# A Meta-Analytic Investigation of Consumer Over-Indebtedness: the Role of Impulsivity

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## Abstract

In the past decade, evidence has been accumulated on the relationship between impulsivity and over-indebtedness. Nevertheless, the magnitude of such association is still considered marginal compared to traditional socio-demographic and economic factors, with the important consequence that impulsivity continues to be ignored in policy interventions for preventing and dealing with over-indebtedness. The aim of this study was to meta-analyze existing studies with the aim to answer the question: Are higher levels of impulsivity associated with greater over-indebtedness? Scopus and Web of Science databases were searched for English language studies. Seventeen studies were eligible for the analysis. Random effect model yielded a significant positive association between impulsivity and over-indebtedness (Hedges' $g$ = .40). Type of over-indebtedness (debt holding vs. unmanageable debt) and work status (percentage of employed individuals) significantly moderated this association. Results are discussed in terms of implications and recommendations for future research, policy, and practice.


*Keywords:* Consumer, Over-indebtedness, Impulsivity, Meta-analysis

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## 1. Introduction

In the last 20 years, credit to consumers has experienced a strong growth (ECRI, 2017). Structural transformations in the economy and changes in social policies, new spending models, and transformation in socio-cultural norms have increased consumer dependency on borrowing, ultimately making personal debt more acceptable (Ferretti and Vandone, 2019; Credit Agricole, 2017). The supply side of the personal debt market has also contributed to support the expansion of personal debt in the economy, with product innovation, technological changes, on-line distribution channels, aggressive marketing and advertising strategies (Zavadil and Messner, 2014; Karacimen, 2017).

Personal debt is an important part of the economy, since it may guarantee heightened economic welfare by providing greater flexibility over spending and smoothing consumption over lifetime (Modigliani and Brumberg, 1954). It is, however, well known that paying back debt may turn into a source of problems and cause over-indebtedness, with negative side effects both at micro and macro level. In fact, over-indebtedness affects individual well-being in terms of poverty, social exclusion, physical and mental health (Bialowolski et al. 2019; Brown, Taylor, and Price, 2005; Drentea and Reynolds, 2012; Meltzer et al., 2011; Sweet et al., 2013), as well as the stability of the financial system, due to potential defaults in debt repayments (Albacete and Lindner, 2013; Ampudia, Vlokhoven, and Zochowski, 2014).

Aware of the potential dangers of over-indebtedness, academics, policy makers and supervisors have increased, especially after the 2008 crises, the research activity directed at investigating which consumers get into arrears and repayment difficulties, with the ultimate goal to set up proper measures

to prevent and manage over-indebtedness (Civic Consulting, 2013; European Commission, 2008; Kilborn, 2010).

Several empirical studies in the field of economics have focused on the socio-demographic and economic characteristics of individuals who are over-indebted or at risk of over-indebtedness, providing a picture of the most vulnerable groups, that is low-income individuals (Bridges and Disney, 2004; Zajaczkowski and Zochowski, 2007), renters (May, Tudela, and Young, 2004), individuals with high levels of accumulated unsecured debt (Messner and Zavadil, 2014), the younger (International Monetary Fund, 2012; Jiang and Dunn, 2013), single parents (Patel, Balmer, and Pleasence, 2012; Russell, Whelan, and Maitre, 2013), and large size families (Brown, Taylor, and Price, 2005; Keese, 2012).

More recently, interdisciplinary studies in the field of psychology and behavioral economics have contributed to a more comprehensive understanding of the phenomenon by drawing attention to the role played by personal attitudes on debt decision-making and pointing to several psychological factors that may affect consumers' debt decisions and risk of over-indebtedness (Białowolski, 2019; Brown, Taylor, and Price, 2005; Karlsson et al., 2004; Lea and Webley, 1995; Rachlin and Jones, 2008; Ranyard et al., 2006; Rohde, 2009). Among those factors, impulsivity appears to play a major role. Impulsivity has been defined as the readiness to take immediate and unplanned action as a response to internal and external stimuli, with no regard for the negative consequences of such response (e.g., Moeller et al., 2001).

Indeed, empirical evidence supports the view that impulsive individuals have a higher propensity to make excessive spending, and to run into debts (e.g., Henegar et al., 2013; Kamleitner, Hoelzi, and Kirchler, 2012; Verplanken and Sato, 2011; Watson, 2009). For example, Ottaviani and Vandone (2011) revealed a significant influence of individuals' impulsivity in making debt decisions, even after controlling for traditional socio-demographic and economic variables. Meier and Sprenger (2010) found that individuals who exhibit a particular desire for immediate consumption also have increased probability to borrow and have higher credit card balances. Similarly, Achtziger et al. (2015) highlighted that consumers with low self-control are more at risk to run into debt problems because they are neither able to resist the temptation to buy something they desire in a given moment, nor to control negative emotions that trigger compensatory responses, such as purchases. Limerick

and Peltier (2014) as well as Pirog and Roberts (2007) confirmed the existence of a positive relation between impulsivity and higher credit card balances and credit card misuse in college students. Anderloni, Bacchiocchi, and Vandone (2012) and Gathergood (2012) found that low levels of self-control predict over-indebtedness and increase the risk to be exposed to adverse financial shocks. Marketing channel innovation, aggressive advertisement, and point-of-purchase stimuli all constitute examples of efforts to activate impulsive behavior (Jones et al., 2003; McCall, Trombetta, and Gipe, 2004). Heidhues and Koszegi (2010) further highlight that many features of consumer credit contracts are consistent with individuals' time inconsistent preferences.

Although all these studies point to a positive association between impulsivity and over-indebtedness, this association has not yet been quantified. This has the unfortunate consequence that impulsivity continues to be ignored in policy interventions for preventing and dealing with over-indebtedness, being considered a marginal factor compared to traditional socio-demographic and economic variables. Systematic reviews and meta-analyses are positioned at the top of the hierarchy of evidence and have enormous potential value in estimating risk factors for unhealthy behaviors such as over-indebtedness and for the development of guidelines for future research or clinical trials to inform policy makers.

The present study is a meta-analysis of available studies on such association with the aim to answer the question: Are higher levels of impulsivity associated with greater over-indebtedness?

