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Abstract

This paper estimates the average population effect of macroeconomic conditions on health behaviours accounting for the heterogeneous impact of the business cycle on individuals. While previous studies use models relying on area-specific unemployment rates to estimate this average effect, this paper employs a model based on area-specific unemployment rates by gender and age group. The rationale for breaking down unemployment rates is that the severity of cyclical upturns and downturns does not only significantly vary across geographical areas, but also across gender and age. The empirical analysis uses microdata from the Italian Multipurpose Household Survey on Everyday Life Issues. The estimates suggest that models employing aggregated and disaggregated unemployment rate measures as a proxy for the business cycle produce similar findings for some health behaviours (such as smoking), whereas different results are obtained for others. While using unemployment rates by gender and age group, fruits and/or vegetables consumption turn out to be procyclical (a 1pp increase in this unemployment rate decreases the probability of consuming at least five daily fruit and/or vegetable servings by 0.0016pp), the opposite effect, though statistically insignificant, is observed once general unemployment rates are used. While both models conclude that physical activity declines during economic downturns, the size of the procyclical effect is much smaller when employing disaggregated rather than aggregated unemployment rates (a 1pp increase in the unemployment rate by gender and age group decreases the probability of doing any physical activity by 0.0017pp).

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1. Introduction

There are a large number of studies looking at the impact of business cycle on health behaviours. Many of these studies document a relationship between unemployment rate[1] and health lifestyles. Unemployment may make people change their health behaviours through shifts in income and time constraints as well as through its psychological effects. However, the direction of the effect of unemployment on health behaviours is ambiguous as conflicting theoretical arguments exist. For instance, although the loss of a job may provide people with more time to do physical activity, the opposite may also occur: they may become physically inactive as a result of the stress and anxiety from being unemployed (Linn et al., 1985; Fenwick and Tausing, 1994). Similarly, while unemployed people may have more time to prepare homemade meals and eat healthy food, the demand for cheaper and unhealthy food may increase. As stated above, unemployment is often accompanied by depression that makes individuals consume more calories and greater amounts of junk food (Wurtman, 1993). Health-depreciating behaviours during recessions are consistent with a "self-medication" hypothesis (Dave and Saffer, 2008). Additionally, although a decrease in unemployment enhances people's affordability to buy cigarettes, it is also possible that cigarette consumption declines in good economic times because individuals tend to work harder and have less recreational time.

Not only is the effect of unemployment on health behaviours theoretically ambiguous, but empirical studies on this issue have produced mixed results. Dave and Kelly (2012) find that a higher unemployment rate is associated with reduced consumption of fruits and vegetables, but the opposite finding, though not statistically significant, is reported by Ruhm (2000). There is also discordant evidence about the effect of the business cycle on physical activity. While Colman and Dave (2013) show that total physical activity decreases during recessions, Ruhm (2005) concludes

[1] While most studies employ the unemployment rate as a proxy for the business cycle, some papers, especially those looking at less developed countries (see, for instance, Pérez-Moreno et al., 2016) use Gross Domestic Product (GDP) per capita.

that physical inactivity declines as employment drops. Ruhm and Black (2002), Johansson et al. (2006) and Ásgeirsdóttir et al. (2014) find that alcohol consumption is procyclical, whereas Dee (2001) argues that problem drinking is strongly countercyclical. Vilaplana et al. (2006) report that drinking is not influenced by the business cycle.

This paper contributes to existing research by using a model based on a different proxy for the business cycle in an attempt to estimate its impact on health behaviours for the overall population. While previous studies employ models relying on area-specific unemployment rates to estimate an average population effect, this paper adopts a new approach that utilizes area-specific unemployment rates by gender and age group. The rationale for breaking down unemployment rates is that the severity of cyclical upturns and downturns does not only significantly vary across geographical areas (e.g. states and regions), but also across demographic groups, especially gender and age. For example, men experience more unemployment increases during recessions compared to women. Unemployment is found to rise faster across young people than adults in recessionary periods.

Although earlier research acknowledges that the effect of macroeconomic conditions on health behaviours varies across individuals depending on their socio-demographic characteristics, the approaches taken are different from that used in this paper. Rather than incorporating the differential impact of the business cycle on individuals into the average population effect, several previous studies attempt to identify people whose health lifestyles are especially affected by changes in economic conditions. For instance, Tekin et al. (2013), in order to test for the existence of heterogeneous effects, divide the sample by gender, education and ethnicity and then estimate separate regressions for males/females, each education group and each ethnicity group. Other papers (Charles and Decicca, 2008; Dave and Kelly, 2012), in order to isolate the effect of the business cycle among those who are most impacted by it, interact unemployment rate with an

indicator of unemployment risk predicted by a logit model that takes several individual-level characteristics into account. The coefficient on this interaction term measures the differential impact of unemployment between people who are most at risk of being unemployed and those who are not at risk of being unemployed.

Another contribution of this paper is that it uses Italian data. To the best of our knowledge, this is the first paper examining the effect of macroeconomic conditions on various indicators for health behaviours in Italy.

Our empirical analysis indicates that, while models based on different unemployment rate measures as a proxy for the business cycle produce similar results for some health behaviours (such as smoking), this is not the case for others. For instance, while the model based on aggregated unemployment rates shows that the consumption of healthier foods such as fruits and/or vegetables increases during economic downturns (though this effect is not statistically significant), the opposite result (this time statistically significant) is found in the model that uses unemployment rates by gender and age group. Providing alternative estimates of the effect of the business cycle on health behaviours for the overall population is of great relevance. It is very important to find out if increased stress and financial constraints during recessions may induce people to have a less healthy lifestyle (such a lower consumption of fruits and vegetables) as this may lead to nutritional deficiencies, a higher incidence of obesity and a potential detrimental effect on long-term health.

