to get drunk') in progressive countries and among adolescents with a higher family affluence.

1. Introduction

The negative consequences of adolescent alcohol use and drunkenness are well established in scientific literature (Bava and Tapert, 2010; Grant et al., 2006; Welch et al., 2013). Previous studies have shown that in adult populations a socio-economic gradient exists for both patterns of alcohol use, especially for drunkenness, and its health-related harm (Bloomfield et al., 2006; Collins, 2016; Roche et al., 2015). For instance, significantly higher rates of mortality and disability due to alcohol use have been found for people with a lower socioeconomic position (SEP), the position a person holds within the society influenced by their social and economic factors, previously also called socioeconomic status (Mackenbach et al., 2015; Probst et al., 2014; Tarkiainen et al., 2015).

Nevertheless, previous research has shown inconsistent results when it comes to the association between family affluence (a proxy for family SEP) and adolescent alcohol use (Bosque-Prous et al., 2017; Currie et al.,

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2006; Hanson and Chen, 2007; Leal-López et al., 2020). A review investigating the association between SEP and adolescent alcohol use by Hanson and Chen (2007) indicated that within the 13 identified high quality studies, eight studies found no significant results, four studies reported on positive and two reported on negative associations. A more recent cross-national study including 33 European and North American countries and regions showed that higher family affluence (i.e., material assets and affluence of the family such as the number of computers a family owns or how often they go travel), was a risk factor for drunkenness (Leal-López et al., 2020). However, a study by Bosque-Prous et al. (2017) found no association between family affluence and an indicator for drunkenness in a study including students aged 14–17 years from six European cities.

Overall, studies including only (Central) Western-European or Nordic countries, more often found that a low SEP was a risk factor for adolescent drunkenness (e.g., Gomes de Matos et al., 2017; Leal-López et al., 2020; Pape et al., 2017) than studies including Eastern- or Southern-European countries in addition to (Central) Western-European and Nordic countries (Currie et al., 2006). At the same time, in (Central) Western-European and Nordic countries, the decreasing trend in youth drinking has started earlier, around the turn of the millennium, and has been stronger compared with other countries in the South or East of Europe (Vashishtha et al., 2020). This may have been the result of, or has coincided with, a similar change in the normative climate in which adolescent drunkenness is more strongly disapproved of. Indeed, there are indications that the decline in youth drinking in these countries may be partly due to, or coincides with, parental norms and practices becoming stricter towards adolescent drinking (de Looze et al., 2015) and to a similar shift in general population norms concerning adolescent drinking (Andersen et al., 2014; Bhattacharya, 2016; Keyes et al., 2012). Thus, some of the inconsistencies in results across studies regarding the direction of the association between family affluence and adolescent drunkenness, may be associated with different time trends and related changes in norms regarding adolescent alcohol use. These variations in the popularity of getting drunk among adolescents at different timings in different national contexts, can be described by the Theory of Diffusion of Innovations (TDI; Rogers, 2003). The TDI is a change model that describes the process of how new trends spread within a social system and categorizes the adopters of new trends based on their innovativeness at five stages: innovators, early adopters, early majority, late majority, and laggards. According to the TDI (Rogers, 2003), the adoption and diffusion process occurs earlier and easier in more progressive countries (i.e., innovators and early adopters) and among people with a higher SEP (higher educated and wealthier people), compared with more traditional countries (i.e., early and late majority, and laggards) and people with a low SEP. .

Previous research has shown the applicability of the TDI on the dramatic changes in the popularity of tobacco smoking in different cohorts of people in Western countries (Di Novi et al., 2018; Di Novi and Marenzi, 2019; Vedøy, 2014). This rise and fall in popularity of tobacco use has shown to correspond with an epidemic, where substance use spread from a relatively small to a large part of the population and then declined again (Lopez et al., 1994). The timing of this change in popularity has shown to differ between people with a low and high SEP (Di Novi et al., 2018; Vedøy, 2014). Initially (among older cohorts in the 1960's), smoking was highest among people with a higher SEP, but this social distribution of smoking reversed later on in such a way that in younger cohorts smoking has become much more prevalent among people with a low SEP (Lopez et al., 1994; Pampel, 2005). Furthermore, previous research has shown that this diffusion seems to depend on a country's speed of modernization processes, with more progressive countries starting and going through the epidemic stages more quickly than more traditional countries (Mackenbach, 2006; Pampel, 2001).

Although there is a growing body of evidence for the applicability of the TDI to the tobacco epidemic, it has not yet been applied to adolescent drunkenness. Nevertheless, the mixed results between countries in the direction of the association between family affluence and adolescent drunkenness could be a result of countries being at different stages in adopting the new 'low drunkenness' norm among adolescents. For countries in earlier stages, where the diffusion of the new 'low drunkenness' norm has already started among adolescents with a high family affluence, there may be a negative association between SEP and adolescent drunkenness. On the other hand, for countries at later stages, where the diffusion of the new 'low drunkenness' norm has not yet started, a positive association between SEP and adolescent drunkenness may apply. Gaining more insight into how the differences in innovation processes across social contexts may influence the direction of the association between family affluence and adolescent drunkenness and its corresponding diffusion new 'low drunkenness' norms, may help to predict future trends and differences in adolescent drunkenness and to plan cohort-related health care demands in the future.

Furthermore, differences across countries in the way family affluence is associated with adolescent drunkenness could be related to more proximal psychological factors such as drinking motives across SEP (Currie et al., 2006). Therefore, it is crucial to gain more insights into mechanisms that may explain these differences across countries regarding the direction of the association between family affluence and adolescent drunkenness, to be able to decrease health inequalities through more tailored prevention efforts. The main aim of the current study is therefore to investigate a) whether a country's diffusion of innovation adoption stage moderates the way family affluence is associated with adolescent drunkenness, and b) to investigate whether drinking motives, the most proximal factor related to alcohol use (Cox and Klinger, 2004), can explain the proposed differences in the direction of the association between family affluence and adolescent drunkenness.