*1.1 The relationship between impulsivity and over-indebtedness*

According to the empirical literature, impulsivity appears to play a role in inducing consumers to make non-rational borrowing choices. The theoretical explanation behind this association is that impulsivity is linked to the concept of hyperbolic discount, which is a psychological bias according to which impulsive individuals tend to systematically overvalue immediate rewards when evaluating options and are less sensitive to the negative consequences of their choices (Franken et al., 2008; Zermatten et al., 2005). From an economic perspective, their preferences are not time-consistent, as posited by traditional life-cycle models (Modigliani and Brumberg, 1954). Conversely, individuals reveal a strong tendency to make choices that are inconsistent over time, as they overestimate the duration of time intervals and, as a consequence, discount the value of delayed rewards more than do

self-controlled individuals. This impacts consumption, saving and borrowing decisions (Graham and Isaac, 2002; Wittman and Paulus, 2008).

When it comes to the decision to demand for debt (and particularly consumer credit) "hyperbolic discounters" make decisions that are motivated by the immediate reward of consumption rather than by the potential long-term negative outcomes of their choices, such as a level of debt which may be unsustainable in comparison to their future income (Martin and Potts, 2009; Potts et al., 2006). In other words, impulsivity pushes consumers, at the time they have to decide whether to purchase on credit terms or not, to opt for ''buy now, pay later'' solutions (e.g. using credit cards) that bring immediate gratification, disregarding the ensuing sustainability of such a debt (Dittmar and Bond, 2010; Meier and Sprenger, 2010; Siemens, 2007).

Our prediction is therefore that impulsivity may overburden consumers with debts they cannot afford and increase the risk of over-indebtedness.

*1.2 The role of potential moderators*

Several empirical studies identified the main statistically significant socio-demographic and economic variables characterizing groups of individuals that are more at risk of being over-indebted, such as the younger, single parents, large families, low-income and low-wealth individuals, renters. However, results are not always univocal, depending on the characteristics of the sample, the quality and quantity of micro-level data available for the analysis, and the variables that can be estimated. Besides, extant literature typically investigates the impact of these variables on over-indebtedness, ignoring their potential role as moderators in the relationship between impulsivity and over-indebtedness. In our moderation analysis we took into account any factor that has been recognized to influence either impulsivity or over-indebtedness or both. Our expected results are based on existing knowledge on the risk factors for both impulsivity and over-indebtedness, hypothesizing that the association between these two variables would be stronger in those individuals who are more vulnerable to both, such as for example, the young generations.

In fact, the role of mean age was the first potential moderator to be examined. This is particularly important, considering that the risk of over-indebtedness is a growing problem among young generations who incur debt for education, housing, and consumption while at the same time having to

deal with the difficulties of a relatively fragile job market (Jiang and Dunn, 2013; Montgomerie, 2013). For example, Oksanen, Aaltonene, and Rantala (2015) found that, in Finland, younger age groups had a higher prevalence of debt problems compared to older groups. Focusing on the financial vulnerability of Spanish consumers, the International Monetary Fund (2012), reports that the share of vulnerable individuals is significantly largest in poorer and younger individuals, although they account only for a small fraction of total personal debt market. Using micro data from the British Households Panel Survey in 1995 and 2000, Del Rio and Young (2008) found that while the proportion of individuals reporting debt problems did not change much between 1995 and 2000, there were significant changes in their socio-economic characteristics, and more specifically an increase in unsecured debt taken own by young individuals with a high debt–income ratio, which, in turn, made them more vulnerable to potential shocks in their income or to increases in interest rates. Due to the reviewed existing evidence, we expected the association between impulsivity and over-indebtedness to be stronger in younger individuals.

Given the extant empirical literature highlighting the impact of demographic variables on individuals' financial vulnerability, sex and marital status are also examined as moderators. In particular, single parents are more likely to be over-indebted (Patel, Balmer, and Pleasence, 2012; Russell, Whelan, and Maitre, 2013). Also, a growing number of non-married individuals are experiencing financial difficulties and a growing proportion is composed by divorced women (e.g., Lyons and Fisher, 2006). In light of such evidence and on the fact that impulsive choice (but not action) and temporal discount are typically greater in females than males (reviewed in Weafer and de Wit, 2014), we hypothesized to find a stronger association between impulsivity and over-indebtedness in women and in non-married individuals.

We then examine the moderating role of level of education, which proxies the ability to understand financial information and raises awareness about the implications of debt. Several empirical studies highlight that less financially knowledgeable individuals tend to hold higher levels of debt-to-income ratio and more difficulties in paying off debt (Disney and Gathergood, 2013; Lusardi and Tufano, 2015; Robb, 2011). Given existing evidence on impulsivity as a mediator of the impact of financial literacy on debt, even after controlling for financial wealth, we expected the association between impulsivity and over-indebtedness to be stronger in less financially

knowledgeable individuals (Ottaviani and Vandone, 2018).

The country where the study was performed is also taken into account as a potential moderator, since significant differences exist across countries in terms of aggregate size, growth, level of maturity of the consumer credit market, diffusion of credit cards, and quick access to credit (Vandone, 2009). This mediation analysis is to be considered exploratory and we had no a-priori hypothesis on the direction of the associations.

Income may be another important moderator because of the higher risk of over-indebtedness in low-income individuals. Zajaczkowski and Zochowski (2007) examined data from the Polish Household Budget Survey to analyze the distribution of debt burden ratio across the individuals in Poland and found that low-income individuals exhibit higher debt service to income ratio. Similarly, using EU-SILC data for a selection of European countries between 2005 and 2008, Magri, Pico, and Rampazzi (2011) found that a share of consumers who borrow in the consumer credit market are poor in income and more at risk of over-indebtedness given their inability to face unexpected expenses. Again, we had no a-priori hypothesis on the effect of income as a specific moderator in the association between impulsivity and over-indebtedness.

Work status is considered in our moderation analysis to assess the role played by this variable in turning a situation of manageable debt into financial distress. Again, over-indebtedness mainly affects the economically and socially weakest members of the society, such as unemployed, who are the most exposed to the risk of holding unmanageable debts (Anderloni, Bacchiocchi, and Vandone, 2012). Our expectation was to find a stronger association between impulsivity and over-indebtedness in unemployed individuals.

Although all the primary papers focus on the "dark" side of personal debt, i.e. over-indebtedness, given the complexity of the phenomenon and the lack of data availability to quantify it (Ferretti and Vandone, 2019), some authors measure it as the amount of debt hold by individuals (with the underlying idea that the higher is the level of debt, the higher the risk that it turns out in over-indebtedness), and others use a more direct measure of problematic usage of debt, such as the level of debt burden (e.g., debt service to income ratio), or a scale to assess the burden of debt (e.g., difficulties and delays in paying back obligations, debt restructuring). We decided to code these two groups separately (debt holding versus unmanageable debt) because, from a theoretical point of view,

personal debt per se is not recognized as being a problem, since it may help to adjust fluctuations in income, address short-term liquidity problems, and give the possibility of improving lifestyle by smoothing consumption over time (Bagliano and Bertola, 2004). The problem arises when irrespective of the causes, indebtedness becomes such that debtors are unable to meet their contractual obligations. Thus, the specific type of over-indebtedness has also been examined in an exploratory moderation analysis.