The remainder of the paper is as follows. Section 2 outlines the methodology used in this paper. Section 3 describes the data employed for the empirical analysis. Section 4 presents and discusses the empirical results. Section 5 concludes.

2. Methodology

The following reduced-form demand function is typically estimated to study the impact of the business cycle and economic activity on health behaviours (Ruhm, 2000; Dave and Kelly, 2012):

$$HO_{itr} = \beta_o + \beta_1 UR_{tr} + \beta_2' X_{itr} + \alpha_t + \mu_r + \varepsilon_{itr} \quad (1)$$

where HO_{itr} denotes the health behaviour of individual i residing in area r in survey year t; UR_{tr} is the unemployment rate among individuals residing in area r in survey year t; X is a vector of basic demographic individual characteristics that are thought to affect health behaviour; α_t and μ_r are fixed effects for survey year and area of residence, respectively; ε is the regression disturbance term. The aforementioned fixed effects account for the possibility that the unemployment rate is correlated with unobservable area of residence-specific and time-invariant factors as well as unmeasured characteristics that change over time but are common to all areas of residence (i.e. statistical endogeneity).

The intuition behind using unemployment rate in a person's area of residence rather than his/her actual unemployment status is that the former, in contrast to the latter, captures different channels through which the business cycle may influence health behaviours (Colman and Dave, 2014). Not only may an increase in local unemployment rate cause changes in health lifestyles among people who have lost their job, but it may also affect the health behaviours of those who remain employed. In recessions, some people have lower average earnings because they work fewer hours, affecting, for instance, their ability to buy alcohol and cigarettes. Similarly, in bad economic times some workers suffer from psychological distress because they fear they may become unemployed.

Following Ruhm (2007), in an attempt to account for confounding factors that vary within areas of residence over time, one can add area-specific linear time trends ($\mu_r \cdot T$) to Equation (1). Thus, Equation (1) becomes:

$$HO_{itr} = \beta_o + \beta_1 UR_{tr} + \beta_2' X_{itr} + \alpha_t + \mu_r + \mu_r \cdot T + \varepsilon_{itr} \quad (2)$$

However, one main problem with Equations (1) and (2) is that they assume that the effects of economic fluctuations are experienced equally by all individuals. There is evidence showing that the business cycle hits different people differently. For instance, data from the US show that in recessions men are more likely to lose their jobs relative to women, but during recoveries, male employment picks up faster (Kochhar, 2011; Hoynes et al., 2012). This is because while men tend to be employed in highly cyclical industries such as construction and manufacturing, women are predominantly employed in less-cyclical industries such as services and public administration. There is also a significant difference by age, with youth experiencing more unemployment than older people during recessions. While a large drop in hiring in economic downturns may hit especially hard people entering into the labor market (such as the youth), many workers with job tenure (such as older people) may be able to keep their jobs (Davis et al., 2012).

In light of the above considerations, in this paper we use a model based on unemployment rates by gender and age group rather than on general unemployment rates in an attempt to study the effect of the business cycle on health behaviours. There are two main advantages in doing so. First, as argued above, disaggregated unemployment rates provide a more precise measure of an individual's risk of becoming unemployed relative to aggregated unemployment rates. The loss of a job may affect a person's health lifestyle through shifts in income and time constraints as well as greater stress. Second, disaggregated unemployment rates may capture another important channel through which the business cycle may influence health behaviours. Given that individuals often

tend to interact with those of a similar gender/age group, the use of group-specific unemployment rates may capture relevant peer effects- that when a person sees others in his/her peer-group being affected by the unemployment, he/she may change his/her health behaviours due to increased stress. On the other hand, however, disaggregated unemployment rate measures do not pick up the effect on health behaviours caused by broader area-level economic shocks affecting all groups.

Following an approach similar to that of Rao (2016), who uses state unemployment rates to examine the impact of macroeconomic conditions in childhood on economic performance later in life, the following equation is estimated:

$$HO_{itr} = \beta_o + \beta_1 UR_{trgk} + \beta_2^{'} X_{itr} + \alpha_t + \mu_r + \nu_g + \delta_k + \alpha_t \cdot \mu_r + \mu_r \cdot \nu_g \cdot \delta_k \cdot T + \varepsilon_{itr} \qquad (3)$$

where UR_{trgk} is the unemployment rate among individuals of gender g, belonging to age group k and residing in area r in survey year t; ν_g and δ_k are fixed effects for gender and age group, respectively; $\mu_r \cdot \nu_g \cdot \delta_k \cdot T$ allows for a linear time trend in age group by gender specific to each area of residence; $\alpha_t \cdot \mu_r$ is a fixed effect for the interaction between survey year and area of residence.

The coefficient of interest is β_1 that represents the mean impact of the average area of residence-specific unemployment rate by gender and age group over all individuals' health behaviours (i.e. average population effect). The identification of β_1 comes from variation in economic conditions across areas of residence and cohorts defined by gender and age group. A significant challenge is to separate such variation from other determinants of health behaviours related to area of residence, cohort (i.e. survey year), age group and gender. To address this concern, Equation (3) includes: fixed effects for survey year, gender, age group and area of residence, an area of residence-specific shock in each survey year and an area of residence-specific linear time trend in

age group by gender. μ_r accounts for permanent differences in health behaviours that vary across areas of residence but remain constant over time. This comprises, for instance, differences in health lifestyles due to persistent regional weather patterns. α_t controls for factors that are national in scope but vary over time such as, for instance, national variations in alcohol, cigarette and food prices. $\alpha_t \cdot \mu_r$ accounts for differences in health behaviours triggered by shocks hitting the economy of a particular area of residence in a given survey year (e.g. natural disasters). Finally, $\mu_r \cdot \nu_g \cdot \delta_k \cdot T$ accounts for unobserved determinants of health behaviours trending over time by gender and age group within an area of residence that are related to economic fluctuations (e.g. social norms).

