Variations on children's performance on the marshmallow test across age, socioeconomic status, ethnicity and body mass index

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Abstract

Better self-regulatory competency in children had been closely linked with better academic performance, better adjustment, and the ability to cope with frustration and stress, among many others. Self-regulation among (N=159) preschoolers aged 41.0 to 84.9 months of various socioeconomic and ethnic backgrounds living in the Netherlands, the Philippines and United Arab Emirates were evaluated using W. Mischel's marshmallow test. Although significant difference on the performance on the marshmallow test was detected on age and income, there were no significant differences across ethnic backgrounds, income-to-needs ratio and body mass index (BMI). Correlation between performance on the test and Hofstede's indulgence index and ethnicity was also found to be significant. Pertinent policy implications of these findings were thoroughly presented towards the end of this paper.

Keywords: Self-regulation, age, income, ethnicity, and body mass index (BMI)

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"*Good things come to those who wait!*"

- The Guy Smiley Singers
of Sesame Street

I. Introduction

The importance of self-regulation in children stems from its predictive power in foretelling better SAT scores and better aptitude to manage frustrations and stress in adolescence as Shoda, Mischel, and Peake (1990) and Mischel, Shoda, and Rodriguez (1989) reported. Its significance lies in its correlation with fewer incidence of psychopathology, higher self-esteem, reduced binge eating and abuse of alcohol, better relationships and relational skills, and more secure attachment (Tangney, Baumeister, and Boone, 2004). Early childhood scholars and academicians also recognize the notion that self-regulatory skills are important and a vital building block of academic success (Blair, 2002; Raver, 2002; and Wenzel, 1991).

It is for these reasons that I seek to investigate whether there are significant differences between and among children of various socioeconomic and ethnic backgrounds on their performance on the marshmallow test that was first developed in the early 1970s (Mischel, Ebessen, and Zeiss, 1972). Income and income-to-needs ratio shall be used to differentiate socioeconomic status of children who participated in this study.

Moreover, I will also look into the effect of age on self-regulation. Children aged three and a half to seven years were recruited from various schools in the Netherlands, the Philippines and United Arab Emirates.

Ethnicity of children, being Southeast Asian, Middle Easterner or South Asian, was considered in this study. This study shall also relate the performance of children on the marshmallow test to Hofstede's findings in terms of indulgence-restraint index, one of the six dimensions of culture (http://geert-hofstede.com, 2016). It will be interesting to see the kind of relationship between performance on a self-regulation test and a measure of cultural restraint of an entire society.

This also seeks to understand whether a child's body mass index (BMI) is correlated with her performance on the marshmallow test.

II. Theory

The classic marshmallow test, a measure of self-regulation that uses the delay of gratification paradigm (Mischel, Shoda, and Rodriguez, 1989), lets preschoolers choose between enjoying an immediate but a less preferred reward (one marshmallow) and waiting indefinitely for a more preferred reward (two marshmallows).

The original set-up administered by Mischel and colleagues (1972) includes four scenarios with two major features: whether the rewards were exposed or obscured; and whether or not ideas were given on what to think in order to achieve longer time in delaying gratification. Among the four scenarios, delay time significantly predicts SAT scores, self-regulatory and coping competence in the group in which the reward is exposed and no ideas are presented to the subject (Zeiss and Mischel, 1982).

Children's self-regulation is the capacity to manage their behavior, emotions, and attention, both voluntarily and adaptively (Li-Grining, 2012). Years ago, the National Scientific Council on the Developing Child distinctly saw its importance in the academic life of children as evident in the following lines:

> "Children clearly need the social and emotional capabilities that enable them to sit still in a classroom, pay attention, and get along with their classmates just as much as they need the cognitive skills required to master the reading and math concepts taught in kindergarten" (As cited by Evans and Rosenbaum, 2008, p. 504).

The critical importance and relevance of self-regulation motivated researchers such as Mischel and Mischel (1983), Holtz and Lehman (1995), and Gibson, Sullivan, Jones and Piquero (2010) to make further studies on the development of children's knowledge of self-control. Other researchers investigated the relationship between self-regulation and obesity (Herman and Polivy, 2011), self-regulation and well-being (Hofer, Busch and Kartner, 2010), and self-regulation and academic achievement (McClelland and Cameron, 2011).

Self-control and self-regulation are considered critical topics because of their role, especially when they are dysfunctional, in crime causation (Wikstrom and Treiber, 2007) and addiction (Wills, Pokhrel, Morehouse, and Fenster, 2011).

Self-regulation and income

Academicians concur that self-regulation is influenced by environmental factors like poverty and parenting practices (Li-Grining, 2012).

Less affluent children show less self-regulation skills compared to their more affluent counterparts (Evans and Rosenbaum, 2008, Galindo and Fuller, 2010; Sektnan, McClelland, Acock and Morrison, 2010).

It is logical to assert that poverty causes poverty-related stressors that strain the child. These chronic stresses take a toll on the prefrontal cortex, the area of the brain associated with self-regulatory behavior (Lupein et. al., 2006; McEwen, 2002). Children with deficient self-regulatory capacities are more likely to have poorer academic performance, less social skills and greater behavioral problems (Blair and Razza, 2007; Espy, Sheffield, and Weibe, Clark, and Moehr, 2011). Noble, Norman and Farah (2005), for example, studied five neurocognitive systems of children from various socioeconomic backgrounds.

Using these findings, it is expected to see parallel result in this study where children belonging to families with lower income will have lesser waiting or delay time on the marshmallow test compared to their richer counterparts.

Children's academic achievement is almost impossible to untangle with income and self-regulation. This is clearly established by Gary Evans and Jennifer Rosenbaum (2008, p. 511) who found out that self-regulation "mediates the prospective relationship" between income and cognitive development. This finding supports an earlier study by Noble, Norman, and Farah (2005) who asserted that socioeconomic status is strongly linked with a child's cognitive ability and achievement that extends beyond childhood.