Impulsivity and self-control are considered as being distinct but interrelated processes that work in tandem in determining risk taking behaviors. Impulsive drivers towards a behavior as well as self-control mechanisms that attempt to inhibit the same behavior are supposed to be simultaneously active (Schmeichel, Harmon-Jones and Harmon-Jones, 2010). Moreover, some definitions of self-control include impulsivity and other conceptualizations blend these two concepts (Duckworth and Kern, 2011). Based on these reasons, we have included the type of measure used to assess impulsivity (coded as impulsivity or self-control according to the operationalization used by the authors) as a moderator in our meta-analysis, with no a-priori hypothesis on the direction of the association.

## 2. Method

Two search strategies were used to systematically collect empirical studies on impulsivity and over-indebtedness. First, on October 10 2017 Scopus and Web of Science databases were searched for the following keywords: *impulsiv* (for impulsivity, impulsiveness, impulsive), self-control, impatience, delay-discounting, hyperbolic discounting, time-inconsistency* combined with *consumer credit, credit card, debt, consumer finance, mortgage, unsecured borrowing*. The search was updated on February 25 2019. Second, the reference lists of previous systematic reviews were searched for relevant studies (Agarwal and Zhang, 2015; Civic Consulting, 2013; European Commission, 2008; Kempson, 2002; Vandone and Anderloni, 2010). To enhance the methodological rigor of the studies examined, the literature search focused solely on articles published in peer-reviewed journals.

### *2.1 Inclusion and exclusion criteria*

Studies were included in the meta-analysis if they included both a measure of impulsivity and a measure of over-indebtedness and if the experimental design was suitable for calculating effect sizes

(i.e., either reporting the prevalence of over-indebtedness in impulsive and non-impulsive groups or the correlation between measures of over-indebtedness and impulsivity).

Studies that looked exclusively at the impact of impulsivity on other economic variables such as savings, planning retirement, or consumptions were excluded. Studies that analyzed the impact of time-inconsistency on sovereign debt were also excluded because this goes beyond the scope of our study. Lastly, studies on gamblers and pathological samples were excluded due to both methodological and pragmatic reasons. Given that the primary goal of this study is to provide indications for future studies, ultimately informing policy makers, we aimed at focusing on healthy individuals, presenting non-pathological levels of impulsivity. As an example, the inclusion of gamblers may inflate the association between impulsivity and debt or make it spurious, likely due to other intervening variables such as behavioral addiction. Moreover, medication use is not well controlled for in studies with clinical samples, and they would have acted as potential confounding in our meta-analysis. Consistent with a dimensional approach, impulsivity is definitely not restricted to psychopathology (Yan et al., 2016).

*2.2 Search procedure*

As shown in Figure 1, a total of 335 articles were retrieved. Comparison of the retrieved articles titles identified 100 studies that were duplicates, thus leaving 235 abstracts for further evaluation. The abstract was screened and, if this was accepted, the full paper was screened. Reasons for rejection were noted during the search.

Specifically, among the 235 potentially relevant abstract, we excluded 146 studies. The main reasons for exclusion were: languages other than English; review, letter and/or methodological articles; pathological samples; studies not relevant for the purpose of our research.

Among the 89 potentially relevant full texts, we excluded 72 studies. The main reasons for rejection were: no simultaneous measures of debt and impulsivity, theoretical papers without empirical analysis, and studies where debt and over-indebtedness were measured using a binary variable. As to the latter, given that a meta-analysis is by definition a quantitative synthesis that calculates weighted average of summary statistics from each study, binary outcomes can only be included in the case of risk ratio (relative risk or odds ration) or difference of risks and their 95%

confidence interval. Besides, studies that had only multilevel analyses (Bertaut, Haliassos, and Reiter, 2009; Cameron and Golby, 1991; Henegar et al., 2013; Wang, Lu, and Malhotra, 2011; Webley and Nyhus, 2001; Zainol et al., 2016) could not be included because the correct way of obtaining effect sizes from such analyses is still under debate (Selya et al., 2012).

The search procedure ended up with 17 papers (see Table 1 and references marked with an asterisk in the reference list). Among the 17 studies, additional data not published in the reviewed article but needed to calculate effect sizes or to run moderator analyses were received from 7 studies.

*2.3 Coding of the studies*

A standardized data coding form was developed to extract the needed information from each study: authors and publication year, characteristics of the study sample, and outcomes of interest. Each research article was read and analyzed by at least two members of the research team (DV, MF). Disagreements were resolved through discussion. Intercoder reliabilities were established for 20% of the studies with satisfactory results (Cohen's kappa = .89). Following the indications of Cooper (2009), each study (and each participant) was included only once in the meta-analyses.

The over-indebtedness measure was coded as "debt holding" or "unmanageable debt" according to the operationalization used by the author(s) (details in Table 1).

As to the measure used to assess impulsive tendencies, we coded as "impulsivity", the scores derived from surveys as well as from standardized questionnaires like the Delay of Gratification Scale (Ray and Najman, 1986), the Barratt Impulsiveness Scale (BIS-11; Patton, Stanford, and Barratt, 1995), the Dickman Functional and Dysfunctional Impulsivity Scale (Dickman and Meyer, 1988). We coded as "self-control" the scores derived from surveys as well as from standardized questionnaires like the Self-Control Scale (Tangney, Baumeister, and Boone, 2004) and the Consumer Spending Self-Control Scale (Haws, Bearden, and Nenkov, 2012).

When studies had the variable income expressed in a currency other than US dollar (i.e., Anderloni, Bacchiocchi, and Vandone, 2012; Ikeda and Kang, 2015; Omar et al., 2014; Ottaviani and Vandone, 2011), the amount was converted in US dollars using the related exchange rate. When studies had the variable age expressed as "age group" (e.g, under 25, 26-35, 36-45, etc.) (i.e., Omar et al., 2014; Ottaviani and Vandone, 2011; Peltier, Dahl, and Schibrowsky, 2016), the weighted average

of each specific group of ages was calculated. For work status, the percentage of employed was used, whereas education refers to the percentage of individuals having more than 13 years of education, which is usually the number of years of compulsory education.