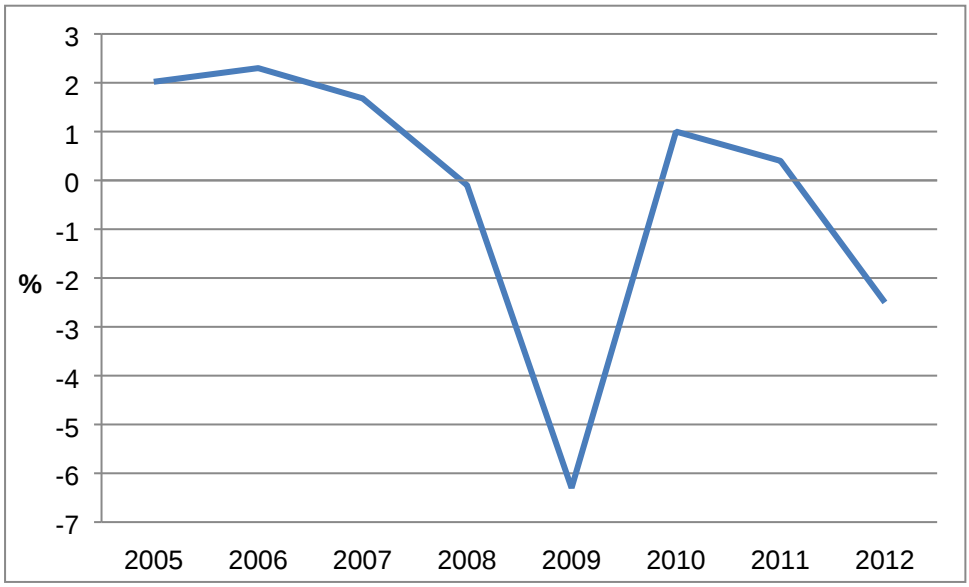
3. Data

Our main data source is the Italian "Multipurpose Household Survey on Everyday Life Issues" (MHSELI)[2]. This is an annual survey, administered by the Italian National Statistical Institute (ISTAT), which collects comparable information across time periods for repeated cross sections of individuals. The survey provides micro-level information on several aspects of the everyday life and behaviour of the Italian population, including health lifestyles. This analysis uses data between 2005 and 2012[3]. As shown in Figure 1, this period essentially covers two business cycles.

[2] The Italian name of the survey is "Indagine Multiscopo sulle Famiglie, Aspetti della Vita Quotidiana".

[3] Although this survey has been carried out every year from 1993 to 2015 (with the exception of 2004), only 2005-2012 data are comparable. Data between 1993 and 2003 are not comparable with those of later years given that some questions included from the 2005 wave onwards are not contained in earlier waves (e.g. questions on physical activity). Additionally, while data between 2005 and 2012 are included in the ISTAT historical public use files, this is not the case for 2013-2015 data. The latter are included in another type of ISTAT files where the level of data confidentiality is different from that of ISTAT historical public use files.

Figure 1: Real GDP growth rate in Italy between 2005 and 2012



Source: European Commission, AMECO database

Using the respondent's region of residence, MHSELI data are matched with data on regional unemployment rate in the year of the survey. Two measures of unemployment rate are used. First, in line with previous studies (e.g. Ruhm, 2007), a general unemployment rate (i.e. unemployment rate among individuals aged 15 or over) is employed[4]. Second, in line with Equation (3), unemployment rate by age group and gender is used. Data on both unemployment rates come from the ISTAT[5].

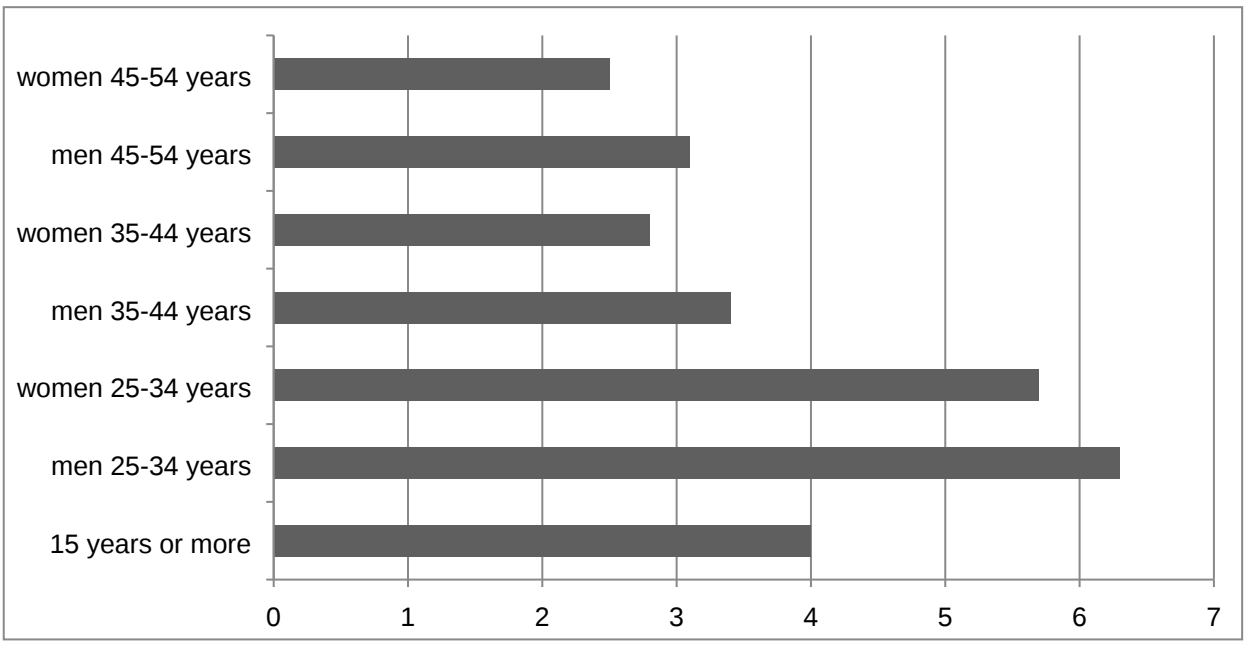
As can be observed in Figure 2, changes in unemployment rates by gender and age group significantly differ from the change in the general unemployment rate. In Italy from the beginning of the recession in 2008 to 2012 unemployment rate among individuals aged 15 or over increased by 4 percentage points. By contrast, during the same period, unemployment rate among men and women aged between 25 and 34 rose by 6.3 and 5.7 percentage points, respectively. These data