Compared to children of higher income families, poor children's weak performance in school is also attributed to limited access to educational resources such as books and educational toys, and to learning opportunities thereby adversely affecting their academic performance (Bradley and Corwyn, 2002, Bradley et al., 2001, Evans, 2004, Gershoff et al., 2007, McLoyd, 1998 and Yeung, Linver and Brooks-Gunn, 2002). However, as will be discussed later, it is more complex than simply ascribing poor academic performance to limited access to those resources and opportunities.

Disparity in academic performance of children from various socioeconomic statuses measured in income-to-needs ratio points not only towards the income-achievement gap but also to children's deficient self-regulation capacities (Evans and Rosenbaum, 2008).

Evans and Rosenbaum (2008) widen the area of analysis of underlying causes of widespread income-achievement gap by incorporating in their study the child's self-regulatory capacities. They assert that parental investment in the form of providing more academically nurturing environment for children, which is a function of income, only partially explains the income-achievement gap. Parental investment includes time spent by parents talking to their children and the provision of environment and resources that encourage learning and stimulates cognitive processes among children (Evans and Rosenbaum, 2008). Their study has shown that low-income children find it more difficult to regulate emotions and behavior compared to their wealthier counterparts, thereby contributing to income-achievement gap. Aside from cognitive competencies, academic achievement is also a function of emotional

capacity that enables them to behave well, listen and pay attention in class (Evans and Rosenbaum, 2008).

The lower the income of a family, the more likely a child in that family will face difficulty in delayed gratification and lower grades in Math and English. In the same paper, Evans and Rosenbaum (2008) gave empirical support to claims that self-regulation predicts grades of children while controlling for net maternal education, single parent status, child gender or ethnicity, and income. They note that one's capacity to sustain effort without immediate reward, to deliberately focus or shift attention, to control emotions, and to restrain pre-potent behavior when necessary are a few of the required skills to prevail in learning environments (Evans and Rosenbaum, 2008).

All these previous research support my hypothesis in this study that less affluent children, based on income and income-to-needs ratio, will have poorer performance on the marshmallow test compared to their more affluent counterparts.

Self-regulation and age

Children improve self-control over age. For example, infants aged 12 to 18 months learn to gain control and by the time they reach 24 months they attain self-control (Kochanska, Coy, and Murray, 2001). It is therefore logical to hypothesize that as children grow older, they perform better on the marshmallow test. I expect to find that older children will perform better on the marshmallow test compared to their younger counterparts.

Self-regulation and ethnic and cultural variation

In a study on the effect of gender and ethnicity on willingness to delay gratification of college students, Héfer Bembenutty (2007) similarly found significant ethnic differences in delay of gratification. Bembenutty (2007) used Caucasian and minority as main ethnic groups. Based on Bembenutty's (2007) research it is possible that I will also find, in this study, significant ethnic differences in delay gratification.

It is however interesting to note that Li-Grining (2007) and Sektnan, McClelland, Acock and Morrison (2010) found no significant difference in self-regulation capacities of preschoolers across various racial and ethnic groups. Li-Grinning (2007) categorized ethnicity as being European, African or Latino while Sektnan, McClelland, Acock and Morrison (2010) classified their subjects into whether or not the subjects have ethnic minority status. These suggest that I might get the same results in this study as these researchers did and find no significant differences in self-regulation across ethnic groups.

Keeping in mind the different findings on the relationship between self-regulation and ethnicity, my hypothesis is that I would not find significant differences in the performance on the marshmallow test between and among the ethnic groups because, unlike Bembenutty (2007), Aikens, Coleman, and Barbarin, (2008), Li-Grining (2007) and Sektnan, McClelland, Acock and Morrison (2010) the ethnic groupings that I used in this study are not significantly correlated with socio-economic status like being white or minority and Caucasian or non-white.

On the basis of cultural variation, it is perhaps rational to look next into the cultural aspects of ethnic groupings by relating them with Professor Geert Hofstede's six cultural dimensions that are a product of extensive studies of how values in the workplace are influenced by culture (http://geert-hofstede.com, 2016). One of the cultural dimensions, the indulgence index, can easily be related to self-restraint or self-regulation.

Hofstede Center's website (https://geert-hofstede.com, 2016) explains "cultural dimensions represent independent preferences for one state of affairs over another that distinguish countries (rather than individuals) from each other." Indulgence versus restraint index (IND) either "allows relatively free gratification of basic and natural human drives related to enjoying life and having fun" or "suppresses gratification of needs and regulates it by means of strict social norms" (http://geert-hofstede.com, 2016).

In essence, it is rational to assume that a society with high restraint index would have individuals who are expected to perform well on tests that measure self-restraint or self-regulation.

In comparing various countries' scores on indulgence index, it is noted that indulgence scores are high in Latin America, parts of Africa, the Anglo world and Nordic Europe while East Asia, South Asia, Eastern Europe and the Muslim world lie on the other end of the spectrum (http://geert-hofstede.com, 2016).

The indulgence index of the Netherlands and the Philippines for instance is 68 and 42, respectively. India, Pakistan and Egypt, on the other hand, have lower indulgence index of 26, 0, and 4, respectively (https://geert-hofstede.com/countries.html, 2016). A complete list of indulgence score of countries, taken from the Hofstede Center website, is attached as Appendix A.

The Geert Center website (2016) explains that countries with very low indulgence index score is said to be a society that is restrained. Societies with a low indulgence index score have the propensity for cynicism and pessimism while these societies tend to restrain their desires and disregard emphasis on leisure time (https://geert-hofstede.com/countries.html, 2016).

Based on the above studies, I hypothesize that I will find significantly longer waiting times for Middle Eastern and South Asian ethnic groups compared to their Southeast Asian counterparts.