< Table 1>

< Figure 1>

*2.4. Data Analyses*

For each study, we calculated a Hedges' *g* effect size. Based on conventional standards, effect sizes of g equal to 0.20, 0.50, and 0.80 were considered small, medium, and large, respectively (Cohen, 1988). Effect sizes indicating higher level of over-indebtedness in more impulsive individuals got a positive sign.

Calculation of effect sizes was based on means, standard deviations, p-values, and sample sizes of the groups. When studies did not provide raw data to calculate effect sizes and instead provided statistics (e.g., *t, p*), we applied transformation formulas to convert to g (Lipsey and Wilson, 2001). When an article reported $p < 0.05$ or n. s., we computed Hedges' *g* with *p*-values of 0.045 and 1 (one-tailed), respectively, which likely yielded a highly conservative estimate of the effect size.

The effect sizes were computed in ProMeta Version 2.1 (Internovi; version 3 is freely available on line at https://www.meta-analisi.it/prometa-software/). Random-effects models were used in all the analyses as they account for the amount of variance caused by differences between associations as well as differences among participants within associations. ProMeta also computes 95% confidence intervals (CI) around the point estimate of an effect size. The $Q$ and $I^2$ statistics were used to assess heterogeneity among studies. A significant $Q$ value indicates a lack of homogeneity of findings among studies (Cochran, 1954). $I^2$ values of 0.25, 0.50, and 0.75 correspond to low, moderate, and high between-study heterogeneity, respectively (Higgins et al., 2003).

The problem of publication bias (e.g., Rothstein, Sutton, and Borenstein, 2005), mostly due to the tendency of journals and authors to publish studies with positive results rather than those with negative or non-significant results, was estimated informally by using a funnel plot of effect size

against standard error for asymmetry and formally by using Begg and Mazumdar's rank correlations, and Egger's regression intercept test.

As the main aim of a meta-analysis is to aggregate overall data, we first run the analyses including the entire set of studies and then subsequently re-run them without potential outliers, to examine the impact of these specific studies. Potential outliers were excluded if they had statistically significant standardized residuals (Ellis, 2010).

Statistics reported in this meta-analysis conformed to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA; Moher et al., 2009) statement.

*2.5. Moderation analysis*

For each outcome we examined how the size of the association varied as a function of mean age (years), sex (% of women), country where the study was conducted, measure of over-indebtedness (debt holding vs. unmanageable debt), education (% of the sample with more of 13 years of education), measure of impulsivity (self-control vs. impulsivity), income (mean value), marital status (% of married), and work status (% of employed). A minimum of four studies for each subgroup was required for the moderation analysis.

Continuous moderators were evaluated using meta-regression (i.e., % of females, % of individuals with dependent children, % of individuals with more of 13 years of education, income, % of employed), while categorical moderators were entered as grouping variables in the effect size calculations. To have a comparable number of studies in each subgroup to reliably detect moderators' effects, mean age had to be recoded as $< 25$ years versus $\geq 25$ years (broadly referring to student vs non-student populations), and Country where the study was conducted had to be recoded as US- versus non-US countries.

## 3. Results

Table 1 discloses the specific measures that were used to extract effect sizes in the present meta-analysis.

Analysis of 17 studies (11814 respondents) showed a significant association between impulsivity and over-indebtedness ($g$ = .40, 95% *CI* (.28, .52), $p$ = .00000000003) in a heterogeneous set of

studies ($Q(16) = 137.9$, $p = .000000000000001$; $I^2 = 88.4$).

< Figure 2>

< Figure 3>

One potential outlier was identified (i.e., Omar et al. 2014).

Outlier exclusion reduced effect size ($g = .35$, 95% *CI* (.25, .46), $p = .0000000001$) but not heterogeneity ($Q(15) = 103.65$, $p = .000000000000002$; $I^2 = 85.53$). The evidence of publication bias remained significant after removal of the extreme outlier.

<Table 2>

*3.1. Moderation analysis*

As illustrated in Table 2, a significant moderator of the relationship was the measure of over-indebtedness that was examined (i.e., debt holding vs. unmanageable debt). The effect of impulsivity was stronger for studies that examined unmanageable debt ($g = .52$, 95% *CI* [.33, .71], $k = 11$, $n = 6901$) compared to those that had debt holding as the outcome ($g = .21$, 95% *CI* [.10, .32], $k = 6$, $n = 4913$).

As to continuous moderators, effect size varied on the basis of the percentage of employed individuals included in the sample ($\beta = -2.13$, $p = .004$), with studies including less unemployed participants showing a stronger association between impulsivity and debt (Fig. 4).

< Figure 4>

When the extreme outlier was removed from the analysis, the effect of impulsivity in increasing indebtedness was bigger in studies that had younger participants ($g = .47$, 95% *CI* [.32, .62], $k = 7$, $n = 2099$ for mean age < 25 years versus $g = .26$, 95% *CI* [.14, .38], $k = 7$, $n = 9374$ for mean age ≥ 25 years; $Q(1) = 4.69$, $p = .03$). Studies with older participants showed higher heterogeneity, $Q(7) =$

52.18; $p = .0001$; $I^2 = 86.59$.

After outlier exclusion, also the type of measure used to assess impulsivity became a significant moderator in the analysis $Q(1) = 4.54$, $p = .03$). Effects were stronger in studies that assessed self-control compared to those assessing impulsivity ($g = .51$, 95% *CI* [.30, .72], $k = 6$, $n = 2878$ and $g = .26$, 95% *CI* [.15, .36], $k = 10$, $n = 8750$, respectively).

Contrasting studies conducted in the United States (US) compared to those conducted in non-US countries yielded significant differences ($Q(1) = 7.65$, $p = .006$), with a stronger association between impulsivity and over-indebtedness in studies conducted in the United States ($g = .46$, 95% *CI* [0.26, 0.65], $k = 7$, $n = 2304$), compared with those conducted elsewhere ($g = .16$, 95% *CI* [0.07, 0.24], $k = 5$, $n = 8116$). It has to be noted, however, that only studies conducted in the United States showed substantial heterogeneity, $Q(6) = 29.17$; $p = .000004$; $I^2 = 79.43$.

The measure used to assess over-indebtedness and work status of participants remained significant moderators after exclusion of the extreme outlier ($Q(1) = 5.30$, $p = .021$ and $Q(1) = 10.13$, $p = .0014$, respectively).