1.1. *Drinking motives, adolescent alcohol use and socio-economic position*

People drink for certain reasons because they want to attain a certain valued outcome (valence), either to obtain positive outcomes (e.g., drinking to enhance your mood) or to avoid negative ones (e.g., drinking to forget your problems) (Cooper, 1994). Furthermore, drinking motives can be roused internally within a person or externally (source) by a person's environment (Cooper, 1994). Four different types of motives result from combining these two dimensions (source and valence), namely: social (external and positive; e.g., drinking to be sociable), enhancement (internal and positive; e.g., drinking because you like the feeling of it), conformity (external, negative; e.g., drinking to fit in with a group) and coping motives (internal, negative; e.g., drinking to forget your problems). It is well established in scientific literature that drinking for different reasons is associated with different frequencies and quantities of alcohol use (e.g., Kuntsche et al., 2014; Kuntsche and Kuntsche, 2009; Schelleman-Offermans et al., 2011b) and these association show a striking cross-cultural consistency (Kuntsche et al., 2014). Across countries, social, enhancement and coping motives showed strong positive associations with adolescent drunkenness, while conformity motives showed a negative association with adolescent drunkenness (Kuntsche et al., 2014).

Only few studies investigated as to whether a socioeconomic gradient is present in drinking motives. Results from a study conducted in the U.S. among adults showed a positive association between neighborhood SEP and social drinking motives and a negative association with drinking to cope, indicating that adults in disadvantaged neighborhoods endorse more coping motives when drinking alcohol (Karriker-Jaffe et al., 2016). A cross-sectional study conducted among a UK sample of 2,294 adults (Heim et al., 2020) showed that responses from participants with a low SEP (i.e., with working-class occupations) tended to be characterized by significantly higher endorsements of coping motives than those from participants with a high SEP (upper middle class or middle class occupations). In a study among Scottish adolescents (Martin et al., 2019), also coping motives were found to be more strongly endorsed in neighborhoods with a low SEP (high level of

deprivation). Moreover, these results indicate that a low SEP (at the individual or neighborhood level) seems to be associated with higher endorsement of coping motives, most likely to cope with the higher stress levels and/or negative emotions and cognitions associated with a low SEP (Schelleman-Offermans and Massar, 2020; Wardle and Steptoe, 2003).

Nevertheless, the endorsement of drinking motives might differ by the restrictive or permissive normative context in relation to alcohol use within a country. Furthermore, the way adolescent drunkenness is viewed upon, may possibly also differ between adolescents from different socio-economic backgrounds within the same context. For example, in countries that have not yet adopted the new 'low adolescent drunkenness' norm (more traditional countries), adolescents with a high SEP most likely have a higher frequency of drunkenness because they highly value drinking to get drunk and drinking to enhance parties (enhancement and social motives) and have the financial means and social network to be more frequently involved in social event than adolescents with a low SEP. If society disapproves of adolescent drunkenness (i.e., in progressive countries), getting drunk might particularly be used by adolescents with a low SEP as a means to avoid negative outcomes. For example, they would get drunk to cope with the stress they experience in daily life. Moreover, possibly different drinking motives play a mediating role in explaining the difference in association between SEP and adolescent drunkenness between traditional and progressive countries.

1.2. This study

To sum up, first, this study investigates as to whether the association between family affluence and adolescent drunkenness is dependent on the country's diffusion of innovation adoption stage. We hypothesize that in countries that are more traditional (i.e., at a later diffusion of innovation adoption stage; i.e., early and late majority countries and laggards) where the process of adopting the new adolescent 'low drunkenness' norm has not yet started, family affluence is a risk factor for adolescent drunkenness (see Fig. 1). In contrast, in countries that are more progressive (at an earlier adoption stage; i.e., innovators or early adopters) where the process of adopting the new adolescent 'low drunkenness' norm has started among adolescents with a high family affluence, family affluence is a protective factor for adolescent frequency of drunkenness. Secondly, we aim to gain insight into whether these possible differences in the direction of the association between family affluence and adolescent drunkenness can be explained by a different endorsement of drinking motives in adolescents with a lower or higher family affluence (see Fig. 2). In traditional countries, we expect that being drunk frequently at parties might still be seen as a status symbol that is additionally more affordable for rich people. As such, we expect that the positive association between family affluence and adolescent drunkenness can be explained by a stronger endorsement of motives that aim to obtain positive outcomes among adolescents with a higher family affluence in these countries (higher endorsement of social and enhancement). Reversely, in progressive countries, we expect that the negative association between family affluence and adolescent frequency of drunkenness can be explained by a stronger endorsement of motives that aim to avoid negative outcomes among adolescents with a lower family affluence (higher endorsement of coping and conformity motives).

2. Method

2.1. Study design and procedure

Data for this study were collected through the Health Behaviour in School-aged Children (HBSC; HBSC.org) study, a World Health Organization (Europe) collaborative project. Data were collected between autumn 2008 and spring 2010 in 11 countries (Belgium, Denmark, Estonia, Finland, Ireland, Poland, Portugal, Scotland, Slovakia Switzerland, and Wales), as these countries included all model variables in their 2009/2010 survey questionnaires. In each included country, nationally representative surveys were conducted, with the exception of Belgium (data representative for the Flemish Community). Data collection was funded by each of the participating countries separately.

A clustered sampling design was used to select students, where either classes or schools served as primary sampling units and each study was approved by the appropriate ethics review board. Anonymous self-report questionnaires were filled out by students in their classroom, resulting in an overall response rate of 60% or higher for all included countries (including dropouts and non-response at the individual, class, and school levels), except for Flemish Belgium (29%).