[4] Ruhm (2007) uses unemployment rate among individuals aged 16 or over. In Italy, given that the legal working age is 15, the unemployment rate considers individuals aged 15 or over.

[5] Data on these unemployment rates can be retrieved from: http://dati.istat.it/Index.aspx?DataSetCode=DCCV_TAXDISOCCU

confirm findings from previous research according to which recessions tend to hit especially hard young individuals. Additionally, looking at the changes in unemployment rate by gender one may observe that unemployment rose faster among men across all age groups. This finding is again consistent with earlier research showing that the weakness of the economy is harder for men than women.

Figure 2: Percentage point change in unemployment rate in Italy between 2008 and 2012, by gender and age group



Source: Italian National Statistical Institute

Following the approach of previous studies[6], we restrict our sample to individuals aged between 25 and 54[7]. The rationale behind focusing on this age range is to consider people who have completed their schooling and are still strongly tied to the labour force.

[6] Tekin et al. (2013) include people aged between 25 and 55 in their sample. Colman and Dave (2013) and Xu (2013) limit their sample to males ages 25 to 55.
[7] The survey provides information on age by group. The following age groups are considered: 25-34, 35-44 and 45-54.

The health outcomes examined include: tobacco use, physical activity, drinking, healthy food consumption and unhealthy food consumption.

Following the approach of Xu (2013), tobacco use is proxied by three dichotomous variables. The first indicates whether the respondent is a current smoker. The second and third look at the intensity of smoking for current smokers. They show whether the respondent smokes 10 or more cigarettes per day and whether the respondent smokes 20 or more cigarettes per day (heavy smoker).

Physical activity is analysed using a dummy variable indicating whether the respondent is engaged in regular or occasional physical activity.

Alcohol consumption is captured by a dichotomous variable indicating whether the respondent drinks wine and/or beer daily without food[8].

A dichotomous variable is constructed as a proxy for healthy food consumption. This indicates whether the respondent regularly consumes at least 5 daily servings of fruits and/or vegetables[9].

Finally, our measure for unhealthy food consumption is a dichotomous indicator of whether the respondent daily eats snacks high in salt (e.g. French fries, popcorn).

Unfortunately, we can only use data on 18 (out of 20) Italian regions since the survey does not allow us to distinguish between people residing in the region of Piemonte and those residing in the small region of Valle d'Aosta[10]. In addition to region of residence, several individual-level characteristics are included in the model as explanatory variables. These comprise gender, age

[8] Frequent alcohol consumption may increase the chances of cirrhosis (an advance form of leaver disease). Consumption of alcohol without food results in higher risk of cirrhosis than with food (Freeman and Parry, 2006).

[9] The American Heart Association recommends 4-5 servings of fruits and vegetables each day (http://www.heart.org/HEARTORG/HealthyLiving/HealthyEating/Nutrition/Eat-More-Fruits-and-Vegetables_UCM_320237_Article.jsp#.WFFeDdKLSUk)

[10] The sensitivity of the results to the inclusion of individuals from Piemonte/Valle d'Aosta is discussed in the next Section.

group, marital status (single, married[11], divorced/separated and widowed) and education (university degree or more, upper secondary school diploma, lower secondary school diploma and primary secondary school diploma or less).

Descriptive statistics for our health behaviour indicators are reported in Table 1. Just under one-third of adults (29%) smoke, about one-fifth (21%) smoke 10 or more cigarettes per day and approximately one-tenth (8.9%) are heavy smokers. About 34% of respondents exercise regularly or occasionally, 0.8% daily consume alcohol without food, 27.3% daily consume at least 5 servings of fruits and/or vegetables, and 3.4% daily consume snacks high in salt.

Table 1: Summary information on indicators for health behaviours MHSELI- ages 25-54

	Mean	Standard Deviation
Current smoker	0.294	0.456
Smokes 10 or more cigarettes per day	0.212	0.409
Smokes 20 or more cigarettes per day	0.089	0.284
Any physical activity	0.338	0.473
Daily consumption of alcohol without food	0.008	0.092
At least 5 daily servings of fruits and/or vegetables	0.273	0.446
Daily consumption of snacks high in salt	0.034	0.180

All descriptive statistics are calculated using the survey sample weights.

[11] Several papers (see, for instance, Waite and Gallagher, 2000; Pijoan-Mas and Rios-Rull, 2014) find that married individuals are healthier and live longer than unmarried ones. This finding is consistent with the marriage protection hypothesis, according to which married individuals are more likely to engage in low-risk activities, share resources, and enjoy caring from each other (Hu and Wolfe, 2002).