Self-regulation and Body Mass Index (BMI)

Body Mass Index (BMI) is defined as the "weight in kilograms divided by the square of height in meters [kg/m2]" (Looney, Spence, and Raynor, 2011).

It has been established that there is a link between BMI and self-regulation as Herman and Polivy (2011, p. 38) investigates "how self-regulation might provide a solution to the obesity epidemic, and how failures of self-regulation may be part of the cause of the problem." They propose that self-regulation is key to many of the suggested solutions to the epidemic.

In a related study, Hughes, Power, O'Connor and Fischer (2015) found that eating while not hungry is positively correlated with delay of gratification.

My hypothesis is that BMI is significantly correlated with the waiting time on the marshmallow test and that children who have higher BMI will have the tendency to have shorter waiting time compared to those with lower BMI.

III. Methodology

The experiment design was patterned after Mischel, Ebessen, and Zeiss (1972) classic marshmallow test experimental design.

A total of 159 children participated in the experiment living in the following countries:

- The Philippines (61);
- United Arab Emirates (83); and
- The Netherlands (15).

In the Philippines, students from the University of the Philippines' Child Development Center (UP-CDC) and Child Care Center (UP-PAUW) located in Metro Manila participated in the experiment. Other participants were from Albert Einstein School (AES) and Cotabato City Central Pilot Elementary School (CCCPES) both in Cotabato City, located approximately 1,300 kilometers south of Metro Manila.

The experiments were conducted on 2-4 March 2016 in Cotabato City and on 8-10 and 14 March 2016 in Manila. A total of 8 subjects from the Philippines were disqualified because they either did not understand the instructions (4 subjects); cried due to fear of abandonment (2 subjects); or left the room because they want to use the toilet (2 subjects).

In United Arab Emirates, all of the 83 children who took the marshmallow test were students of Deira International School in Dubai, UAE. The tests were administered on 2-3 and on 10-11 May 2016. Deira International School is a

prestigious international school in Dubai. Two participants from Dubai were disqualified because the first refused to cooperate to take the marshmallow test while the other failed to understand the instructions.

In the Netherlands, preschoolers from Letterland Primary School located in Almere participated in the experiment. Data were gathered on 26 May and 3 June 2016. Three were disqualified because the first two refused to be left with the experimenter and the last one could not understand and follow instructions.

A. Sampling

Getting the school administrators to agree to have preschoolers undergo the marshmallow test was the first challenge in the data gathering process. Numerous schools in the Philippines, the Netherlands and United Arab Emirates were initially contacted via email. Others were also phoned to follow-up on the email sent, inviting them to participate in the marshmallow experiment. Appendix B lists down the schools that were contacted per country for this purpose. In the Netherlands and UAE, only one school participated from each country from among the total 47 schools contacted.

Because the experiment involved children who cannot yet make informed decisions, consent of their parents, legal guardian or custodial parent is necessary. A proper introduction letter from the experimenter was attached to the consent form along with the questionnaires that were distributed by the school administrators to the respective parents or guardians of the preschoolers.

The sample introduction letter, consent form and questionnaire are presented in Appendix C.

Prior to the conduct of the experiment, the Erasmus Research Institute of Management (ERIM) Ethics Board has approved of the conduct of this study in the Netherlands involving preschoolers. The ethics code was 2016/02/11-05483wve. This assures that certain rigorous ethical standards shall be followed in the conduct of experiment involving children to ensure protection of privacy and identities of the children participating in this study as well as non-authorized use and non-transfer of information to other entities.

All students of the schools that agreed to participate were seen as prospective subjects so their parents or guardians were sent the introduction letter, consent form and questionnaire.

However, because the study involved income and parental educational background, information that was sensitive for some people, some parents declined to participate in the study.

B. Design and Procedure

The parents submitted the accomplished questionnaire and consent forms to the school administration. Only children whose parents gave their consent to have their children undergo the test were included in this study.

Prior to the conduct of the experiment, the experimenter met first with the subjects in batches of not more than 30 in one room in the presence of other teachers. The experimenter was introduced as a guest teacher to the students. The experimenter established rapport with the subjects by asking about their favorite colors, animals and toys. They were also asked about whether they have pets at home and to share their stories of their pets. The experimenter, at the same time, also shared his stories as well as his favorite colors, animals and toys.

Only after the getting-to-know-you meet up could the conduct of experiment begin. Each child was individually (one at a time) taken from their classes and brought to the experiment room. In the room, the experimenter explained the mechanics of the test using the following standard script:

> "*Here's the deal: if you will wait for me to come back to this room without eating that (points to either a marshmallow or a gummy bear), you will have two of that when I come back. If you cannot wait for me by either eating the marshmallow/gummy bear or ringing the bell, you'll only get one marshmallow/gummy bear instead of two."*

To ensure that the subjects understood the instructions, the experimenter quizzed the subject by asking:

> *"How many marshmallows/gummy bears do you get if you will wait for me without eating the marshmallow or the gummy bear? How many marshmallow/gummy bear will you get if you cannot wait for me by eating the marshmallow/gummy bear or ringing the bell? If you want to call me back to the room, what would you do? Can you try ringing the bell to check whether it is working well?"*

Marshmallows were used in the Philippines and United Arab Emirates while gummy bears were used in the Netherlands because the school psychologist thought that their students are more familiar with gummy bears than marshmallows. School administrators of the school in Dubai requested that marshmallow to be used in the experiment should be *halal* to conform to Islamic standards so that Muslim students can also participate in the experiment. Some parents

requested a vegetarian marshmallow for their child because they are vegetarian.

The experiments were conducted in a private room with the least distraction available inside each respective school. The room was usually an office of one of the administrators of the school. The subject was alone in the room, and cannot be disturbed while the experiment was being conducted. A discreet and inconspicuous camera phone was set up in the room to monitor the subject's behavior from the time the experimenter leaves the room. The camera in the room was connected to another device via Skype for monitoring.