2.2. Analytic sample

Participants with missing values for gender or age (about 1.1% in total, ranging from 0% in Belgium, Portugal, and Scotland to 8.4% in Denmark) were excluded. The merged data file comprises 56,909 boys and girls aged 11–19 years. Students who reported not having consumed alcohol in the last 12 months (abstainers) (48.8%) were excluded from the analytic sample, since drinking motives can only be assessed in people who drink alcohol. Cases (0.9%) with missing values in all the three items of at least one of the four drinking motive dimensions, with missing values on one or more FAS items (3.2%), and missing values on frequency of drunkenness (2.1%) were excluded from the analyses. The remaining net samples used in the analyses consisted of 25,566 students.

2.3. Measures

2.3.1. Family affluence

Family affluence was used as a proxy for the individual SEP of adolescents, since, according to the Theory of Diffusion of Innovation (Rogers, 2003), the adoption and diffusion process occurs earlier and easier among people with a high socio-economic position (higher educated and wealthier people). Family affluence of adolescents was measured by the Family Affluence Scale (FASII) which measures material affluence, a proxy for socioeconomic position, and consisted of four items (Currie et al., 2008): 'During the past 12 months, how many times did you travel away on holiday with your family?' (0 = not at all, 1 = once, 2 = twice, 3 = more than twice); 'Do you have your own bedroom for yourself?' (0 = no; 1 = yes); 'How many computers does your family own?' (0 = none, 1 = one, 2 = two, 3 = more than two); 'Does your family own a car, van or truck?' (0 = no; 1 = yes one; 2 = yes two or more). To be able to compare FAS between the countries included, the full composite score of FAS has been transformed into a continuous proportional rank score (ridit score) for each country separately, creating a relative indicator for the FAS. The ridit score indicates the proportion of respondents with scores on family affluence ranging from 0 to 1, with the country sample means set at 0.5 (Bross, 1958). Higher values of the ridit score reflect higher family affluence relative to the others within the country.

2.3.2. Frequency of drunkenness

Participants were asked, "Have you ever had so much alcohol that you were really drunk?" with answer categories *no, never; yes, once; yes, 2–3 times; yes, 4–10 times;* and *yes, more than 10 times.* To create a linear frequency measure, midpoints of categories were used and 13 was adopted for the upper category (10 times plus the range to midpoint of adjacent category). Log transformed values were used in the analyses, to account for the non-normal distribution.

2.3.3. Drinking motives

The Drinking Motive Questionnaire Revised Short Form (DMQ-R SF; Kuntsche and Kuntsche, 2009) was used to measure social, enhancement, conformity and coping drinking motives for drinking in the last 12

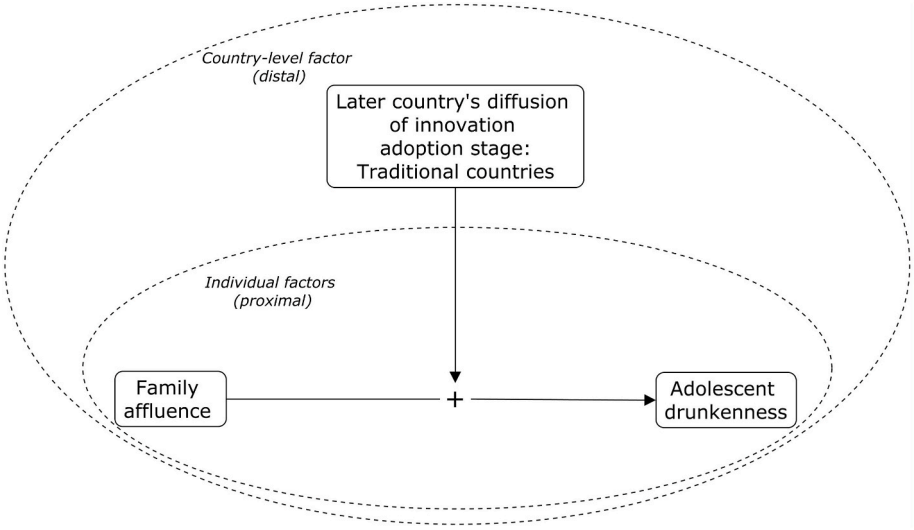

Fig. 1. Schematic overview of the proposed cross-level interaction.[11]

months. The DMQ-R SF has a total of 12 items. Each dimension was measured with three items rated on a relative frequency scale. In Belgium, Finland, Scotland, and Slovakia the five-point scale from the original DMQ-R (Cooper, 1994) was used (*(almost) never* (1), *some of the time* (2), *about half of the time* (3), *most of the time* (4), and *(almost) always* (5)). In Estonia, Ireland, Poland, and Wales, the original three-point scale of the DMQ-R SF was used. Those values were transformed to match those of the DMQ-R as follows: *(almost) never* (coded as 1), *about half of the time* (coded as 3), and *(almost) always* (coded as 5) (see Kuntsche et al., 2014 for a similar procedure). The four-factor structure of drinking motives was confirmed in a previously conducted study (Kuntsche et al., 2014), including the internal consistency for each drinking motive dimension, which showed to be greater than or equal to 0.70.