4. Empirical results

We estimate linear probability models using Ordinary Least Squares (OLS)[12] and report robust standard errors clustered at the region of residence level. All the regressions are weighted using the MHSELI sample weights. Table 2 presents estimates from Equations (1), (2) and (3). We focus our attention on the issue of primary interest in this paper and thus we only report the estimates on unemployment rate. Equation (1) uses regional unemployment rates among individuals aged 15 or over as a proxy for the business cycle and controls for education, age, marital status and gender in addition to the fixed effects for region of residence and survey year. Equation (2) adds to Equation (1) region of residence-specific linear time trends. Equation (3) employs regional unemployment rates by gender and age group as an indicator for the business cycle and, in addition to the controls of Equation (1), it also comprises linear time trends in age group by gender specific to each region of residence and fixed effects for the interaction between survey year and region of residence.

[12] Estimation of the models via probit leads to quantitatively similar marginal effects.

Table 2: Impact of regional unemployment rate on health behaviours MHSELI- ages 25-54

	Current smoker	Smokes 10 or more cigarettes per day	Smokes 20 or more cigarettes per day	Any physical activity	Daily consumption of alcohol without food	At least 5 daily servings of fruits and/or vegetables	Daily consumption of snacks high in salt
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Equation (1)							
General unemployment rate	-0.0059*** (0.0021)	-0.0043*** (0.0013)	-0.0006 (0.0012)	-0.0072*** (0.0023)	0.0004 (0.0003)	0.0040 (0.0038)	-0.0005 (0.0006)
Adjusted R^2	0.046	0.059	0.050	0.127	0.008	0.008	0.009
Equation (2)							
General unemployment rate	-0.0045** (0.0019)	-0.0031* (0.0015)	-0.0003 (0.0014)	-0.0074*** (0.0012)	0.0003 (0.0002)	0.0053 (0.0040)	-0.0007 (0.0008)
Adjusted R^2	0.046	0.059	0.050	0.127	0.008	0.008	0.010
Equation (3)							
Unemployment rate by gender and age group	-0.0047*** (0.0014)	-0.0038*** (0.0007)	-0.0010** (0.0004)	-0.0017* (0.0009)	0.0004** (0.0002)	-0.0016** (0.0007)	-0.0006** (0.0003)
Adjusted R^2	0.049	0.062	0.053	0.128	0.009	0.011	0.010
Number of observations	145,665	145,665	145,665	147,831	143,188	145,747	144,656

All Equations include fixed effects for region (of residence) and (survey) year in addition to controls for education, age, marital status and gender. Equation (2) contains region (of residence)-specific linear time trends. Equation (3) comprises linear time trends in age group by gender specific to each region (of residence) and fixed effects for the interaction between (survey) year and region (of residence). Due to space considerations, only the results on the variable of interest are presented. Full results are available from the author upon request. Robust standard errors clustered at the region (of residence) level are reported in brackets. All the regressions are weighted using the survey sample weights. ***p<0.01, p**<0.005, p*<0.1.

Estimates reported in columns 1 and 2 of Table 2 consistently indicate that an increase in regional unemployment rates is associated with a statistically significant decrease in the probability of both smoking and smoking 10 or more cigarettes per day. The size of this effect is expectedly small as it represents the average impact over all individuals. For instance, one percentage point increase in

yearly regional unemployment rates will reduce the probability of smoking by between 0.0045 and 0.0059 percentage points. The income effect may play a determinant role in explaining this result. During economic recessions many people see a reduction in their income as a result of losing their job, working fewer hours and receiving pay cuts, which could lead to a lower consumption of tobacco (Kaiser et al., 2017). Estimates reported in column 3 of Table 2 show that smoking 20 or more cigarettes per day is also found to be procyclical in all the three Equations. However, not only is the effect of the regional unemployment rate larger in Equation (3) relative to Equations (1) and (2), but is statistically significant just in Equation (3) due to a considerably smaller standard error. Finally, it is interesting to observe that, in line with expectations, the impact of the business cycle on smoking behaviour decreases as the number of smoked cigarettes per day increases.

Estimates shown in column 4 of Table 2 suggest that physical activity declines during economic recessions. However, although the direction of the effect of the regional unemployment rate on physical activity is consistent across all the three Equations, the magnitude of this effect appears to be much smaller in Equation (3) relative to Equations (1) and (2).

Estimates depicted in column 5 of Table 2 consistently show that the consumption of wine and/or beer without food is countercyclical. The relevant coefficient has virtually the same size in all the three Equations. However, it is more precisely estimated in Equation (3) relative to Equations (1) and (2), and so is statistically significant only in the former case. This finding suggests that psychological and emotional effects associated with the economic crisis may more than offset any decrease in alcohol consumption due to reduced income (Popovici and French, 2013).

A similar consideration can be made for the consumption of snacks high in salt, though this is procyclical. As shown in column 7 of Table 2, the magnitude of the unemployment coefficient is practically the same when using regional aggregated or disaggregated unemployment rates.

Nevertheless, the standard error of this coefficient is again smaller in Equation (3) relative to Equations (1) and (2), making it statistically significant only in the former case.

Column 6 of Table 2 shows estimates for the effect of unemployment rate on the regular daily consumption of at least 5 servings of fruits and/or vegetables. While there is a positive and statistically insignificant relationship in Equations (1) and (2), this turns out to be negative and statistically significant in Equation (3).