The slow and bad Internet connection in the Philippines made it more difficult to monitor the behavior of the subjects in Cotabato City and Manila. To remedy the situation, the experimenter recorded the experiment, but to ensure privacy of the subjects, the video recordings were deleted immediately after their review and observations have been recorded in the questionnaire forms.

After each experiment, the experimenter takes the weight and height of the subject, and then escorts her back to her classroom.

The maximum waiting time was set at 15 minutes or 900 seconds. The experiment is terminated after the subject has successfully waited for 15 minutes even though she is still willing to wait longer, consistent with Mischel, et. al. (1972) classic marshmallow test.

C. Variables and Statistical Techniques

Waiting time, measured in seconds, is the amount of time preschoolers are willing to inhibit behavior in order to enjoy a greater reward.

Independent variables gathered for the purpose of this research are the following: age in months, monthly family income, number of siblings, ethnicity, weight and height.

The following variables are derived or computed using the information given in the questionnaires:

1. Family income in USD

   Monthly family income in dollars were generated using the declared family income of the parents multiplied by the average exchange rate from 1 January to 31 May 2016 between the currency and US dollar (USD). The average exchange rate between the Philippine peso (PHP) to USD is 0.0212940590, United Arab

Emirates dirham (AED) to USD is 0.272264276, and Euro to USD is 1.114770553 (all from x-rates.com, 2016).

2. Income-to-Needs Ratio

   The definition of income-to-needs ratio by McCloyd, (as cited by Noble, Norman, and Farah, 2005, p. 76) – "the total family income divided by the official poverty threshold for a family that size," – was used in generating them. Family size was computed by adding three to the number of siblings in the questionnaire form to account for the father, mother and the child taking the marshmallow test.

   The poverty threshold for the respective countries was used as a benchmark for the needs component of the income-to-needs ratio. The data for the Philippines were obtained from the National Statistical Coordinating Board's www.nscb.gov.ph, an official website of the Philippine Statistics Authority, which has information on the annual poverty threshold for 2012 per region. The amount was adjusted using the inflation rate obtained from the same website to approximate the amount for 2016. The amount was then converted to USD using the average exchange rate between the currency and USD from 1 January to 31 May 2016 (x-rates.com, 2016).

   The poverty threshold for United Arab Emirates was obtained from www.thepovertyline.net/uae, adjusted for inflation and then converted to dollar.

   Poverty threshold for the Netherlands was sourced from DutchNews.nl (2014), also adjusted for inflation, then converted to dollar.

3. Body Mass Index (BMI)

   Body mass index was computed using the website of WebMD.com (2016). The site takes into account gender, exact age (birthdate), weight, and height of children in computing the BMI. It also includes a description of the BMI classifying them as either underweight, normal, overweight, or obese. Anyone can compute the BMI of any child by keying in required information in this url:

   http://www.webmd.com/parenting/raising-fit-kids/weight/bmi/bmi-calculator

4. Ethnicity

   Because there are very few East Asians, Whites, Africans and Latin Americans, only Southeast Asians, South Asians (mostly Indians),

and Middle Easterners will be included in the analysis on ethnicity. Ethnicity is based on the parent's belief of their children's ethnicity. To simplify classification of ethnicity of children of inter-racial couples, the father's ethnicity is used as the basis of child's ethnicity.

It must be noted that nationality does not necessarily correspond to ethnicity since a child, for example, may be a Canadian national but identified as ethnic Chinese. Nationalities represented in this study are the Philippines (62), India (23), Jordan (11), UAE (9), Egypt (7), Pakistan (7), USA (5), Canada (4), China (3), Eritrea (3), Syria (3), Palestine (2), South Africa (2), Bahrain (2), Belorussia (1), Britain (1), Finland (1), France (1), Germany (1), Iraq (1), Kazakhstan (1), Lebanon (1), Mozambique (1), Norway (1), Romania (1), Singapore (1), South Korea (1), Turkey (1), Ukraine (1), and Venezuela (1).

In the conduct of analysis, general descriptive statistics is first made to see the overall behavior of data gathered. Second, tests of correlations shall be performed to study links between and among variables. Finally, while t-tests are only appropriate for comparing two independent samples, this study compares more than two independent samples necessitating the use of analysis of variance (ANOVA) with a significance level of 5%.

SPSS will be used in all statistical analyses relevant to this study.

IV. Results

Waiting time is significantly (Pearson) correlated with age ($p=0.01$) and income in US dollar ($p=0.046$). Using analysis of variance (Anova), it is found that age in months and income in US dollar are both significant (both $p=0.01$) covariates of waiting time. Income-to-needs ratio and BMI score are found not to be significant covariates of waiting time.

Mean waiting time from the following data source or data collected from the Netherlands ($M=587.13$; $SD=384.17$), the Philippines ($M=372.75$; $SD=294.84$) and UAE ($M=452.16$; $SD=372.5$) are not significantly different from each other. The following ethnic groups: Southeast Asian ($M=385.12$; $SD=296.42$), South Asians ($M=503.60$; $SD=393.14$), and Middle Easterners ($M=419.32$; $SD=363.80$) are not significant fixed factors of waiting time. Mean waiting time across BMI classification such as underweight ($M=406.93$; $SD=368.02$), normal ($M=425.78$; $SD=361.94$), overweight ($M=494.06$; $SD=342.52$) and obese ($M=470.42$; $SD=267.31$) is also not significantly different from each other.

Income in US dollar is significantly (Pearson) correlated with waiting time (p=0.046), ethnicity (p=0.01), BMI class (p=0.043), and data source or data collected from the Philippines, the Netherlands and United Arab Emirates (p=0.01).