2.3.4. Traditional vs. progressive countries based on their diffusion of innovation adoption categorization

According to the Theory of Diffusion of Innovations (Rogers, 2003), at the country level, the adoption and diffusion process occurs earlier and easier in more innovative or progressive countries (i.e., innovators and early adopters). Therefore, the Global Innovation Index (GII; INSEAD, 2010) was used to determine the diffusion of innovation adoption stage and to categorize the included countries into progressive and traditional countries. The GII (2009/10) assesses a countries' ability and preparedness to leverage innovation advances and is a composite index score constructed in a multi-stage weighted average aggregation procedure including 60 single innovation indicators coming from the International Telecommunication Union, United Nations, the World Bank and from the Executive Opinion Survey annually conducted by the World Economic Forum (GII; INSEAD, 2010). The GII 2009/10 consists of six main innovation pillars: a) institutions (political, regulatory and business environments), b) human capacity (investment in and quality of education institutions, innovation potential), c) ICT and uptake of infrastructure (information and communication technologies, general infrastructure and its uptake and general use), d) market sophistication (investor and creditor conditions, access to private credit), e) business sophistication (innovation environment in firms, innovation ecosystems, openness to foreign and domestic competition), f) scientific outputs (knowledge creation and application, exports and employment), and g) creative outputs and wellbeing (creative outputs, benefits to social welfare). The GII has been used in previous scientific literature (Ashrafian, 2018) as a useful marker of the innovativeness of a country and has shown to be a driver for economic growth (Raghupathi and Raghupathi, 2017). Furthermore, a composite score has been considered the most valid way to measure innovativeness of a country (Corrente et al., 2021). For more information about the design and validity of the GII see https://www.globalinnovationindex.org.

Based on the countries' ranking on the GII 2009-10, the countries included in this study were divided into one of the five proposed adoption categories informed by the theory of diffusion of innovations (Rogers, 2003). Of all countries included in the GII 2009-10 and informed by the theory of diffusion of innovations (Rogers, 2003), countries ranked within the first 2.5% are considered innovators, the next 13.5% early adopters, the next 34% fall into the early majority stage, the next 34% late majority and the last 16% of the countries are considered laggards. Following this strategy, Poland, Slovakia, Estonia, and Portugal were categorized as early majority countries, which will be referred to as traditional countries in this study. Wales, Scotland, Ireland, Switzerland, Belgium, Finland, and Denmark were categorized as early adopters, which will be referred to as progressive countries in this study. There were no countries included in the current study that could be categorized as innovators, late majority countries, or laggards when comparing the GII of all world economies.

2.3.5. Gender and age

Gender was coded 0 for girls and 1 for boys. Age was entered as dichotomous variable using median split (0 = below the mean age of 14.76, 1 = above the mean age 14.76).

2.4. Analytic strategy

Different models were estimated in Mplus v7.4 statistical software (Muthén and Muthén, 2011) using maximum likelihood robust estimation to account for non-normal distribution of dependent variables. First, a two-level model was performed to investigate the direct main effect of family affluence on frequency of adolescent drunkenness, adjusting for age, gender and GII adopter stage as covariates. No significant main effect of family affluence was expected when analyzing all countries together, due to the difference in how family affluence relates to frequency of adolescent drunkenness in more traditional and progressive countries based on innovativeness (effects rule each other out).

Secondly, to investigate whether family affluence was differently associated with frequency of drunkenness in the two groups of countries (early majority/traditional countries and early adopters/progressive countries), a cross-level interaction effect was added to the first model testing whether the slope (i.e., the individual-level family affluence - drunkenness relationship) is different in traditional versus progressive countries (see Fig. 1 for a visualization). It was expected that family