To sum up, the estimates of Table 2 indicate that, while Equations that use general unemployment rates and the one that utilizes unemployment rates by gender and age group produce similar results for smoking behaviour, consumption of wine and/or beer without food and consumption of snacks high in salt (though relevant point-estimates are more precisely estimated in Equation (3)), different findings emerge for physical activity and consumption of fruits and/or vegetables. How can this be explained? One should examine the differential impact of our unemployment rate measures on the specific pathways that drive the relationship between macroeconomic conditions and health behaviours. As argued in Section 2, one disadvantage of using group-specific unemployment rates is that they do not capture broader area-level economic shocks affecting all groups. This means, for instance, that disaggregated unemployment rates do not pick up regional variations in price levels throughout the business cycle. Since in Italy food prices increase less in recessions than in expansions[13] and there are great variations across regions[14], not accounting for this may reduce the countercyclicality of the consumption of fruits and/or vegetables. This consideration, however, does not apply to smoking behaviour given that the price of cigarettes is fixed by the government for all the Italian regions and tends not to vary according to the business cycle. On the other hand, as also explained in Section 2, one advantage of employing unemployment rates by gender and age group is that they better capture the effect of increased

[13] See data on the Italian consumer price index for food (available from http://dati.istat.it/).
[14] See data on the Italian consumer price index for food, by region (again available from http://dati.istat.it/).

stress during recessions (due to personal circumstances and/or peer effects) on health behaviours. In economic downturns stressed people may switch fruits and vegetables with high-calorie food, and therefore the use of group-specific unemployment rate may increase the procyclicality of the consumption of fruits and/or vegetables.

Next, two tests are conducted to check the robustness of the estimates of Table 2. First, despite the fact that people residing in the regions of Piemonte and Valle d'Aosta are recorded together in MHSELI, we include them in the sample and use unemployment rate in Piemonte as a proxy for the business cycle. This is because Valle d'Aosta is a very small region and its population is about 34 times smaller than that of Piemonte. The results presented in Table 3 show that coefficients on the unemployment rate remain largely unchanged following the inclusion of people from Piemonte/Valle d'Aosta.

Table 3: Impact of regional unemployment rate on health behaviours MHSELI- ages 25-54 (including Piemonte/Valle d'Aosta)

	Current smoker	Smokes 10 or more cigarettes per day	Smokes 20 or more cigarettes per day	Any physical activity	Daily consumption of alcohol without food	At least 5 daily servings of fruits and/or vegetables	Daily consumption of snacks high in salt
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Equation (1)							
General unemployment rate	-0.0056*** (0.0020)	-0.0036** (0.0014)	-0.0007 (0.0010)	-0.0060** (0.0023)	0.0004 (0.0003)	0.0048 (0.0036)	-0.0003 (0.0007)
Equation (2)							
General unemployment rate	-0.0051*** (0.0018)	-0.0033** (0.0015)	-0.0006 (0.0014)	-0.0067*** (0.0012)	0.0002 (0.0002)	0.0052 (0.0036)	-0.0007 (0.0008)
Equation (3)							
Unemployment rate by gender and age group	-0.0045*** (0.0013)	-0.0040*** (0.0007)	-0.0011*** (0.0004)	-0.0015* (0.0009)	0.0003** (0.0001)	-0.0017** (0.0007)	-0.0006** (0.0003)
Number of observations	159,980	159,980	159,980	162,345	157,321	160,060	158,844

All Equations include fixed effects for region (of residence) and (survey) year in addition to controls for education, age, marital status and gender. Equation (2) contains region (of residence)-specific linear time trends. Equation (3) comprises linear time trends in age group by gender specific to each region (of residence) and fixed effects for the interaction between (survey) year and region (of residence). Due to space considerations, only the results on the variable of interest are presented. Full results are available from the author upon request. Robust standard errors clustered at the region (of residence) level are reported in brackets. All the regressions are weighted using the survey sample weights. ***p<0.01, p**<0.005, p*<0.1.

Second, we expand the sample so that it includes also individuals aged between 55 and 64. This is because in Italy many people retire in their 60s[15]. These new estimates, which are presented in Table 4, confirm that models based on different proxies for the business cycle produce different average population effects for some health behaviours. The two differences already emerging in Table 2 are confirmed in Table 4. First, the magnitude of the procyclical effect related to physical activity is smaller in the Equation where unemployment rates by gender and age group are used as

[15] In 2011 in Italy the average age of people retiring from the workforce was 61.

a proxy for the business cycle. Second, while estimates of Equation (3) indicate that higher unemployment rates are associated with reduced daily consumption of at least 5 servings of fruits and/or vegetables, the opposite result emerges from the estimates of Equations (1) and (2).

Table 4: Impact of regional unemployment rate on health behaviours MHSELI- ages 25-64

	Current smoker	Smokes 10 or more cigarettes per day	Smokes 20 or more cigarettes per day	Any physical activity	Daily consumption of alcohol without food	At least 5 daily servings of fruits and/or vegetables	Daily consumption of snacks high in salt
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Equation (1)							
General unemployment rate	-0.0049*** (0.0016)	-0.0038*** (0.0012)	-0.0009 (0.0011)	-0.0059*** (0.0020)	0.0006 (0.0004)	0.0060 (0.0041)	-0.0006 (0.0006)
Equation (2)							
General unemployment rate	-0.0027* (0.0014)	-0.0023* (0.0013)	-0.0004 (0.0011)	-0.0058*** (0.0012)	0.0004 (0.0004)	0.0078* (0.0039)	-0.0007 (0.0007)
Equation (3)							
Unemployment rate by gender and age group	-0.0012 (0.0009)	-0.0013* (0.0006)	-0.0003 (0.0004)	-0.0039*** (0.0008)	0.0004*** (0.0001)	-0.0013** (0.0005)	-0.0003 (0.0002)
Number of observations	189,553	189,553	189,553	192,313	186,245	189,631	187,850

All Equations include fixed effects for region (of residence) and (survey) year in addition to controls for education, age, marital status and gender. Equation (2) contains region (of residence)-specific linear time trends. Equation (3) comprises linear time trends in age group by gender specific to each region (of residence) and fixed effects for the interaction between (survey) year and region (of residence). Due to space considerations, only the results on the variable of interest are presented. Full results are available from the author upon request. Robust standard errors clustered at the region (of residence) level are reported in brackets. All the regressions are weighted using the survey sample weights. ***p<0.01, p**<0.005, p*<0.1.

Additionally, we run a placebo test and estimate the Equations for individuals aged between 14 and 24[16]. Since it is reasonable to assume that a high proportion of these people have not completed their schooling, macroeconomic conditions are expected to have little or no effect on

[16] In Italy between 2005 and 2012 the age limit for purchasing wine and beer was 16 years on-premises and 18 off-premises. During the same period the age limit for purchasing cigarettes was 16 years.

their health behaviours[17]. If relevant effects are uncovered for this group, then this would indicate that our previous estimates are confounded by unobserved heterogeneity or unobserved trends (Colman and Dave, 2013). In line with the expectations, estimates depicted in Table 5[18] show that only in a few cases the coefficient on unemployment rate is found to be statistically significant at conventional levels. For none of our health behaviour indicators the effect of the business cycle turns out to be consistently significant across the three Equations. The only relevant effect is found in Equations (1) and (2) and relates to the daily consumption of snacks high in salt. Perhaps this result is driven by the relatively high consumption of this type of food among young people.

[17] Using data from a large number of countries, Paling and Vall Castello (2017) find that there is a relationship between unemployment rate and adolescents' health behaviours. However, this relationship holds only in less developed countries. In more developed countries (like Italy), business cycle conditions are not found to have any significant effect on substance consumption behaviour of adolescents.

[18] In Equation (3) we use regional unemployment rate by gender among people aged between 15 and 24. This is because, as stated earlier, in Italy the legal working age is 15 and hence data on unemployment rate among people aged between 14 and 24 do not exist. On the other hand, in the survey the relevant age group starts at 14 and not at 15.

Table 5: Impact of regional unemployment rate on health behaviours MHSELI- ages 14-24

	Current smoker	Smokes 10 or more cigarettes per day	Smokes 20 or more cigarettes per day	Any physical activity	Daily consumption of alcohol without food	At least 5 daily servings of fruits and/or vegetables	Daily consumption of snacks high in salt
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Equation (1)							
General unemployment rate	0.0002 (0.0020)	0.0024 (0.0022)	0.0009 (0.0012)	-0.0032 (0.0043)	-0.0004 (0.0004)	0.0074 (0.0042)	0.0048* (0.0022)
Equation (2)							
General unemployment rate	-0.0002 (0.0019)	0.0024 (0.0021)	0.0011 (0.0010)	-0.0044 (0.0031)	-0.0004 (0.0005)	0.0098* (0.0051)	0.0060** (0.0026)
Equation (3)							
Unemployment rate by gender and age group	-0.0005 (0.0008)	-0.0005 (0.0007)	0.0001 (0.0006)	-0.0005 (0.0012)	-0.0001 (0.0001)	-0.0008 (0.0018)	-0.0003 (0.0009)
Number of observations	38,859	38,859	38,859	39,666	38,134	39,029	38,812

All Equations include fixed effects for region (of residence) and (survey) year in addition to controls for education, age, marital status and gender. Equation (2) contains region (of residence)-specific linear time trends. Equation (3) comprises linear time trends in age group by gender specific to each region (of residence) and fixed effects for the interaction between (survey) year and region (of residence). Due to space considerations, only the results on the variable of interest are presented. Full results are available from the author upon request. Robust standard errors clustered at the region (of residence) level are reported in brackets. All the regressions are weighted using the survey sample weights. ***p<0.01, p**<0.005, p*<0.1.

Finally, as an extension of our analysis, a dummy for individual unemployment status[19] and an interaction between this variable and regional unemployment rate are added to the covariates of the Equations (1), (2) and (3). This interaction term allows us to study whether the business cycle affects differently the health behaviours of unemployed and not unemployed individuals.

Results from columns 1, 2, and 3 of Table 6 show that unemployed people are more likely to be smokers, smoke 10 or more cigarettes per day and be heavy smokers. However, the interaction

[19] One should note, however, that individual unemployment may be endogenous due to unobserved factors simultaneously affecting labour market status and health behaviours.

term between unemployment status and regional unemployment rate has a statistically significant negative coefficient. This indicates that, during recessions, smoking behaviour decreases more across the unemployed than it does across those who are not unemployed. These findings are in line with those of Charles and Decicca (2008). They find that individuals with higher predicted employment values are less likely to smoke daily than those with lower values. Additionally, their results indicate that the procyclical relationship between smoking and local unemployment rate weakens as the predicted employment value increases.

The estimates reported in column 4 of Table 6 show that unemployed individuals have a lower probability of doing physical activity than those not unemployed. Nevertheless, the magnitude of this difference diminishes in periods of economic slowdown, during which the probability of engaging in physical activity is found to decrease less across the unemployed than it does across those who are not unemployed.

Estimates reported in column 5 of Table 6 suggest that being unemployed increases the likelihood of drinking wine and/or beer daily without food, though this effect is not statistically significant in Equation (3). However, the coefficient on the interaction term is consistently negative and statistically significant, indicating that during downturns the probability of drinking wine and/or beer daily without food increases less across the unemployed than it does across those who are not unemployed.

As shown in column 6 of Table 6, unemployment status is not related to the probability of having at least 5 servings of fruits and/or vegetables a day. Only in the model employing unemployment rates by gender and age group the coefficient on the interaction term turns out to be statistically significant, with unemployed people decreasing their probability of eating healthy food less than people who are not unemployed during recessionary periods.

Results reported in column 7 of Table 6 indicate that being unemployed increases the probability of eating snacks high in salt every day, though this effect is smaller and imprecisely estimated in Equation (3). Similarly, while the coefficient on the interaction term has consistently a negative sign, it is statistically significant only in the models based on general unemployment rates.

Table 6: Impact of regional unemployment rate on health behaviours by unemployment status MHSELI- ages 25-54

	Current smoker (1)	Smokes 10 or more cigarettes per day (2)	Smokes 20 or more cigarettes per day (3)	Any physical activity (4)	Daily consumption of alcohol without food (5)	At least 5 daily servings of fruits and/or vegetables (6)	Daily consumption of snacks high in salt (7)
Equation (1)							
General unemployment rate	-0.0051**	-0.0036**	-0.0003	-0.0083***	0.0005*	0.0041	-0.0003
	(0.0020)	(0.0013)	(0.0012)	(0.0023)	(0.0003)	(0.0037)	(0.0006)
Unemployment status	0.0655***	0.0585***	0.0282***	-0.0964***	0.0081***	0.0094	0.0120***
	(0.0156)	(0.0113)	(0.0081)	(0.0175)	(0.0027)	(0.0116)	(0.0040)
General unemployment rate * Unemployment status	-0.0038**	-0.0030**	-0.0017**	0.0052***	-0.0006**	-0.0007	-0.0009**
	(0.0014)	(0.0012)	(0.0006)	(0.0014)	(0.0002)	(0.0012)	(0.0003)
Equation (2)							
General unemployment rate	-0.0037**	-0.0025	0.00003	-0.0086***	0.0004*	0.0054	-0.0005
	(0.0018)	(0.0015)	(0.0014)	(0.0013)	(0.0002)	(0.0039)	(0.0008)
Unemployment status	0.0631***	0.0574***	0.0277***	-0.1014***	0.0088***	0.0075	0.0112***
	(0.0157)	(0.0114)	(0.0082)	(0.0169)	(0.0026)	(0.0120)	(0.0040)
General unemployment rate * Unemployment status	-0.0035**	-0.0029**	-0.0016**	0.0057***	-0.0008***	-0.0005	-0.0008**
	(0.0014)	(0.0012)	(0.0006)	(0.0014)	(0.0002)	(0.0012)	(0.0003)
Equation (3)							
Unemployment rate by gender and age group	-0.0044***	-0.0036***	-0.0009*	-0.0020**	0.0004**	-0.0018***	-0.0006**
	(0.0013)	(0.0008)	(0.0004)	(0.0009)	(0.0002)	(0.0006)	(0.0002)
Unemployment status	0.0538***	0.0508***	0.0237***	-0.0773***	0.0039	-0.0083	0.0063
	(0.0124)	(0.0108)	(0.0061)	(0.0159)	(0.0026)	(0.0091)	(0.0049)
Unemployment rate by gender and age group* Unemployment status	-0.0025***	-0.0022***	-0.0014***	0.0033**	-0.0003*	0.0009*	-0.0003
	(0.0008)	(0.0006)	(0.0004)	(0.0012)	(0.0002)	(0.0005)	(0.0004)
Number of observations	145,665	145,665	145,665	147,831	143,188	145,747	144,656

All Equations include fixed effects for region (of residence) and (survey) year in addition to controls for education, age, marital status and gender. Equation (2) contains region (of residence)-specific linear time trends. Equation (3) comprises linear time trends in age group by gender specific to each region (of residence) and fixed effects for the interaction between (survey) year and region (of residence). Due to space considerations, only the results on the variables of interest are presented. Full results are available from the author upon request. Robust standard errors clustered at the region (of residence) level are reported in brackets. All the regressions are weighted using the survey sample weights. ***p<0.01, p**<0.005, p*<0.1.

5. Conclusions

This paper examines the impact of the business cycle on health behaviours for the overall population. We expand earlier research and contribute to the literature along two aspects. First, while previous research is mostly based on US data, this paper focuses on Italy. Specifically, we use microdata for adults from the 2005-2012 years of the Italian Multipurpose Household Survey on Everyday Life Issues. This survey contains questions about tobacco use, physical activity, drinking, healthy food consumption and unhealthy food consumption. Second, we employ a model where area-specific disaggregated unemployment rates are used as a proxy for the business cycle rather than area-specific aggregated unemployment rates. The use of the former allows us to better predict an individual's risk of becoming unemployed due to changing macroeconomic conditions, and hence its impact on health behaviours. Additionally, group-specific unemployment rates may capture relevant peer effects- that when a person sees others in his/her peer-group being affected by the unemployment, he/she may change his/her health behaviours due to increased stress. On the other hand, disaggregated unemployment rate measures do not pick up the impact on health behaviours triggered by broader area-level economic shocks affecting all groups.

The effects of the business cycle on health behaviours appear to be more precisely estimated when using unemployment rates by gender and age group rather than general unemployment rates. Additionally, models based on these different unemployment rate measures produce similar results for some health behaviours such as smoking, whereas different results are obtained for others. Specifically, two important differences emerge. First, while there is a statistically significant negative association between unemployment rates by gender and age group and regular daily consumption of at least 5 servings of fruits and/or vegetables, the opposite effect, though statistically insignificant, is observed once general unemployment rates are used. Second, while both models conclude that physical activity is procyclical, the size of the procyclical effect is

much smaller when employing disaggregated rather than aggregated unemployment rates. Results from both models suggest also that the business cycle affects differently the health behaviours of unemployed and not unemployed individuals.

Understanding how changes in economic conditions impact health behaviours is of key importance. This is because there is the risk that increased job stress and reduced income during recessions may lead individuals to follow an unhealthy lifestyle, which could result in serious detrimental health effects in the long run. From this perspective, when comparing estimates from models based on aggregated and disaggregated unemployment rates, there is one good and one bad news. The good news is that the model proposed in this study suggests that the decrease in physical activity over economic downturns is smaller than that found in the conventional model. The bad news is that, in contrast to the latter, the former indicates that people may eat less healthy food during economic slowdowns.

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