## 4. Discussion

The 2008 financial crisis and the turmoil in the personal debt market underscored the need to better understand which consumers get into arrears and repayment difficulties and why their debt became unmanageable. This is because the possible effects of over-indebtedness have multiple negative impact on i) the consumers' well-being, in terms of reduced standard of living, social exclusion, physical and mental health; ii) the stability of the financial system, due to potential defaults in debt repayments; and iii) the society as a whole, in terms of reduced aggregate demand, employment, and growth. Several empirical studies in the field of economics have focused on the characteristics of individuals who are over-indebted or at risk of over-indebtedness, providing a comprehensive picture of the most vulnerable groups, which is mainly based on the analysis of socio-demographic and economic factors. More recently, interdisciplinary studies in the field of psychology and behavioral economics have also focused on the role played by personal attitudes on debt decision-making, suggesting that impulsivity plays a key role in consumers over-indebtedness since it pushes

consumers, at the time they have to decide whether to purchase on credit terms or not, to opt for immediate purchase.

In this meta-analysis, we investigated the association between impulsivity and over-indebtedness. Our hypothesis that impulsivity plays a significant role in consumers' over-indebtedness was supported by the data, suggesting a significant positive association between impulsivity and over-indebtedness of medium effect size.

This result is particularly relevant in the light of the fact that the vast majority of the empirical literature on over-indebtedness still focuses only on socio-demographic and economic determinants of financial fragility, and analyze debt on the basis of the traditional Life-Cycle Theory (Modigliani and Brumberg, 1954), which is based on the assumption that individuals make rational economic choices. On the contrary, individuals systematically deviate from the assumptions of *homo economicus* behind the Life-Cycle Theory (Modigliani and Brumberg 1954), and they may become over-indebted because of behaviors that conflict with traditional notions of economic rationality. The results of the present meta-analysis clearly indicate that ignoring the behavioral drivers of over-indebtedness may end up in an insufficient understanding of the phenomenon as well as in inadequate designing of policy measures to prevent and manage financial distress.

As to moderator analysis, impulsivity emerged to be more strongly associated with unmanageable debt (large effect size) compared to debt holding (medium effect size). From an economic viewpoint, consumer borrowing is seen positively to adjust fluctuations of income, address short-term liquidity problems, and give the possibility of improving lifestyle by smoothing consumption and making accessible expensive goods such a property. The problem arises when, irrespective of its causes, indebtedness turns into one where the debtor becomes unable to meet his/her contracted obligations so that indebtedness exceeds vis-à-vis the repayment capacity. This situation of persistent difficult and traumatic situations may be due to changes in circumstances that make the debt contracted no longer sustainable, but also to excessive levels of accumulated debt, and impulsivity is exactly one of the factors that may push consumers to borrow up to levels that are unsustainable on the basis of present or future earnings.

As to work status, the stronger association between impulsivity and over-indebtedness in employed compared to unemployed individuals may actually be due to the limited access to credit

granted to unemployed individuals since credit scoring procedures strongly relate the probability of loan rejection to the level of wage of the individual applying for personal debt (Fabbri and Padula, 2004; Ferri and Simon, 2000).

After removal of the potential outlier, effects were bigger in studies that a) were conducted in the US, b) had samples composed by younger participant, and c) measured impulsivity instead of self-focus. The first result is likely due to the wide diffusion of credit card in the US, which reached a total of 5.98 trillion dollars in 2016, with a growth rate of 7.4% from the previous year and an increase in the number of payments equal to 10.2%, mainly boosted by online shopping (Federal Reserve, 2017). Credit cards are the most relevant vehicle for impulsive consumptions. In fact, while the consequences of low self-control in spending are likely to affect behavior regardless of the form of payment, the characteristics of credit cards are such that they are psychologically different from other forms of debt (Prelec and Simester, 2001). Indeed, low self-control consumers tend to make disproportionate use of quick-access credit products close to point of purchases, such as in-store credit cards or mail order catalogue, which facilitate hyperconsumption and impulsive spending financed by debt (Bearden and Haws, 2012; Gathergood, 2012).

Second, the association between impulsivity and over-indebtedness was higher in adults younger than 25 years of age compared to older individuals. This result is consistent with studies underlying increased financial pressure on young adults, who have to borrow money for education and housing and end up with postponing their studies or holding unmanageable amount of debt (Jiang and Dunn, 2013; Montgomerie, 2013; Oksanen, Aaltonene, and Rantala, 2015). Besides, college students are often financially vulnerable due to their compulsive spending behavior, massive use of credit cards, and the habit of paying the minimum required payments therefore incurring in very high-interest balances (Pirog and Roberts, 2007). Growing concern about credit card debt has already led some colleges and universities to restrict on campus credit card marketing activity.

Lastly, measures that directly assess the presence of impulsivity instead of the lack of self-control are better detectors of risk factors for over-indebtedness, and this can potentially inform both future studies on this topic as well as prevention campaigns.

Surprisingly, sex was not a significant moderator in our analysis, despite existing studies in the field of psychology have highlighted that men engage in impulsive and risky behaviors more

frequently than women (Cross, Copping, and Campbell, 2011). Similarly, level of education does not seem to moderate the association between impulsivity and over-indebtedness. Unfortunately, financial literacy was not assessed by the studies examined in this meta-analysis; therefore, we opted for years of education as a proxy for financial knowledge, while indeed this is not always the case.

The association between impulsivity and over-indebtedness did not appear to be influenced by traditional socio-demographic and economic variables. This "null-result" is a result in itself, pointing to the fact that in the case of impulsive individuals, the traditional targets of policy interventions for preventing and dealing with over-indebtedness are likely to be ineffective.

*4.1. Implications*

Consumers with impulsivity problems are more likely to use forms of credit that facilitate impulse-driven purchases and to accumulate levels of debt that become unmanageable. Besides, these individuals are less capable to take corrective steps to improve their habits, despite knowing the dangers of over-indebtedness. Indeed, recent studies have highlighted that impatient individuals heavily discount the benefits of being financially literate (Gathergood, 2012; Ottaviani and Vandone, 2018) and are less likely to participate in credit counseling programs even though those programs are provided for free (Meier and Sprenger, 2013). Taken together, these results point to the urge for policy makers to set policy measures specifically tailored to impulsive individuals. For example, training programs aimed at strengthening people's self-control are proved to be helpful in reducing the urge to buy (Muraven, Baumeister, and Tice, 1999; Muraven, Tice, and Baumeister, 1998; Oaten and Cheng, 2007), although these results have not always been replicated (see for example Angel, 2018; Lee and Kemmelmeier, 2017). Besides, the benefits of using planning strategies to reach difficult financial goals and to put into place solutions designed to safeguard the financial future, were demonstrated to be effective in enhancing responsible decision making and raising awareness about behavioral patterns that may lead into excessive debt (Braunstein and Welch, 2002; Rabinovich and Webley, 2007). Notably, group cognitive behavioral therapy has been shown to be effective in reducing a specific behavior resulting from impulsiveness and potentially leading to over-indebtedness, i.e., compulsive buying (e.g., Muller, 2015; Muller and Mitchell, 2010).