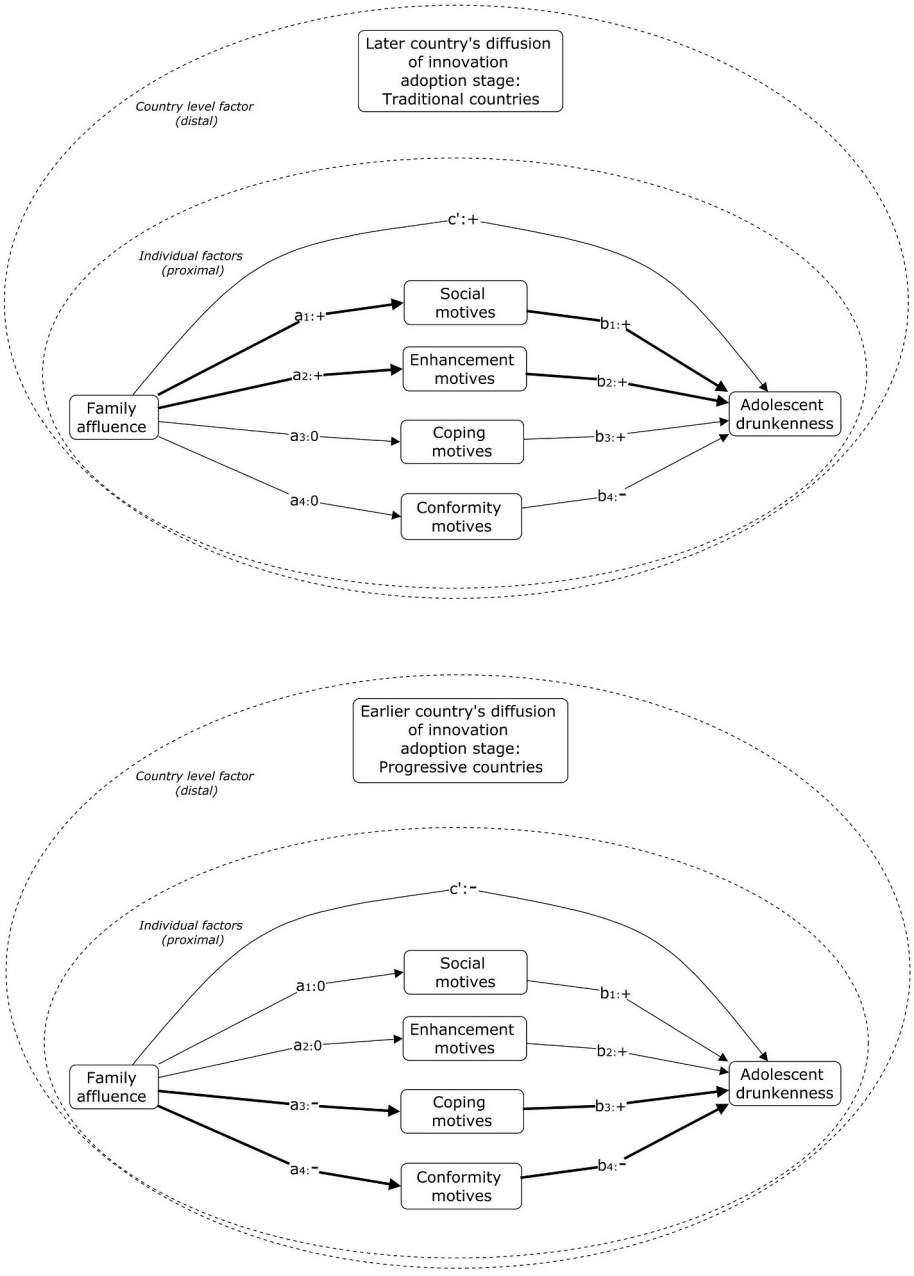

Fig. 2. Schematic overviews of the proposed multi-group mediation analyses in traditional and progressive countries.[21]

affluence is a risk factor for frequency of drunkenness in traditional countries, whereas for progressive countries it is a protective factor. An additional model was tested, in which we, next to including the diffusion of innovation category as country-level modifier (progressive/traditional), additionally adjusted for the country-level aggregate scores of adolescent drunkenness as a proxy for per capita consumption per country. Findings showed that the country-level aggregate score of adolescent drunkenness did not contribute to the model in terms of an additional predictor (results are not presented in the current study but can be obtained from the corresponding author), showing the robustness of the presented findings.

Third, for traditional and progressive countries separately (multi-group mediation analysis), we investigated whether and which drinking motives mediate the link between family affluence and frequency of adolescent drunkenness (see Fig. 2 for a visualization). In traditional countries, we expected that the positive effect of family affluence on adolescent frequency of drunkenness is meditated by a higher endorsement of social and enhancement motives among adolescents with a high SEP. Reversely, in progressive countries, we expected that the negative (protective) effect of family affluence on adolescent frequency of drunkenness is mediated by a higher endorsement of coping and/or conformity motives among adolescents with a low SEP. To test this, structural equation modelling was conducted adjusting for the clustered sampling design (schools/school classes) and adjusting for age and gender as covariates. Additionally, because bootstrap resampling cannot be combined with cluster analysis, the same analyses were repeated using bootstrap resampling with 1000 random draws (MacKinnon et al., 2007). Any differences in results will be presented.

[1] The opposite association is expected for countries at an early diffusion of innovation stage (progressive countries); Age and gender were included as covariates, but are not depicted in the Figure.

3. Results

3.1. Sample description

For descriptive statistics per country of variables included in the tested models, please see Appendix B. The total sample consisted of 25,566 adolescents, 48.7% boys, with an overall mean age of 14.8 years (Table 1). The mean age as well as the percentage boys significantly differed between country groups: adolescents from progressive countries were slightly older and were less often boys than adolescents from more traditional countries. Across the country groups, social motives were most often endorsed, followed by enhancement, coping and conformity motives. In progressive countries, adolescents showed a significantly higher score on social motives and overall significantly higher scores on frequency of drunkenness, compared with adolescents from traditional countries. Adolescents from traditional countries showed significantly higher levels of enhancement, coping and conformity motives than adolescents from progressive countries.

3.2. Results of multilevel regression analyses and cross-level interaction effect

Pearson correlations between model variables are shown in Appendix A. Table 2 presents the results of the multilevel regression analysis investigating the main effect of family affluence and diffusion of innovation adopter stage on frequency of drunkenness and the results of the multilevel cross-level interaction effect, controlling for age and gender as covariates. Age and gender both showed a positive association with frequency of drunkenness; boys and older adolescents showed a higher frequency of drunkenness. Furthermore, no significant association between neither family affluence nor diffusion of innovation adopter stage and adolescent frequency of drunkenness was found.

The results of the model testing the cross-level interaction showed a significant cross-level interaction effect ($\beta = 0.26$). In progressive countries (coded as 0), results showed a slightly negative relationship ($\beta = -0.06$) between family affluence and drunkenness (i.e., adolescents with a lower family affluence are more often drunk). The opposite is the case in traditional countries (coded as 1). In traditional countries the effect of family affluence on frequency of drunkenness is positive ($\beta = 0.20$), showing that in these countries, adolescents from more affluent families are more frequently drunk.

3.3. Results of the multiple group mediation analyses

Results of the multiple group mediation analyses are shown in Table 3, including family affluence as independent, frequency of drunkenness as dependent, and drinking motives as mediators in the tested model. In line with the results of the multi-level cross-level interaction model, for more traditional countries, the effect of family affluence on frequency of drunkenness was significantly positive ($\beta = .12$) even after controlling for covariates (age and gender) and drinking motives. This indicates that the higher the family affluence is, the higher the frequency of drunkenness in these countries. In contrast, after controlling for covariates and drinking motives, the association between family affluence and frequency of drunkenness in progressive countries showed to be slightly negative ($\beta = -0.04$).

Furthermore, in more traditional countries, family affluence showed a significant positive association with enhancement ($\beta = 0.13$) and social motives ($\beta = 0.11$), and a negative association ($\beta = -0.08$) with conformity motives. In progressive countries, a significant negative association ($\beta = -0.23$) between family affluence and coping motives was shown.

[2] Age and gender were included as covariates, but are not depicted in the Figure.

Adjusting for age and gender as covariates, results of the mediation analyses showed that, for traditional countries, the association between family affluence and frequency of drunkenness was significantly mediated by social ($\beta = 0.03$), enhancement ($\beta = 0.02$) and conformity motives ($\beta = 0.01$). For progressive countries, a significant mediated effect was found for coping motives ($\beta = -0.03$).