The mean income in US dollar is found to be significantly different (p=0.01) from each of the data gathered from the Netherlands (M=4,773.24; SD=867.55), the Philippines (M=1,250.03; SD=865.18) and United Arab Emirates (M=12,635.86; SD=5265.86). It is also found to be significantly different (p=0.016) across BMI classification such as underweight (M=6,608.75; SD=7,477.39), normal weight (M=8,354.23; SD=6,609.83), overweight (M=6,769.9; SD=6,429.25) and obese (M=2,697.52; SD=3,482.94). Ethnic groups composed of Southeast Asian (M=1,791.49; SD=2,760.58), South Asian (M=9,866.02; SD=4605.83) and Middle Eastern (M=13,885.48; SD=5,757.07) have significantly different (p=0.01) mean income in US dollar.

Income-to-needs ratio is significantly (Pearson) correlated with ethnicity (p=0.01), BMI classification (p=0.013) and data source or data collected from the Netherlands, the Philippines and United Arab Emirates (p=0.01).

Mean income-to-needs ratio is found to be significantly different (p=0.01) across ethnic groups such as Southeast Asian (M=6.54; SD=4.53), South Asian (M=3.59; SD=1.34) and Middle Eastern (M=4.23; SD=2.05). There are also significant differences (p=0.01) in the mean income-to-needs ratio of those gathered from the Netherlands (M=2.36; SD=0.52), the Philippines (M=6.8; SD=4.58), and United Arab Emirates (M=4.03; SD=1.73).

Age in months is significantly correlated with ethnicity (p=0.01), BMI score (p=0.013), BMI classification (p=0.043) and data source or data collected from the Netherlands, the Philippines or United Arab Emirates (p=0.01).

Using analysis of variance, both ethnicity (p=0.01) and BMI classification (p=0.032) are found to be significant fixed factors of age in months as dependent variable. The independent t-test reveals that although the mean age of subjects is not found to be significantly different (p=0.64) between Southeast Asia and the South Asia, the mean age of Middle Easterners (M=62.28; SD=9.87) subjects is found to be both significantly different (both p=0.01) from Southeast Asians (M=67.98; SD=9.84) and South Asians (68.91; SD=9.88).

The following BMI classifications are a significant fixed factor of age as dependent variable: underweight (M=66.56; SD=10.98), normal (M=64.82; SD=9.58), overweight (M=67.14; SD=11.32), and obese (M=72.02; SD=9.49). Significant differences in mean age of subjects are likewise detected across data source or data collected from the Netherlands (M=76.74; SD=3.91), the Philippines (M=67.33; SD=9.76) and United Arab Emirates (M=63.55; SD=9.98).

Hofestede's indulgence index is found to be significantly (Pearson) correlated with ethnicity (p=.01). Ethnicity is also found to be a significant fixed factor (p=.01) of Hofstede's indulgence index as dependent variable namely Southeast Asia (M=43.05; SD=5.68), South Asian (M=29.95, SD=21.59) and Middle East (M=31.45, SD=23.96).

BMI score is significantly (Pearson) correlated with age in months (p=0.013) and data source or data collected from the Netherlands, the Philippines, and United Arab Emirates (p=0.037). The mean BMI scores of Southeast Asians and Middle Easterners are not significantly different from each other (p=0.116 assumed equal variances and p=0.054 not equal variances assumed). However, t-tests show that the mean BMI scores of South Asians (M=14.66; SD=1.68) are significantly different from Southeast Asians (M=17.58; SD=8.20; p=0.029 assumed equal variances and p=0.01 equal variances not assumed) and Middle Easterners (M=15.52; SD=1.71; both p=0.026 for assumed and not assumed equal variances). Data source or data collected from the Netherlands (M=13.85; SD=1.62), the Philippines (M=17.54; SD=1.62) and United Arab Emirates (M=15.52; SD=2.16) is a significant fixed factor (p=0.026) of BMI scores as dependent variable.

V. Discussion

Self-regulation and income

It is expected, right from the start, that income makes a difference in a child's self-regulation capacities. The significant differences in performance in the marshmallow test among income groups found in this study support earlier findings of Evans and Rosenbaum (2008), Galindo and Fuller (2010), and Sektnan, McClelland, Acock and Morrison (2010).

It is, however, important to note that although income is found to be significant, the income-to-needs ratio is not a significant variable when it comes to affecting performance on the marshmallow test. This is perhaps due to the heterogeneity of the data as evidenced by the significant difference in the income-to-needs ratio between and among the data collected from the Netherlands (M=2.3645, SD=0.51789), the Philippines (M=6.7970, SD=4.58456), and United Arab Emirates (M=4.0280, SD=1.73382). The discrepancy in the income-to-needs ratio between these countries is expected due to their disparities in terms of income inequality (CIA World Factbook website, 2016). The Gini index, a measure of income inequality, of the Philippines is higher compared to United Arab Emirates and the Netherlands (CIA World Factbook, 2016). The income-to-needs ratio gathered from those countries very well reflects the difference in the Gini index between and among them. It may also be explained by the significant differences in income-to-needs ratio across ethnic groups.

Another explanation why the income-to-needs ratio is not a statistically significant covariate of waiting time is due to significantly lower mean income-to-needs ratio for the Netherlands compared to the two other countries (the Philippines and UAE) while its mean waiting time is considerably higher than the other two. One more important consideration is the huge disparities in the number of subjects in each group (the Netherlands, n=15; vs. the Philippines n=61 and UAE, n=83).

Nonetheless it is remarkable that income (converted to USD) is found to be a significant covariate of the dependent variable delay time. In terms of parental investment, this reinforces claims that wealthier families can provide their children with an environment that is conducive to the development of her cognitive and other faculties (Bradley and Corwyn, 2002, Bradley et al., 2001, Evans, 2004, Gershoff et al., 2007, McLoyd, 1998 and Yeung, Linver and Brooks-Gunn, 2002).