On the part of lenders, policy makers may stress the need to adopt responsible lending measures to prevent consumers from holding excessive levels of debt. These measures may include appropriate scoring procedures, which account not only for repayment history but also for payment behaviors. Limited access to credit (e.g., quick-access consumer credit products) for consumers who exhibit impulsive problems may also restrain the over-indebtedness phenomenon.

*4.2. Limitations and recommendations for future research*

Several limitations need to be acknowledged. First, there was substantial heterogeneity across studies. To address this limitation random-effects models were used in the analyses. Nevertheless, there may be other important moderators that we did not consider. For example, studies that could not be included in the meta-analysis, highlight the potential role of other personal traits, such as risk attitude, self-esteem, and money attitude in debt-decision making (Henegar et al., 2013; Wang et al. 2011), as well as personality dimensions, like extraversion or neuroticism (Zainol et al., 2016). Besides, some studies measured over-indebtedness using a binary variable, and therefore had to be excluded (Choi and Laschever, 2018; Celsi et al., 2017; Gathergood, 2012; Gathergood and Weber, 2014, 2017; Mansfield, Pinto, and Parente, 2003). From a methodological point of view, it is relevant that future studies on this topic adopt relevant continuous measures, while limiting the use of indicator variables, in order to appreciate the economic significance of the estimated effects. Lastly, we did not include studies published in languages other than English. In light of these limitations it is important to note that a meta-analysis is only able to highlight some relations between a number of very restricted variables and present results do not intend to provide an exhaustive picture of this complex phenomenon.

Additional research in the field of consumer finance should focus on marketing strategies and loyalty programs specifically designed for quick-access credit products, and their impact on impulsive versus non-impulsive individuals. Besides, research should point out pros and cons of enriching credit scoring procedures with payment behaviors and personal traits, which is now technically possible by means of big data, artificial intelligence, and machine learning. Additional research in other domains of consumption may help to shed light on the impact of impulsivity in other dimensions of individual choices apart from consumption and borrowing decisions.

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**Table 1** Studies included in the meta-analysis and measures used to derive effect sizes.

| *Studies* | *n* | *Data collection year* | *Country* | *% Fem* | *Age* | *Income ($/year)* | *% > 13 Years Education* | *% Employ* | *% Marri* | *Impulsivity measure* | *Over-indebtedness measure* | *Correlation/Contrast* | *Hedges'g* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Achtziger et al., 2015 | 946 | - | Germ | 55.4 | 48.9 | - | - | 69.4 | 49.5 | Self-discipline subscale of the SCS (SC) | Ad-hoc questions[a] (Unmanageable) | $r$ = .065 | .13 |
| Anderloni et al., 2012 | 3102 | 15/9-30/9 2009 | Italy | 21.5 | 51.5 | 31,820 | 64.6 | 69.9 | 74.0 | BIS[b] (Imp) | Debt service to income ratio (Unmanageable) | $r$ = .037 | .07 |
| Bearden and Haws, 2012 | 173 | - | USA | 51.4 | 44.1 | 50,000 | - | 89 | - | CSSC scale (SC) | Ad-hoc questions[c] (Unmanageable) | $r$ = .38 | .82 |
| Beauchaine et al., 2017 | 544 | - | USA | 46 | 35.3 | 45,000 | - | 82.9 | - | SCS (SC) | At least one late credit card payment (Unmanageable) | $r$ = .28 | .58 |
| Boddington and Kemp, 1999 | 155 | - | - | 74.5 | - | - | - | - | - | Questions on impulsive buying (Imp) | Attitude to Debt Scale (Debt holding) | $r$ = .18 | .36 |
| De Matos et al., 2019 | 1245 | - | Brasil | 51 | 36.7 | 8,467 | 42 | 79 | - | 3-item measure[d] (Imp) | Ad-hoc questions[e] (Unmanageable) | $r$ = .15 | .30 |
| Goldsmith et al., 2015 | 594 | - | - | 56 | 21.3 | 17,800 | - | - | - | BSCS (SC) | Credit Overuse Concern Scale (Unmanageable) | $r$ = .21 | .43 |
| Ikeda and Kang, 2015 | 2386 | 21/10-27/10 2010 | Japan | 50.1 | 41.8 | 57,000 | 54.6 | - | - | Hyperbolic discounting (Imp) | Debt amount other than mortgages (Debt holding) | $r$ = .056 | .11 |
| Meier and Sprenger, 2010 | 541 | 2006-2007 | USA | 64 | 35.8 | 18,084 | 51 | - | - | Time preference (present-biased) in choice experiments (Imp) | Presence of Debt (Debt holding) | .45 ± 0.5 vs .39 ± .49 | .12 |
| Norvilitis et al., 2003 | 227 | Mid-spring 2000 | USA | - | 24 | 10,085 | - | 67 | - | DII (Imp) | Debt-to-income ratio (Unmanageable) | $r$ = .09 | .18 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Norvilitis et al., 2006 | 448 | - | USA | 75.7 | 20.5 | 7,892 | - | - | - | DGI (SC) | Possessing a credit card (Debt holding) | *r* = .23 | .47 |
| Norvitilis and MacLean, 2010 | 173 | - | USA | 77.5 | 23.1 | - | - | - | - | DGI (SC) | Problematic credit card usage (Unmanageable) | *r* = .37 | .79 |
| Omar et al., 2014 | 186 | - | Mala | 51.3 | 32.4 | 17,194 | 70.7 | 98.6 | - | Compulsive buying (Imp) | Credit card misuse (Unmanageable) | *r* = .53 | 1.24 |
| Ottaviani and Vandone, 2011 | 445 | 2009 | Italy | 21.8 | 43.0 | 59,555 | 55.2 | 86.5 | - | BIS (Imp) | Holding unsecured debt (Debt holding) | *r* = .11 | .23 |
| Peltier et al., 2013 | 205 | - | - | 48.0 | 20.0 | - | - | - | - | 5-item measure[f] (Imp) | Total credit card debt (Unmanageable) | *r* = .18 | .34 |
| Peltier et al., 2016 | 198 | - | USA | 49.5 | 19.2 | - | - | - | - | 6-item measure[g] (Imp) | Outstanding credit card balance (Unmanageable) | *r* = .17 | .36 |
| Pirog and Roberts, 2007 | 254 | Fall 2002 | - | 50.4 | 20.9 | 80,000 | - | - | - | CIS (Imp) | Credit card misuse (Unmanageable) | *r* = .37 | .79 |

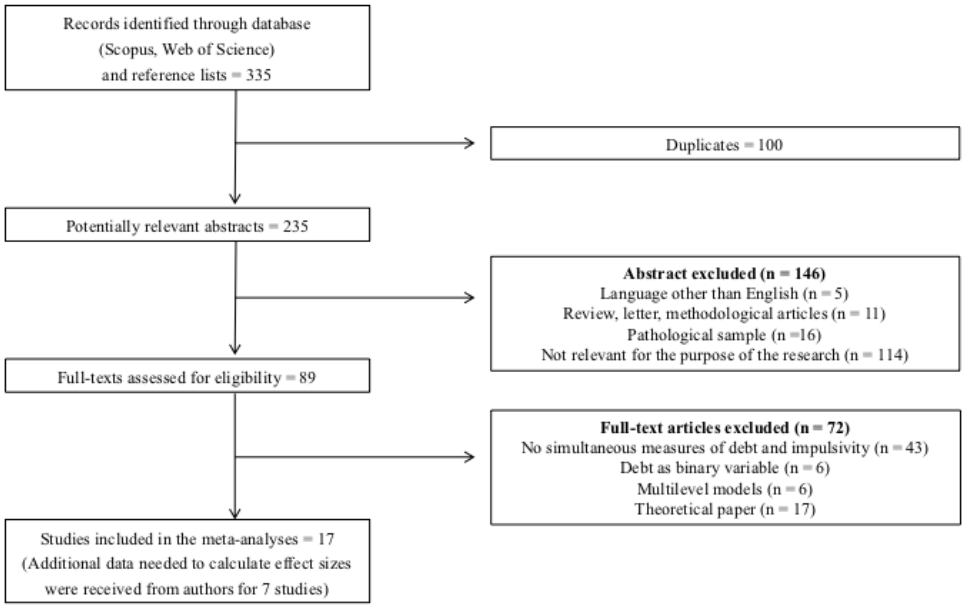
*Notes*. *n* = number of participants; Count = Country where the study was conducted; % Fem = percentage of females in the sample; % > 13 Years Education = percentage of participants with more than 13 years of education; % Employ = percentage of employed participants; % Marri = percentage of married participants; Germ = Germany; Malay = Malaysia; SC = Self-control; Imp = Impulsivity; Over = Over-indebtedness; SCS = Self Control Scale; BIS = Barratt Impulsiveness Scale; CSSC = Consumer Spending Self-Control; BSCS = Brief Self Control Scale; DII = Dickman's Impulsivity Inventory; DGI = Delaying Gratification Inventory; CIS. [a] "Disregarding possible real estate credits or loans, please calculate the sum of your current debt, including debt at banks, saving banks and companies (e.g. installment plans), and with friends and family members. If you are in debt please enter....Euros"; [b] score on a subset of questions; [c] Items regarding perception of levels of credit card debt ("I have a lot of credit card debt"; "I have too much credit card debt"); [d] Adapted from Rook and Fisher (1995) ; [e] Z-score on a subset of questions: [f] Adapted from Rook and Fisher (1995), Pirog and Roberts (2007), Nga, Yong and Sellappan (2011), Wang and Xiao (2009), and Peltier, Pomirleanu, Endres, and Markos (2013); [g] Adapted from Rook and Fisher (1995), Pirog and Roberts (2007), Nga, Yong and Sellappan (2011) and Wang and Xiao (2009)

**Table 2**

*Impulsivity and debt/over-indebtedness in different subgroups*

| | | | Random-effects model | Heterogeneity | | Test of difference | |
|---|---|---|---|---|---|---|---|
| | *k* | *N* | *g* (95% CI) | *Q* | $I^2$ | *Q* | *p* |
| **Age (years)** | | | | | | 1.34 | 0.25 |
| < 25 years | 7 | 2099 | .47 (.32, .62)** | 15.85* | 62.15 | | |
| ≥ 25 years | 9 | 9560 | .35 (.20, .50)** | 90.01** | 91.11 | | |
| **Country** | | | | | | 1.99 | 0.15 |
| US | 7 | 2304 | .46 (.26, .65)** | 29.17** | 79.43 | | |
| Non-US | 6 | 8302 | .28 (.12, .43)* | 52.93** | 90.55 | | |
| **Measure of debt** | | | | | | 7.63 | 0.01 |
| Debt | 6 | 4913 | .21 (.10, .32)** | 14.01* | 64.30 | | |
| Unmanageable debt | 11 | 6901 | .52 (.33, .71)** | 114.28** | 91.25 | | |
| **Measure of impulsivity** | | | | | | 1.88 | 0.17 |
| Impulsivity | 11 | 8936 | .34 (.20, .47)** | 78.97** | 87.34 | | |
| Self-control | 6 | 2878 | .51 (.30, .72)** | 34.07** | 85.33 | | |

*Note*. Moderation analyses are presented for the full set of studies including potential outliers (see the Results section for moderation results that changed after outlier's exclusion). Due to differences in the number of studies, % Caucasians had to be specifically re-coded for each outcome as indicated in the table. *k* = number of studies; *n* = number of participants; *g* = Hedges' *g* effect size; CI = Confidence Interval; *Q*, $I^2$ = heterogeneity statistics. *Q* = contrast between (sub)sets of studies. * p < .05; ** p < .0001.