4. Discussion

Prevention of early alcohol use can lower the risk for adolescents for developing hazardous drinking patterns later in life (Grant et al., 2006; Wells et al., 2004), which may be specifically important for adolescents with a low family affluence due to their possible higher risk of hazardous drinking and related harms (e.g., Pape et al., 2017). Gaining insight into the pathways that can explain differences across countries and between adolescents with a low or higher family affluence in the diffusion of new, less excessive drinking norms among adolescents, may help to predict future trends. This is also important for policy makers to better plan care demands and to develop targeted prevention efforts decreasing health inequalities in a more tailored way. The main aim of this study was therefore to gain insight into whether a) family affluence is a risk or protective factor for the frequency of adolescent drunkenness in countries at different adaptation stages of the diffusion of the new less excessive drinking norm, and b) whether this difference in the association between family affluence and frequency of drunkenness could be explained by different endorsements of drinking motives.

Our results showed that family affluence is differently associated with the frequency of adolescent drunkenness in progressive countries (those at an earlier diffusion of innovation adoption stage) and traditional countries (those at a later diffusion of innovation adoption stage). As expected based on the theory of diffusion of innovation (Rogers, 2003), in traditional countries, family affluence appears to be a risk factor for frequency of drunkenness, whereas in progressive countries it appears to be a protective factor. This result indicates that, at the time of data collection (2009/10), traditional countries had not yet adopted the new adolescent 'low drunkenness' norm (innovation). This assumption is underlined by results from previous research showing that the declining trend in adolescent drinking was earlier and more pronounced (Vashishtha et al., 2020) and norms and parenting practices in relation to adolescent drunkenness became stricter (e.g., de Looze et al., 2015) in the countries that are labeled as progressive countries, compared with countries that are labeled as traditional countries in the current study. Furthermore, such a substance use related decline that appears to occur earlier in more progressive countries and in more educated people (a proxy for socio-economic position) has also been shown in previous studies investigating the sequence of the smoking epidemic (Mackenbach, 2006; Pampel, 2001). Moreover, new norms can indeed be seen as innovations and adoption of such a new trend seems to depend on a country's speed of modernization process and on the socio-economic background of a person (Rogers, 2003). At the time of data collection in traditional countries, adolescent drunkenness was most likely still seen as a behaviour for the upper class for which alcohol was more affordable and who likely engaged more frequently in social gatherings at which alcohol was used as a way to enhance parties and moods.

Results obtained from our mediation analysis underline this assumption. Increased levels of social and enhancement motives (e.g., drinking to have fun and to enhance moods) and decreased levels of conformity motives (e.g., drinking to fit in with a group) among adolescents with a higher family affluence played a role in explaining the positive association between family affluence and frequency of drunkenness in traditional countries. Results from progressive countries showed that adolescents with a lower family affluence more strongly endorsed coping motives that explained (mediated) why family affluence was a protective factor for adolescent drunkenness in these countries.

Table 1
Mean scores (SD) or percentages for model variables in progressive and more traditional countries.

	Early adopter/progressive countries (N = 17,676)	Early majority/traditional countries (N = 7,890)	Total (N = 25,566)	F	t	χ2
Family affluence [range = .00-.98]	0.50 (.28)	0.50 (.29)	.50 (.28)	.28	.00	n.a.
Freq. of drunkenness [range = 0–13]	3.33 (4.34)	2.86** (4.11)	3.19 (4.28)	31.68	9.45	n.a.
Social motives [range = 1–5]	2.95 (1.20)	2.63** (1.17)	2.85 (1.20)	.11	20.11	n.a.
Enhancement motives [range = 1–5]	2.38 (1.17)	2.46** (1.14)	2.44 (1.15)	5.06	10.55	n.a.
Coping motives [range = 1–5]	1.73 (1.03)	2.09** (1.14)	1.84 (1.08)	280.90	−24.18	n.a.
Conformity motives [range = 1–5]	1.44 (.81)	1.63** (.93)	1.50 (.85)	217.49	−15.27	n.a.
Age (in years) [range = 11–19]	14.9 (1.40)	14.5** (1.65)	14.8 (1.49)	608.64	−16.34	n.a.
% Boys	49.4	47.2**	48.7	n.a.	n.a.	10.29

Footnote: *p < .05 (2-tailed); **p < .01 (2-tailed); SD = standard deviation; n.a. = not applicable.

Table 2
Results of the multi-level regression analyses on frequency of drunkenness (N = 25,566).

	Main effects model	Cross-level interaction model
Within level	β (SE)	β (SE)
Relative family affluence → Frequency of drunkenness	.01 (.04)	n.a.
Age → Frequency of drunkenness	.46*** (.04)	.46*** (.04)
Gender (girls = 0, boys = 1) → Frequency of drunkenness	.12** (.04)	.12** (.04)
Between level	**β (SE)**	**β (SE)**
Diffusion of innovation adopter stage[1] → Frequency of drunkenness	−.08 (.13)	−.21 (.12)
Diffusion of innovation adopter stage[1] → Slope (relative family affluence on frequency of drunkenness)	n.a.	0.26*** (.04)
Intercepts	**β (SE)**	**β (SE)**
Frequency of drunkenness	.68*** (.03)	.72*** (.06)
Slope relative family affluence on freq. of drunkenness	n.a.	−.06* (.03)

Footnote: *p < .05; **p < .01; ***p < .001; [1]0 = early adopter/progressive countries, 1 = early majority/traditional countries; SE = standard error; n.a. = not applicable.

Table 3
Results of the multi-level mediation analyses, adjusting for schools/school classes.

	Traditional countries	Progressive countries
Direct associations from relative family affluence, drinking motives, age and gender on frequency of drunkenness	β (SE)	β (SE)
Relative Family Affluence (c')	.12*** (.03)	−.04* (.02)
Social motives (b_1)	.22*** (.01)	.18*** (.01)
Enhancement motives (b_2)	.17*** (.01)	.29*** (.01)
Coping motives (b_3)	.12*** (.01)	.13*** (.01)
Conformity motives (b_4)	−.19*** (.01)	−.16*** (.01)
Age	.32*** (.02)	.28*** (.01)
Gender (0 = girls, 1 = boys)	.08*** (.01)	.08*** (.01)
Direct associations from relative family affluence on drinking motives	β (SE)	β (SE)
Social motives (a_1)	.13* (.05)	−.02 (.03)
Enhancement motives (a_2)	.11* (.05)	−.04 (.03)
Coping motives (a_3)	−.05 (.05)	−.23*** (.03)
Conformity motives (a_4)	−.08* (.04)	−.04 (.07)
Indirect associations relative family affluence on frequency of drunkenness via drinking motives ($a_{1\text{-}4}$*$b_{1\text{-}4}$)	β (SE)	β (SE)
social (a_1*b_1)	.03* (.01)	−.00 (.01)
enhancement (a_2*b_2)	.02* (.01)	−.01 (.01)
coping (a_3*b_3)	−.01 (.01)	−.03*** (.01)
conformity (a_4*b_4)	.01* (.01)	.01 (.00)

Footnote: ***p < .001; **p < .01; *p < .05; SE = standard error; Results of the additional analysis testing mediation effects with bootstrap resampling with 1000 random draws show similar results as the results presented in this Table; $a_{1\text{-}4}$, $b_{1\text{-}4}$ and c' refer to the associations as depicted in Fig. 2.

4.1. Strengths and limitations

This study uses a unique dataset in which frequency of drunkenness, drinking motives and family affluence is measured in large national representative samples in different European countries. Although the data used is rather old (from 2009 to 2010), the timing of data acquisition offered a unique possibility to investigate the direction of the association between family affluence and adolescent drunkenness in countries where youth drinking had already started declining (progressive countries) and in countries where this did not happen (yet) (traditional countries). However, this study also has limitation. There was only a limited number of countries that agreed to assess drinking motives in 2009/2010 and this study makes use of cross-sectional data, limiting the possibilities to generalize the findings and draw conclusions about causality. Nevertheless, the different associations found between family affluence and adolescent drunkenness between countries at different stages of adopting the new, less excessive adolescent drinking norm, indicates that the sequence of the 'adolescent drunkenness epidemic' might be similar to the sequence of the smoking epidemic, (e.g., Pampel, 2001; Mackenbach, 2006), which is in line with assumptions of the theory of diffusion of innovation (Rogers, 2003). Another limitation of this study was that adolescent drunkenness was measured in a subjective way that may be interpreted differently in different contexts or cultures and among people with a higher or lower family affluence. Moreover, replication of the results is urgently needed, including more countries (at different diffusion of innovation stages), including longitudinal data and/or multiple cross-sectional measurements, and including more objective measures of heavy episodic drinking.

4.2. Implications for prevention and further research

Results of this study indicate that, at which stage a country is, in the process of adopting innovations such as a new adolescent 'low drunkenness' norm, shapes the direction of the association between family affluence and adolescent drunkenness as well as the endorsement of drinking motives. Therefore, the results of this study bring about important implications for prevention efforts and suggest that a different approach might be necessary to lower adolescent drunkenness in countries at different diffusion on innovation stages. In more traditional countries, where family affluence may (still) be a risk for a higher

frequency of drunkenness, prevention efforts to tackle adolescent drunkenness should focus primarily on adolescents with a higher family affluence. Furthermore, since social and enhancement motives (party drinking) showed to mainly explain why adolescents with a higher family affluence are more at risk for drunkenness, their social drinking occasions may be limited or monitored more thoroughly, for instance by more restrictive adolescent drinking policies (e.g., higher age limits) or by their parents. Strict parental alcohol-specific rules indeed have shown to limit adolescent alcohol and drunkenness (Schelleman-Offermans et al., 2011a, 2013) and can be targeted in interventions (e.g., Schelleman-Offermans et al., 2014). Also, increases in age limits have shown promising effects in curbing adolescent drinking (Roodbeen et al., 2021).

In contrast, in progressive countries, where higher family affluence was associated with a lower frequency of drunkenness, interventions aimed at lowering adolescent drunkenness should specifically focus on adolescents with a low family affluence. Because in progressive countries, results indicate that higher levels of drunkenness of adolescents from lower affluent families can be explained by a higher endorsement of coping motives, prevention efforts should specifically try to reduce stress levels and/or increase healthy ways to cope with stress for adolescents with a low family affluence. Lowering stress could be targeted at the individual level with for example mindfulness mediation (e.g., Hoge et al., 2013), but also via changing more structural factors in the environment of adolescent with a low family affluence that are possibly causing the stress or give them fewer possibilities to cope with stress in a more healthy way. For instance, low SEP neighborhoods are characterized by higher crime rates and fewer green areas, which have shown to increase stress and decrease health outcomes and (e.g., Arcaya et al., 2016). Furthermore, increasing alternative opportunities specifically for less affluent adolescents to cope with stress in a more healthy way (e.g., by doing sports or art) might additionally be useful (e.g., Dolenc, 2015).

Moreover, results of our study indicate that intrapersonal factors, such as socio-economic position and drinking motives, may play out differently in different societies where the diffusion of the new adolescent 'low drunkenness' drinking norm has already started. When diffusion of this new trend has already started, family affluence protects against adolescent drunkenness and the frequency of drunkenness in adolescents with a low family affluence is mainly due to drinking for coping reasons. It is therefore important that the interplay between intrapersonal and societal factors is taken into account when interpreting previously conducted studies and when designing future studies investigating alcohol-related health inequalities, by for instance including measures that indicate the degree to which the new adolescent 'low drunkenness' norm are adopted.

Author contributions

Karen Schelleman-Offermans: Conceptualization; Formal analysis; Writing original draft; Visualization. **Alessio Vieno**: Writing – review & editing. Gonneke Stevens: Writing – review & editing. **Emmanuel Kuntsche**: Conceptualization; Methodology; Writing – review & editing.

Data availability

Data used in this study is available via open access: Open Access | HBSC Data Management Centre | UiB.

Appendix A. Pearson correlations between model variables for progressive and traditional countries

Early adopter/progressive countries (N = 17,676)						
	Relative family affluence	Freq. of drunkenness	Enhancement motives	Social motives	Coping motives	Conformity motives
Relative family affluence	1					
Freq. of drunkenness	−.03**	1				
Enhancement motives	−.01	.56**	1			
Social motives	−.00	.50**	.65**	1		
Coping motives	−.07**	.32**	.41**	.35**	1	
Conformity motives	−.01	.08**	.27**	.28**	.36**	1
Early majority/traditional countries (N=7,890)						
	Relative family affluence	Freq. of drunkenness	Enhancement motives	Social motives	Coping motives	Conformity motives
Relative family affluence	1					
Freq. of drunkenness	.06**	1				
Enhancement motives	.03*	.44**	1			
Social motives	.03**	.47**	.68**	1		
Coping motives	−.01	.34**	.58**	.51**	1	
Conformity motives	−.02*	.09**	.45**	.42**	.46**	1

Footnote: *p < .05 (2-tailed); **p < .01 (2-tailed).

Appendix B. Mean scores (SD) [range] or percentages of model variables per country

Progressive countries	Family affluence (ridit score)	Sum score family affluence	Freq. of drunkenness	Social	Enhancement	Coping	Conformity	Age (years)	% Boys	GII world ranking (2009/10)
Belgium (N = 3,768)	.50 (.28) [.00 .96]	5.94 (1.76) [0; 9]	2.83 (4.01) [0; 13]	2.50 (.12) [1; 5]	2.12 (.93) [1; 5]	1.46 (.81) [1; 5]	1.34 (.69) [1; 5]	15.47 (1.88) [11; 19]	53.5	17
Denmark (N = 1,459)	.50 (.28) [.00 .93]	6.83 (1.53) [0; 9]	4.53 (4.81) [0; 13]	3.20 (1.24) [1; 5]	3.12 (1.28) [1; 5]	1.51 (0.86) [1; 5]	1.38 (0.76) [1; 5]	14.55 (1.02) [11; 16]	46.1	5
Finland (N = 1,275)	.50 (.28) [.00 .96]	6.13 (1.62) [1; 9]	5.02 (4.90) [0; 13]	3.07 (1.05) [1; 5]	3.23 (1.17) [1; 5]	1.97 (1.04) [1; 5]	1.66 (.84) [1; 5]	15.27 (.45) [14; 16]	45.5	6

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(*continued*)

Ireland (N = 3,211)	.50 (.28) [.00 .98]	5.73 (1.70) [0; 9]	3.76 (4.49) [0; 13]	3.36 (1.18) [1; 5]	2.66 (1.16) [1; 5]	1.83 (1.11) [1; 5]	1.58 (.96) [1; 5]	15.47 (1.13) [11; 18]	51.4	19
Scotland[2] (N = 1,606)	.50 (.28) [.00 .96)	6.20 (1.73) [0; 9]	4.51 (4.86) [0; 13]	3.27 (1.24) [1; 5]	2.48 (1.11) [1; 5]	1.81 (1.12) [1; 5]	1.45 (.85) [1; 5]	15.08 (.29) [14; 16]	44.2	14
Switzerland (N = 2,557)	.50 (.28) [.00 .95]	6.39 (1.65) [0; 9]	2.13 (3.48) [0; 13]	2.56 (1.14) [1; 5]	2.28 (1.10) [1; 5]	1.58 (.90) [1; 5]	1.18 (.51) [1; 5]	14.59 (.84) [12; 16]	49.9	4
Wales[2] (N = 3,800)	.50 (.28) [.00 .96]	6.09 (1.75) [0; 9]	2.75 (3.98) [0; 13]	3.02 (1.10) [1; 5]	2.25 (1.03) [1; 5]	1.99 (1.13) [1; 5]	1.54 (.86) [1; 5]	13.86 (1.32) [11; 16]	48.1	14
Traditional countries	Family affluence (ridit score)	Sum score family affluence	Freq. of drunkenness	Social	Enhance-ment	Coping	Confor-mity	Age (years)	% Boys	GII world ranking (2009/10)
Estonia (N = 2,038)	.50 (.29) [.00 .96]	5.79 (1.99) [0; 9]	3.27 (4.24) [0; 13]	2.97 (1.18) [1; 5]	2.92 (1.26) [1; 5]	2.47 (1.21) [1; 5]	1.97 (1.03) [1; 5]	14.33 (1.45) [11; 16]	46.7	29
Poland (N = 1,094)	.50 (.29) [.00 .98]	4.91 (1.93) [0; 9]	5.09 (5.01) [0; 13]	3.12 (1.04) [1; 5]	2.10 (1.03) [1; 5]	2.11 (1.09) [1; 5]	1.36 (.65) [1; 5]	17.27 (.45) [17; 18]	44.5	47
Portugal (N = 1,372)	.50 (.28) [.00 .96]	6.12 (1.75) [0; 9]	1.72 (3.11) [0; 13]	2.56 (1.18) [1; 5]	2.43 (1.09) [1; 5]	1.96 (1.21) [1; 5]	1.62 (1.10) [1; 5]	14.56 (1.07) [12; 16]	45.2	34
Slovakia (N = 3,386)	.50 (.29) [.00 .98}	5.03 (2.02) [0; 9]	2.35 (3.74) [0; 13]	2.28 (1.07) [1; 5]	2.13 (1.07) [1; 5]	1.91 (1.03) [1; 5]	1.51 (.80) [1; 5]	13.73 (1.22) [11; 16]	49.2	37

Footnote: Countries are presented in alphabetical order; GII = Global Innovation Index; [2]the GII index score of the United Kingdom was used.

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