From a neurological perspective, it strengthens the assertions made by some scholars that chronic poverty-related stressors burden the prefrontal cortex, the area of the brain associated with self-regulatory behavior (Lupein et. al., 2006; McEwen, 2002), leaving little resources for the brain to make better judgment and decisions, hence low self-regulation capacity.

This finding in effect suggests that children who are born poor face more challenges to be able to perform better in school, manage relationships better and become more successful in life relative to their wealthier counterparts. Consequently, this explains, albeit partly, the vicious cycle of poverty which "takes many forms, since the attribute of poverty which makes escape difficult may be poor health, lack of skill, lack of self- confidence or support mechanisms, remoteness from markets and institutions, social exclusion, lack of physical assets or borrowing power, or combinations of the above" (Mosley, and Verschoor, 2005, p. 60). The lack of skill probably most corresponds to having low self-regulation capacity, that is, unfortunately perpetuated by poverty itself.

Significant differences in income is expected across data gathered from the Netherlands, the Philippines, and United Arab Emirates because of the huge disparities in the per capita GDP among these countries (CIA World Factbook website, 2016)

Using the findings of this study on income and self-regulation, it is recommended that education policy makers take into account children's self–regulation capacity, which is correlated with income. More often than not, it is easier for policy makers to only look at the income-achievement gap, ignore other factors, and purely ascribe poor academic performance of children to inadequate cognitive skills building, effectively overlooking the impact of children's self-regulation and other capacity on their academic progress (Evans and Rosenbaum, 2008). Many scholars warn that policies that only address cognitive competencies without tackling other important aspects will most likely be unsuccessful (Raver, 2002; Raver and Zigler, 1997).

A more comprehensive and holistic way of approaching the income-achievement gap is by considering the development of other capacities of children most especially their ability to self-regulate.

Consequently, it is imperative too for educators to implement programs that develop and enhance children's self-regulation and other capacities like interpersonal skills. Some scholars have already demonstrated that self-regulation can be taught to children essentially confirming that children can learn to improve their self-regulation capacity (Imuta, Hayne, and Scarf, 2014). For example, they used a paradigm that made use of "cool" system making the children more mindful and more future-oriented in their decisions. Tools of the mind curriculum developed by Diamond, Barnett, Thomas, and Munro (2007, p. 1387) "improve executive functions [EF] in preschoolers in regular classrooms with regular teachers at minimal expense. Core EF skills are (i) inhibitory control (resisting habits, temptations, or distractions), (ii) working memory (mentally holding and using information), and (iii) cognitive flexibility (adjusting to change)."

In the latest book of Mischel (2014), he shared that even Sesame Street, a TV program for young children shown all over the world, has started teaching preschoolers the benefits of waiting. The show demonstrates how cookie monster tames his visceral desire for cookies by employing techniques such as singing, playing with a toy, and thinking of something to distract attention on the immediate reward. Another program, the Knowledge is Power Program, more popularly known as KIPP, brings to classroom progressive and revolutionary findings of psychological science (Mischel, 2014). The program mainly aims to give genuine choice for everyone transcending economic and demographic backgrounds.

All of these programs demonstrate that appropriate educational policies can positively alter children's self-control and self-regulation capacity that will eventually bring better results.

Self-regulation and age

It is not surprising that age is a significant variable in children's performance in the marshmallow test. It was my hypothesis that as children grows older, they have better self-regulation skills and therefore perform better on the marshmallow test. The findings of this study confirm such hypothesis.

Because self-regulation can be taught to children or they can be trained to improve their self-regulation skills (Imuta, Hayne, and Scarf, 2014), it may be reasonable to start the intervention at a younger age. This can be seen in the television program Sesame Street and in KIPP, which target preschoolers (Mischel, 2014). Starting the intervention at a young age will consequently impact children's self-regulation and other capacity on their academic progress (Evans and Rosenbaum, 2008).

Since the importance of self-regulation on the academic life of children has already been established by the National Scientific Council on the Developing Child (as cited by Evans and Rosenbaum, 2008), it is imperative to implement interventions as early as possible.

Based on the results of the statistical tests, it is apparent that old age is closely associated with overweight and obesity because BMI classification is a significant fixed factor of age as dependent variable. This is reasonable because higher incidence of obesity is also seen in older children compared to younger ones in other studies (Ho, Chay, Yip, Tay and Wong, 1983; Kosti and Panagiotakos, 2006; and Raj and Kumar, 2010).

Self-regulation and ethnicity and culture

With respect to the effects of ethnicity on self-regulation, it is evident that the results of this study agree with the conclusions of Li-Grining (2007) and Sektnan, McClelland, Acock and Morrison (2010) who also found no significant difference in self-regulation across different ethnic groupings.

It has been my theory right from the start because the ethnic groupings in this study are not tied to socio-economic status such as being Caucasian or minority as previously studied by Bembenutty (2007); or being European, African or Latino as previously studied by Li-Grinning (2007); or ethnic minority status as studied by Sektnan, McClelland, Acock and Morrison (2010). The ethnic groupings in this study are Southeast Asian, South Asian, and Middle Easterner.

This finding makes sense because ethnic groupings, like being South Asian or Southeast Asian or Middle Easterner, not based on socio-economic demographics, will not likely result in significant differences unlike previous study by Bembenutty (2007) wherein subject grouping was based on socio-demographics.

With regards to Hofstede's indulgence index, it is interesting to note the significant correlation between the index and ethnicity as well as the significance of ethnicity as a fixed factor of the index as dependent variable. These findings lend credence to Hofstede's study that, the index is closely linked with culture, which is indirectly linked to ethnicity (Hutchinson and Smith, 1996).

It has been my theory that based on the indulgence index, ethnic groups that have low indulgence index will be able to wait longer compared to other ethnic groups that have higher indulgence index. Although the mean waiting time of the South Asians and Middle Easterners is longer compared to the Southeast Asians as predicted by Hofstede (http://geert-hofstede.com, 2016), the mean waiting time across the ethnic groups is not significantly different from each other.