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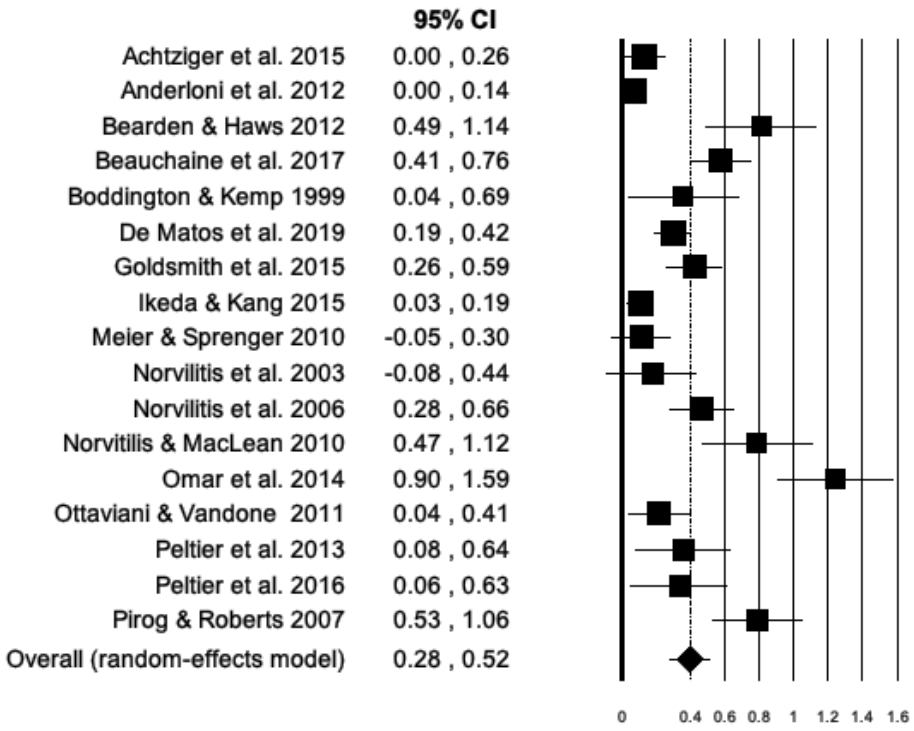


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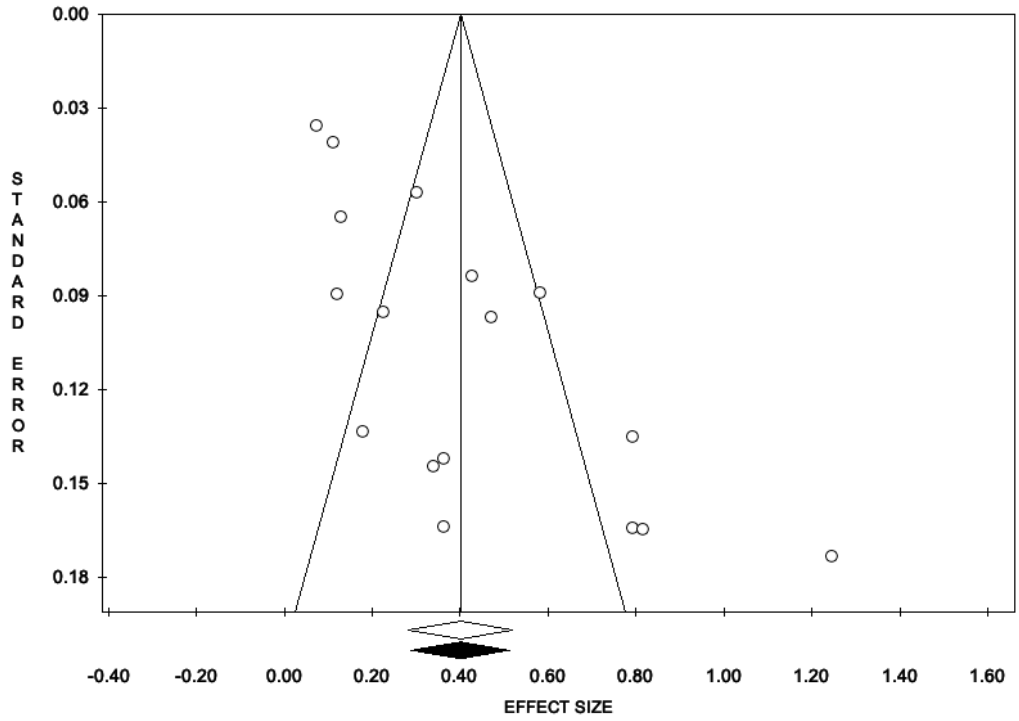


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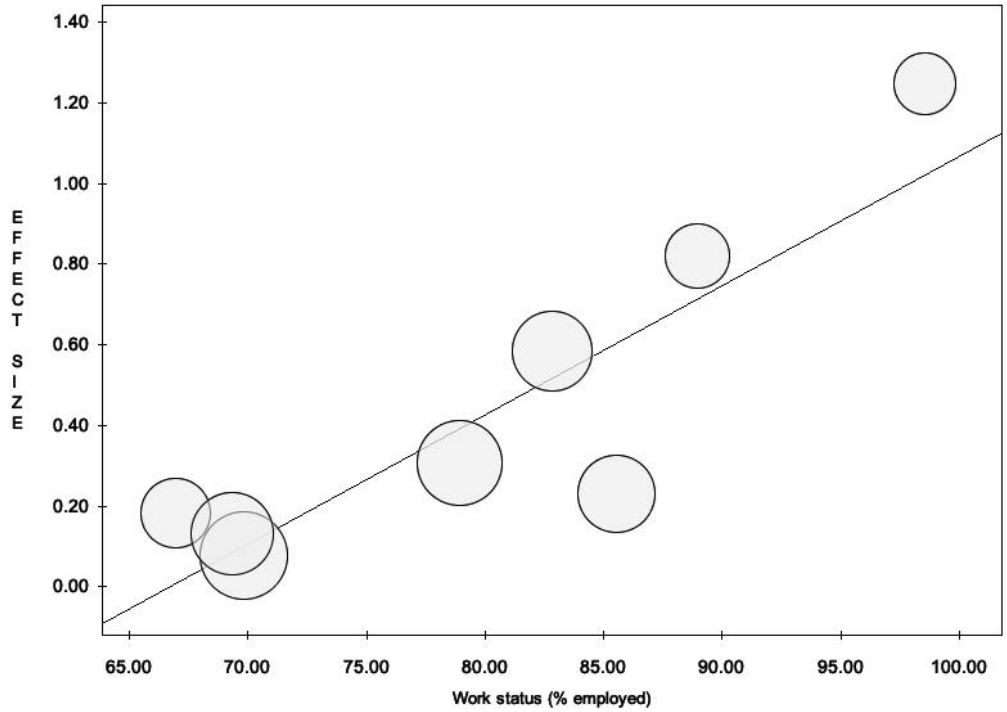


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