One of the main reasons for insignificant differences in the mean waiting time across ethnicity is that Hofstede's index is based on nationality and not ethnicity. The indulgence score of the countries represented in this study is attached as Appendix A. It should be noted that the indulgence index score of the following Middle Eastern countries are not available in Hofstede Center's website (2016): UAE, Syria, Palestine, and Bahrain. Because there are more than a handful of UAE, Syrian and Palestinian nationals who participated in this study, it translates into sizeable amount of missing indulgence index data. Another reason may be the huge difference in the number of nationalities that participated in this study, for example, 62 Filipino children compared to 2 Palestinian nationals, or 9 UAE nationals. The mean indulgence scores will be severely affected by the disparities in the number of participants from each country because the index scores are based on nationality.

Self-regulation and BMI

Mean waiting time is not significantly different across BMI classification mainly because there is no significant difference in the mean BMI score between those from Southeast Asia and Middle East while there is significant difference between South Asians vis-à-vis Southeast Asians and the Middle Easterners.

One of the possible explanations for this is that "obesity prevalence varies across socio-economic strata. In developed countries, children of low socio-economic status are more affected than their affluent counterparts. The opposite is observed in developing countries: children of the upper socio-economic strata are more likely than poor children to be obese (Raj and Kumar, 2010, p. 599)."

Looking at the mean income of the various BMI classes, it is apparent that the mean income is highest among children with normal weights (M=8,354.23; SD=6,609.83) while the lowest mean income (M=2,697.52; SD=3,482.94) are those of obese children. This is consistent with the significant correlation between income and BMI class. Juxtaposing Raj and Kumar (2010) findings, it is reasonable to conclude that the children in this study exhibit characteristics of a developed country as whole because obesity is seen in lower income families. But the Philippines, a developing country, which has 61 children who participated in this study most probably diluted the data from the more developed countries – the Netherlands and UAE.

Another explanation is that South Asians living in the Netherlands who participated in this study must have been affected by the healthy lifestyle of Dutch people that is why they have lower mean BMI scores compared to Southeast Asians and Middle Easterners.

One more possible explanation is that most of the subjects who participated in this study are mostly children of expatriates or migrant workers. Living outside their home country may have influenced their "dietary and physical activity patterns" as well as "other environmental factors" that influence

incidence of obesity (Kosti and Panagiotakos, 2006, p. 153, 154, 155). These factors, however, do not necessarily affect children's self-regulation capacity or skill, which is measured in terms of waiting time on the marshmallow test.

Limitations and further research

There are two limitations to this research. First, it would have been more meaningful if the academic performance, interpersonal skills of children, and other performance measures were also included in the study to be able to employ the full and complete conceptual model devised by Evans and Rosenbaum (2008). In this way, it can be directly tested whether children who are able to wait longer are also more likely to perform better at school and exhibit better interpersonal skills.

Second, it is highly recommended that a panel study be conducted in the future over a certain period of time that involves academic performance, obesity incidence, and other performance indicators to better study the progress of children across different performance indicators over time. The study of Evans and Rosenbaum (2008) was a panel study but it only included cognitive development as performance indicator.

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VII. Appendix

A. Indulgence Score of Countries
(Source: https://geert-hofstede.com/countries.html)

Country	Indulgence	Region
Albania	15	Southeastern Europe
Angola	83	Africa
Argentina	62	South America
Australia	71	Australia & Oceana
Austria	63	Western Europe
Bangladesh	20	South Asia
Belgium	57	Western Europe
Bhutan	n/a	Southeast Asia
Brazil	59	South America
Bulgaria	16	Eastern Europe
Burkina Faso	18	Africa
Canada	68	North America
Cape Verde	83	Africa
Chile	68	South America
China	24	Southeast Asia
Colombia	83	South America
Costa Rica	n/a	South America
Croatia	33	Central Europe
Czech Republic	29	Eastern Europe
Denmark	70	Northern Europe
Dominican Republic	54	South America
Ecuador	n/a	South America
Egypt	4	Africa
El Salvador	89	South America
Estonia	16	Eastern Europe
Ethiopia	n/a	Africa
Fiji	n/a	Australia & Oceana
Finland	57	Northern Europe
France	48	Western Europe
Germany	40	Western Europe
Ghana	77	Africa
Greece	50	Southern Europe

Guatemala	n/a	Central America
Honduras	n/a	Central America
Hong Kong	17	Eastern Asia
Hungary	31	Eastern Europe
Iceland	67	Western Europe
India	26	South Asia
Indonesia	38	South East Asia
Iran	40	Middle East
Iraq	17	Middle East
Ireland	65	Northern Europe
Israel	n/a	Middle East
Italy	30	Western Europe
Jamaica	n/a	Caribbean
Japan	42	Eastern Asia
Jordan	43	Middle East
Kenya	n/a	Africa
Kuwait	n/a	Middle East
Latvia	13	Northern Europe
Lebanon	25	Middle East
Libya	34	Northern Africa
Lithuania	16	Eastern Europe
Luxemburg	56	Western Europe
Malawi	n/a	Africa
Malaysia	57	Southeast Asia
Malta	66	Mediterranean
Mexico	97	North America
Morocco	25	Northern Africa
Mozambique	80	Africa
Namibia	n/a	Africa
Nepal	n/a	South Asia
Netherlands	68	Western Europe
New Zealand	75	Australia & Oceana
Nigeria	84	Africa
Norway	55	Western Europe
Pakistan	0	South Asia
Panama	n/a	Central America
Peru	46	South America

Philippines	42	South East Asia
Poland	29	Eastern Europe
Portugal	33	Southwestern Europe
Romania	20	Eastern Europe
Russia	20	Eastern Europe
Saudi Arabia	52	Middle East
Senegal	n/a	Africa
Serbia	28	Eastern Europe
Sierra Leone	n/a	Africa
Singapore	46	South East Asia
Slovakia	28	Eastern Europe
Slovenia	48	Central Europe
South Africa	63	Southern Africa
South Korea	29	East Asia
Spain	44	Southwestern Europe
Sri Lanka	n/a	South Asia
Suriname	n/a	South America
Sweden	78	Northern Europe
Switzerland	66	Western/Central Europe
Syria	n/a	Middle East
Taiwan	49	East Asia
Tanzania	38	Africa
Thailand	45	South East Asia
Trinidad&Tobago	80	Caribbean
Turkey	49	Middle East
Ukraine	18	Eastern Europe
UAE	n/a	Middle East
United Kingdom	69	Northwestern Europe
USA	68	North America
Uruguay	53	South America
Venezuela	100	South America
Vietnam	35	South East Asia
Zambia	42	Africa

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12. Dr. Tassos Anastasiades
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13. Mr. William Johnston
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14. Mr. Paul Asir Joseph
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16. Mme. Ranju Anand
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17. Stephen Chynoweth
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18. Mr. Beat Sommer
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19. Mme. Carmel Platt
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20. Mme. Jane Knight
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21. Ms. Kaneez-e Ali Abbas
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22. Dr. Patricia D. Cruz
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23. Mme. Robin Appleby
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24. Mme. Thelma Miranda
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25. Mr. James Richard
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26. Mr. David Baldwin
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27. Mr. Kingston Gilbert
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28. Mr. Kevin Loft
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29. Mr. Hisham Hassan
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30. Ms. Aalia Munir,
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31. Sayliva Basumatary
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32. Ms. Jocelyn Sollano
    School Principal
    The Philippine School
    Dubai, UAE
    principal@thephilippineschooldubai.com

C. Introduction Letter, Consent Form and Questionnaire

Letter:

Dear Parent(s),

My name is Jeffrey P. Salik and I am scholar of the Department of Foreign Affairs where I work as a Foreign Service Officer. I am a graduate student at the Erasmus School of Economics of the Erasmus University Rotterdam (EUR) in the Netherlands.

I would like to measure the degree of self-regulation of your child **for free**. This test was first conducted by a group of professors from Stanford University in California. It was later found that this test was a good predictor of **scholastic aptitude and ability to cope with frustrations and stress in adolescence**. The test administrator will discuss the results to CDC, which will then convey the results to you so that you may better understand your child's self-regulatory capacity.

This is a study sanctioned by the Erasmus School of Economics of the EUR in the Netherlands. Participants in this study will come from various cities in the Netherlands, United Arab Emirates, United States of America and the Philippines. The goal of the study is to compare the performance of children in this test across countries, income groups, and parents' educational background.

Participation in this activity is **voluntary**. The benefit of participating, however, is **determining the degree of your child's self-regulation** at his/her present age. It is interesting to note that while it offers benefits, there are **no inherent risks** in the conduct of this test for it will be **administered like a game** that will not last more than 15 minutes per child.

The Erasmus Research Institute of Management (ERIM) Ethics Board has approved of the conduct of this study in the Netherlands. The ethics code, for your reference, is 2016/02/11-05483wve. The Erasmus School of Economics will never know the identities of the children participating in this study to **protect the privacy of the participants**. The information gathered in this study would neither be transmitted to other entities nor used for other purposes.

I plan to administer the test as soon as possible.

If you have any questions, you may contact me via email at jeffrey.salik@student.eur.nl.

Consent form:

I/We,

_____

_____ (Full Name(s) of Custodial and/or Non-Custodial Parent(s)/Legal Guardian(s))

am/are the lawful custodial parent and/or non-custodial parent(s) or legal guardian(s) of

Child's full name:_____,
with

Reference number: DEDUIF-
_____.

has my/our consent to have our child undergo a test, which is one of the ways to measure the degree of self-regulation among preschoolers.

Enclosed is a brief questionnaire that needs to be answered. In order to protect the identities of the children (and their parents) participating in this study, a reference number is randomly assigned to your child. You may wish to submit the questionnaire in a sealed envelope (or folded and stapled) so that only the test administrator may see your answers to the enclosed questionnaire.

Signature:_____
Date:_____ (Signature of Custodial Parent, and/or Non-Custodial Parent or Legal Guardian)

Full Name:
_____

Questionnaire:

This questionnaire is part of the administration of a test that measures child's self-regulatory capacity.

You may wish to submit this to the school in a sealed envelope (or folded and stapled) so that only the test administrator will know the information contained in this questionnaire. The test administrator will give the results to the school, which will then discuss the results to you.

Kindly fill in the answers to all of the following required information:

CHILD'S INFORMATION

Reference No: School-_____
Nationality:_____ Date:_____
Gender: ( ) Male ( ) Female Birthday: Day __Month_____Year____

Number of Child's Siblings:_____
Position in family: ( )1st ( ) 2nd ( )3rd ( ) Others _____

FAMILY INFORMATION

Father's highest educational attainment:_____
Age of father:_____
Ethnicity: ( ) Malay or Brown race ( ) Chinese ( ) Indian ( )
Others_____

Mother's highest educational attainment:_____
Age of mother:_____
Ethnicity: ( ) Malay or Brown race ( ) Chinese ( ) Indian ( ) Others _____

Total monthly family income: EURO_____
Percent of monthly family income spent on food: _____%

Thank you very much.

++++++++++++++++**RESERVED FOR TEST ADMINISTRATOR**++++++++++++

Total waiting time: _____(seconds) Weight:___kg Height: _____cm

Describe coping strategy:

Marshmallow ( ) complete
( ) not complete, describe

Other observations:

Difficulties/challenges encountered with the administration of the test: