FACEBOOK® ADDICTION, INTENSIVE SOCIAL NETWORKING SITE USE, MULTITASKING, AND ACADEMIC PERFORMANCE AMONG UNIVERSITY STUDENTS IN THE UNITED STATES, EUROPE, AND TURKEY: A MULTIGROUP STRUCTURAL EQUATION MODELING APPROACH

A dissertation submitted to the Kent State University College of Education, Health, and Human Services in partial fulfillment of the requirements for the degree of Doctor of Philosophy

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Research has shown since 2008 that social networking site (SNS) use comprises the majority of time spent on the Internet. The age distribution and large amount of time spent on SNSs evoke a new research era: How students use SNSs and how the uses of SNSs impact their academic performance. The main objective of the pilot study was to investigate the relationship between time spent on SNSs, frequency of SNS use, multitasking with SNSs, time spent studying, and Grade Point Average (GPA). In the first part, the cross-cultural differences between the United States (US; \( n = 444 \)) and European college students (\( n = 346 \)) were examined using path models.

After examining the path models, a new survey was administered with additional items (with existing reliability and validity evidence). The purpose of the main study was to define new constructs using observed variables. These constructs were Facebook® addiction, multitasking with SNSs while studying, using SNSs for school work, the amount of time spent on SNSs, college self-efficacy, and academic performance. A structural equation model (SEM) was developed using the above constructs. SEM has many advantages compared to path analysis, and it was used to compare two countries: the US (\( n = 226 \)) and Turkey (TR; \( n = 200 \)). This exploratory investigation focused on
the following main goals: (a) testing if Facebook® addiction and intensive SNS use impact academic performance, (b) identifying the variables that directly or indirectly impact SNS use and academic performance, (c) understanding the impact of Facebook® addiction on general SNS use and academic performance, (d) indicating relationships between the variables, and (e) probing the differences between university students from different cultures (i.e., the US and TR).
Dedicated to my family…
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PART I

CHAPTER I

INTRODUCTION TO THE PILOT STUDY

Research has shown since 2008 that social networking site (SNS) use comprises the majority of time spent on the Internet. The United States’ (US) digital year report illustrates that individuals spent an extensive amount of time online (ComScore, 2013). SNSs, such as Facebook®, Myspace®, LinkedIn®, and Twitter®, have attracted millions of people around the world and individuals have integrated these sites into their daily routines (Boyd & Ellison, 2007).

Facebook® is the leading online SNS on which many people spend extensive amount of time (ComScore, 2013; Kemp, 2014). The other social networks with a high number of active users are Qzone® (i.e., 632 million), Google+® (i.e., 300 million), LinkedIn® (i.e., 259 million) and Twitter® (i.e., 232 million; Kemp, 2014). More than one third of the world’s population uses the Internet, and 34.3% of the Internet users and 12.1% of the world population have Facebook® accounts (InternetWorldStats.com, 2012). North America and Europe have the highest numbers of Facebook® users compared to other geographic regions in the world. The age distribution among Facebook® users in the US roughly shows that 23.4% are 18-24 and 23.9% are 25-34 (CheckFacebook.com, 2013), with a similar distribution in Europe. Additionally, almost one fourth of the total Facebook® users are college students.
The age distribution and large amount of time spent on SNSs evoke a new research era: How students use SNSs and how the uses of SNSs impact their academic performance. Researchers have focused on the negative and positive impact of SNSs on students’ academic performance. The recent literature illustrates a big debate showing a negative (Bjerregaard, 2010; Junco, 2012c; Kirschner & Karpinski, 2010; Stollak, Vandenberg, Burklund, & Weiss, 2011; Rouis, Limayem & Salehi-Sangari, 2011) or no relationship (Ahmed & Qazi, 2011; Hargittai & Hsieh, 2010; Lubis et al., 2012; Pasek, More, & Hargittai, 2009) between time spent on SNSs and academic performance (i.e., Grade Point Average [GPA]). However, few studies have examined whether multitasking with technology (e.g., using SNSs) while studying impacts the relationship between SNS use and academic performance (Fox, Rosen, & Crawford, 2008; Jacobsen & Forste, 2011; Junco & Cotten, 2012; Karpinski, Kirschner, Ozer, Mellot & Ochwo, 2013; Walsh, Fielder, Carey, & Carey, 2013; Xu, 2008).

Multitasking is defined as the simultaneous execution of two or more processing activities at the same time. Many individuals have assumed that they are capable of doing this without any loss of efficiency or effectiveness, and that there has been a specific evolution of our brains to allow this (Kirschner, Sweller & Clark, 2006; Sweller, Kirschner, & Clark, 2007). However, researchers have shown that switching between tasks frequently, when compared to carrying out tasks in sequence, leads to poorer learning results in students and poorer performance on tasks (American Psychological Association [APA], 2006; Ophira, Nass, & Wagner, 2009). Thus, perceived level of multitasking in general or specifically with SNSs may have a direct or indirect negative
impact on academic performance (Ellis, Daniels, & Jauregui, 2010; Gabre & Kumar, 2012; Golub & Miloloža, 2010; Junco & Cotten, 2012; Karpinski et al., 2013).

Junco and Cotten (2012) reported that using Facebook® and texting while doing school work were negatively associated with GPA. Gabre and Kumar (2012) found that students using Facebook® in the background while studying experienced lower academic performance. Karpinski and colleagues (2013) examined differences between the US and European students’ SNS use and academic performance (i.e., GPA) moderated by multitasking and found that the negative relationship was moderated by multitasking in the US sample.

As mentioned above, researchers are beginning to examine cultural differences in SNS use. Culture, which can be seen as the shared perception of social environment, shapes the way that people behave, the way that they interact and communicate with each other, and how they build relationships with each other (Gudykunst et al., 1996; Gudykunst & Nishida, 1986; Hofstede, 2001). Research has shown that cultural contexts can influence both the patterns of media usage and attitudes toward them (Garramone, Harris, & Anderson, 1986; Papacharissi & Rubin, 2000). Therefore, cultural differences due to multitasking (while using SNSs) may exist, which in turn may impact GPA. In this pilot study, college students in the US and Europe is compared.

The present study (i.e., pilot study) addresses whether time spent on SNSs has an impact on students’ GPA, including other observed variables such as multitasking and hours spent studying. Path models based on previous research and theory were developed to describe the above relationships. In addition, two separate path models
were compared for the US and Europe as a pilot study examining cross-cultural differences.

Problem Statement

Most of the previous research has examined the relationship between time spent on SNSs and GPA. Important variables such as multitasking have only recently been considered. Furthermore, cross-cultural SNS use differences are beginning to emerge in the literature. Methodologically, there is a lack of research using different statistical methods to examine the above relationships. Therefore, the goal of the current study is to examine the relationships among the time spent on SNSs, frequency of SNSs use, multitasking with SNSs, time spent studying, and GPA using Path Analysis. Furthermore, as it is discussed in Part II, this pilot study serves as a basis for conducting structural equation modeling (SEM) using latent variables of SNS use, attitudes towards multitasking, and academic performance.

Research Questions and Hypotheses

The main research question was “What is the relationship between time spent on SNSs, frequency of SNS use, multitasking with SNSs, time spent studying, and Grade Point Average (GPA)?” The second research question of this pilot study was “What are the differences between the United States (US) and European models examining the relationship between time spent on SNSs, frequency of SNS use, multitasking with SNSs, time spent studying, and Grade Point Average (GPA)?”

The following research hypotheses were investigated in the overall model, and then for the US and European models:
(H1): Time spent studying has a positive and direct relationship with students’ GPA.

(H2): Time spent on the SNSs has a negative and direct relationship with students’ GPA.

(H3): Having SNSs on in the background while studying has a positive and direct relationship with total social networking hours.

(H4): Using SNSs multiple times per day has a positive and direct relationship with total social networking hours (see Figure 1).

Figure 1. The proposed conceptual framework for the current pilot study

Identification of the Variables

As shown in Figure 1, time spent on SNSs and self-reported GPAs are the dependent variables (i.e., endogenous variables that have at least one path leading to it).
The time spent studying, frequency of SNS use, and using SNSs in the background while studying are the independent variables (i.e., exogenous variables that have paths coming from it and none leading to it). For the main variables of interest in the current study (collected via an online survey), one of the endogenous variables (i.e., GPA) was collected by asking participants, “What is your current cumulative grade point average?” Because various ranges of scales are used for GPA in different countries, a follow-up question was necessary: “Out of how many points is the scale for your grade point average?” For comparison purposes, all GPAs were placed on a scale from zero to 4.0. The other endogenous variable, SNS use, was collected by asking participants, “Approximately how many hours per day do you spend using SNSs?”

The exogenous variables including the amount of study time was collected by asking, “Approximately how many hours per DAY do you spend studying (i.e., outside the classroom)?” The act of multitasking with SNSs while studying was collected by asking “Do you use SNSs or have SNSs on in the background while studying?” The frequency of SNSs usage was collected by asking “How often do you use it (Check one)?” and the responses included 0 = Every 3 months, 1 = Every month, 2 = Every week, 3 = Daily, and 4 = Multiple times per day.

Significance of the Study

Information presented in this study can provide useful information to guide students and university officials in understanding how multitasking with SNSs can impact performance on the main task at hand (i.e., studying). Additionally, as the new-generation college students use SNSs with more frequency and intensity in their daily
routines, it is important to understand the pros and cons of SNS use, how students integrate SNSs into their study environment, and the impact of extensive use on academic performance. Another perspective that this explanatory study will provide is showing the differences between different world regions in the areas of technological advances and cognitive mechanisms (i.e., multitasking).

**Organization of the Remaining Document**

The next section of this document (i.e., Chapter 2: Literature Review of the Pilot Study) will include a literature review of general SNS use, multitasking, cultural differences in SNS use, and academic performance. Chapter 3 (i.e., Methodology of the Pilot Study) will preview an in-depth description of the methods used to address the pilot study’s main goals. This section will provide extensive descriptions of the variables, measures, and analyses. In the results section (i.e., Chapter 4), the statistical analysis output will be provided for the pilot study, and the last chapter of Part I will provide a discussion of the analyses, limitations and reasons for conducting the main research study outlined in Part II.
CHAPTER II
LITERATURE REVIEW OF THE PILOT STUDY

This chapter reviews the body of literature exploring academic performance and time spent studying, social networking sites (SNSs) use in the United States (US) and European countries (EU), the relationship between SNS use and academic performance, and multitasking with SNSs while studying.

Theoretical Framework

This pilot study examines the relationship of multitasking with SNSs and college students’ GPAs. The term multitasking is defined as “divided attention and nonsequential task switching for ill-defined tasks as they are performed in learning situations” (Junco & Cotten, 2012). An example of this definition would be considered as a college student checking SNSs while studying, or attempting to respond a friend’s post in the classroom. A reasonable number of studies examined how college students multitask with SNSs and how multitasking affects their ability to learn (Junco & Cotten, 2012; Karpinski et al., 2013; Mayer & Moreno, 2003; Rosen, Carrier, & Cheever, 2013; Wood et al., 2012).

Sweller’s (1994) Cognitive Load Theory (CLT) emphasized that task switching from controlled to automatic processing can be continuous and slow, and he stated, “Once the familiarity with a domain is gained; the need to devote attention to the required processes is reduced” (p.298). According to Schneider and Shiffrin (1977), the definition of two-process theory of human information processing is stated as:
Automatic processing is activation of a learned sequence of elements in long-term memory that is initiated by appropriate inputs and then proceeds automatically—without subject control, without stressing the capacity limitations of the system, and without necessarily demanding attention.

Controlled processing is a temporary activation of a sequence of elements that can be set up quickly and easily but requires attention, is capacity-limited (usually serial in nature), and is controlled by the subject (p.1).

Controlled processing occurs when continuous attention is given to only one task at a time, whereas automatic processing occurs unconsciously (Schneider & Shiffrin, 1977). Pashler (1994) reported many people routinely carry out two activities at the same time. Thus, this requires reduced mental capacity because one or both of the tasks have become automatic through practice.

In this chapter, the observed variables are discussed in detail:

- Academic performance and time spent studying
- Social networking sites (SNSs)
  - SNS Use in the United States (US) and Europe (EU)
- SNS Use and Academic Performance
- Multitasking and SNS Use

**Academic Performance and Time**

Course grades are a common indicator of student learning, especially at the college level. All grades, from the courses student attended, comprise an overall Grade Point Average (GPA). In most cases, high school or college GPAs can play an important
role in an individual’s life (e.g., job and graduate school applications). Therefore, it is essential to understand what factors can positively or negatively impact students’ grades.

Self-reported GPA is frequently used in research; not only as an indicator of student learning, but also as a predictor of academic performance and other important life outcomes (Kuncel, Credé, & Thomas, 2005). Hinrichsen (1972) reported study-relevant behaviors (i.e., average amount of time spent studying per day, average number and length of interruptions during a study session, average number of days per week on which study occurred, average amount of time spent studying each time student sat down to study) being potential predictors of GPA (Allen, Lerner, & Hinrichsen, 1972).

Understanding time in relation to academic work is challenging. Thus, the relationship between the amount of time spent studying and academic performance has been debated. Researchers have defended that the relationship between the two is important. However, others have also emphasized that academic performance is not the only important variable to consider in relation to study time (Allen et al., 1972; Gijselaers & Schmidt, 1995; Hinrichsen, 1972; Plant, Ericsson, Hill, & Asberg, 2005).

Carroll (1984) derived a model for “the prediction of success in complex learning tasks” (i.e., The Model of School Learning [MSL]; p.17). Carroll specified three basic variables (i.e., aptitude, perseverance, opportunity to learn) in terms of the amount of time that: (a) a student would need to learn something, (b) a student would be willing to engage in active learning, and (c) the organization of a course would allow for learning. The other two variables in the model that were not defined in terms of time were given as: (d) ability to understand instruction and (e) quality of instruction. As Carroll (1984)
represented in MSL (see Figure 2), time is an important variable in learning, and achievement is maximized when the time spent is equivalent to the time needed to learn.


Social Networking Sites (SNSs)

Social, Digital and Mobile Report published in 2014 reported that 2.5 billion people all around the world are Internet users and that corresponds to almost 35% of the world’s population (Kemp, 2014). According to the same report, the average number of hours spent on the Internet was three hours per day through mobile devices, and 5.2 hours through laptop or desktops in the US. The average number of hours was lower in European countries (i.e., UK: 4.2 hours; France: 4.1 hours; Germany: 3.8 hours per day through laptops/desktops) compared to the US. The report also illustrated that there are more than 1.8 billion SNS users all around the world. That means almost 25% world’s
population and almost 75% Internet users have at least one SNS account and use SNSs actively.

Facebook® is the leading online SNS (Kemp, 2014) with more than 1.2 billion monthly active users (MAUs), and 802 million daily active users (DAUs) reported as of March 31, 2014 (Facebook® Q1 2014 Quarterly Earnings Slides, 2014). Briefly, more than one third of the world’s population uses the Internet, and almost 17% of the world population has Facebook® accounts. In 2012, according to the US digital year report, among the top four online content areas according to the individuals’ share of overall time spent online, portals (e.g., Yahoo, MSN, AOL, etc.) were the largest with a 20.2% share of time spent. Social networking was the second with 14.4%, entertainment was the third (12.6%), and e-mail or communication with other channels was the fourth (11%; ComScore, 2012). However, according to GfK’s original digital video consumer study published in April 2014, social networking is the first popular online activity in the US with an average use of 37 minutes per day, which was 26 minutes per day in 2010. The other online activities were e-mail (i.e., 29 minutes per day), online video (i.e., 23 minutes per day), search (i.e., 23 minutes), online games (i.e., 19 minutes, GfK Media & Entertainment, 2014). Accordingly, one of the main reasons individuals use the Internet is for social networking purposes. For example, SNSs (e.g., Facebook®, Tumblr®, Pinterest®, Twitter®, LinkedIn®, etc.) have attracted millions of users around the world, with these sites being incorporated in their daily routines (Boyd & Ellison, 2007; ComScore, 2013).
Boyd and Ellison (2007) define SNSs as “web-based services that allow individuals (a) to construct a public or semi-public profile within a bounded system, (b) to articulate a list of other users with whom they share a connection, and (c) to view and traverse their list of connections and those made by others within the system” (p.211). According to the US Digital Year in Review, SNSs continue to increase in use “SNSs accounted for 16.6% of all time spent online in 2011 with the average Internet user spending more than 4.5 hours on these sites each month” (ComScore, 2012, p.10). As demonstrated above, social networking has become an indispensable feature of the Internet.

Facebook® is the leading online social network (i.e., 83% share of time spent among others) on which many people spend excessive amount of time (ComScore, 2013). It is a communication platform used for creating and demonstrating a personal profile for other users or friends to share images, videos or ideas (Dawley, 2009). In 2012, the total number of Facebook® user accounts increased to 937 million with 12.1% of the population around the world having an account (InternetWorldStats.com, 2012). In the first quarter of 2014, Facebook® executives declared the number of DAUs as 802 million in the world, and 150 million in the US and Canada, 203 million in Europe, and 233 million in Asia (Facebook® Q1 2014 Quarterly Earnings Slides, 2014). Today, having more than 800 million DAUs, 945 million mobile MAUs, and 1.2 billion MAUs of Facebook® is a clear reflection of how this SNS has become popular all around the world.
In addition, it is also important to understand the total or average amount of time spent on Facebook® per individual. The report illustrates the growth of Facebook’s US audience in 2010 with 49.4 billion minutes spent on Facebook® (ComScore, 2012). The average time spent on this SNS per day was 25 minutes in 2010, and more than 50% of active users log on to Facebook® on any given day (ComScore, 2012; Facebook.com). Today, active social media users spend two hours per day on average on social channels (Kemp, 2014).

**SNS use in the United States and Europe.** Free social media monitoring platforms (i.e., CheckFacebook.com; InternetWorldStats.com; SocialBakers.com) track data from countries and regions. According to one of those platforms, currently, there are 163 million Facebook® users in the US, which means the country is ranked first in all Facebook® statistics (SocialBakers, 2013). The list of other countries ranked according to the total number of monthly active Facebook® users includes Brazil, India, Indonesia, Mexico, Turkey, United Kingdom, Philippines, France, and Germany (SocialBakers, 2013).

Table 1 demonstrates the number of the Internet and Facebook® users and the penetration rates for the highest three world geographic regions. The Internet Penetration Rate corresponds to the percentage of the estimated population of a given country or region that uses the Internet. The Facebook® Penetration Rate corresponds to the percentage of the estimated population of a given region that uses Facebook®. The Facebook® Index corresponds to the ratio of Facebook® users in relation to the total number of estimated Internet users in each world region, expressed as a percentage.
Table 1 shows that 78.61% of North America uses the Internet and Facebook®
penetration is also the highest in this region (52.89%) compared to the region’s estimated
population. Europe is listed as the second highest region with nearly two thirds of the
population using the Internet and almost one third of the population having a Facebook®
account. North America refers to regions such as Canada, Greenland, and the US.
Europe refers to 53 European countries (e.g., Germany, France, Netherlands, Turkey,
etc.). Thirty-five countries encompass Asia (e.g., Bangladesh, China, India, Japan, etc.;
InternetWorldStats.com, 2012).

Table 1

<table>
<thead>
<tr>
<th>Geographic World Regions</th>
<th>Population (Estimated 2012)</th>
<th>Internet Users</th>
<th>The Internet Penetration Rate</th>
<th>Facebook® Users Sep-2012</th>
<th>Facebook® Penetration (%Population)</th>
<th>Facebook® Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>North America</td>
<td>348,280,154</td>
<td>273,785,413</td>
<td>78.61%</td>
<td>184,200,000</td>
<td>52.89%</td>
<td>67.28%</td>
</tr>
<tr>
<td>Europe</td>
<td>820,918,446</td>
<td>518,512,109</td>
<td>63.16%</td>
<td>243,000,000</td>
<td>29.60%</td>
<td>46.86%</td>
</tr>
<tr>
<td>Asia</td>
<td>3,922,066,987</td>
<td>1,076,681,059</td>
<td>27.45%</td>
<td>236,000,000</td>
<td>6.02%</td>
<td>21.92%</td>
</tr>
<tr>
<td>World Total</td>
<td>7,017,846,922</td>
<td>2,405,518,376</td>
<td>34.28%</td>
<td>937,407,180</td>
<td>13.36%</td>
<td>38.97%</td>
</tr>
</tbody>
</table>

*Note.* Adapted from “Usage and Population Statistics: Facebook® users in the world” by

Additionally, the age distribution among Facebook® users in the US roughly
shows that 23.4% of Facebook® users are 18-24 and 23.9% are 25-34
(CheckFacebook.com, 2013). With regards to European Facebook® users, the highest
age distributions include Turkey (i.e., 34% of Facebook® users are 18-24 and 29.3% are
25-34), the United Kingdom (i.e., 23.2% of Facebook® users are 18-24 and 25.4% are 25-34), and Germany (i.e., 25% of Facebook® users are 18-24 and 26.9% are 25-34). Thus, college students are frequent users of not only Facebook®, but also various SNSs (e.g., Twitter®, Instagram®, Tumblr, etc.) compared to the general population.

**Culture and SNS use.** Recently, researchers have started to examine the cross-cultural differences not only in general Internet use, but more specifically, SNS behavior (Chapman & Lahav, 2008; Jackson & Wang, 2013; Kim, Sohn, & Choi, 2011; Vasalou, Joinson, & Courvoisier, 2010). Chapman and Lahav (2008) examined cross-cultural differences in the usage patterns of SNSs (i.e., the users’ goals, typical pattern of self-expression, and common interaction behaviors) with observation and ethnographic interviews in multiple cultures (i.e., US, France, China, and South Korea), and the results showed that social networking behaviors vary from culture to culture. In another study, Vasalou and colleagues (2010) identified cross-cultural differences in SNS use between the US, the UK, Italy, France, and Greece. According to their findings, culture had an impact on users’ motivations for using SNSs, instrumental uses, and time spent on the sites. Compared to the US, time spent on Facebook® was higher in the UK, and lower in France.

In another study, Kim and colleagues (2011) found that the patterns of SNS use were remarkably different for the US and Korean students (i.e., the US students’ SNS use were almost five times larger on average compared to their Korean counterparts). In a recent study, Jackson and Wang (2013) compared SNS use in China (i.e., collectivist culture) and the US (i.e., individualistic culture; Hofstede and Bond 1984). Compared to
Chinese participants, US college students were more likely to use SNSs to keep in touch with parents and family members, friends, and to get information. Thus, cultural differences in SNS use and its impact on individuals are expected.

**SNS Use and Academic Performance**

Besides the above reported statistics on the use of the Internet and SNSs, the relationship between the Internet or SNSs and academic performance has become an important issue for researchers (see Table 2). Facebook® as the most popular SNS has also remained as a central subject to criticisms by many educators with suggestions that students spend a large amount of time on Facebook®, and find it “addictive” (Bugeja, 2006, p.1; Das & Sahoo, 2011). Additionally, media and recent empirical studies discussed the negative and positive impact of SNSs on students’ academic performance since 2009. Table 2 summarizes preceding research studies that reported the findings related to the relationship between SNS use and academic performance.

Some of the research studies have indicated that using SNSs has a negative impact on university students’ academic progress. Kirschner and Karpinski (2010) focused on users versus nonusers. This study emphasized a negative relationship between Facebook® use and academic performance. In other words, the results indicated that Facebook® users have lower GPAs and spend fewer hours per week studying than nonusers (Kirschner & Karpinski, 2010). In one thesis project, Bjerregaard (2010) questioned 130 students about their academic performance and self-perception of Facebook® use. The findings showed that the average GPA of non-Facebook® users is higher than the average GPA of Facebook® users. However, these studies cautioned that
there are multiple explanations as to why the relationship might exist. For example, Bjerregaard (2010) stated that “the present study left it unclear as to whether academic performance was affected by the amount of time spent on Facebook®, or whether it was a time management concern in how the SNS was used that led to the diminished academic performance” (p.50).

Similarly, Stollak and colleagues (2011) found a negative relationship between time spent on the social network and students’ grades. Another study by Junco (2012c) examined the relationship among Facebook® use, participation in Facebook® activities, time spent studying, and overall GPA. The results showed that time spent on Facebook® was negatively related to overall GPA, while only weakly related to time spent studying (Junco, 2012c). As an example of research outside the US, Rouis et al. (2011) investigated Facebook® use, perceived effect of personality traits, self-regulation, and trust on students' academic achievement. The findings showed Facebook® use by students with extraverted personalities led to poor GPA scores.

In contrast, some research studies illustrate no relationship between SNS use and academic performance. Pasek et al. (2009) found no relationship between Facebook® use and academic achievement. The researchers concluded that “Facebook® simply does not seem to have a generalizable impact on grades” (p.1). Similarly, Hargittai and Hsieh (2010) found no relationship between the SNS use “intensity” and academic achievement. Outside the US, a study in Malaysia found that student's GPA was not significantly related to time spent on Facebook® (Lubis et al., 2012). Additionally,
<table>
<thead>
<tr>
<th>Author(s), Year</th>
<th>Participants/Country</th>
<th>N</th>
<th>Purpose</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ahmed &amp; Qazi (2011)</td>
<td>Pakistan</td>
<td>730</td>
<td>To explore the relationship between SNSs usage and educational performance of the student users.</td>
<td>SNSs did not have an adverse impact on academic performance.</td>
</tr>
<tr>
<td>Bjerregaard (2010)</td>
<td>South-western community college, the US</td>
<td>130</td>
<td>To investigate the relationship between high use of Facebook® and academic performance in the college atmosphere</td>
<td>Non-Facebook® users had a higher GPA compared to medium or high Facebook® users. There was a direct negative correlation between the two variables.</td>
</tr>
<tr>
<td>Harrigattai &amp; Hsieh (2010)</td>
<td>18- and 19-year-old first year students at an urban public research university, the US</td>
<td>1060</td>
<td>To investigate the implications of SNS usage</td>
<td>Neither SNS usage intensity nor social practices performed on these sites were systematically related to students’ academic performance. Engaging more intensely with SNSs, in particular, shows no relationship to our outcome variable of academic achievement.</td>
</tr>
<tr>
<td>Junco (2012c)</td>
<td>4-year, public, primarily residential institution, Northeastern university, the US</td>
<td>1839</td>
<td>To examine the relationship among frequency of Facebook® use, activities, and time spent preparing for class and actual overall GPA.</td>
<td>The time spent on Facebook® was negatively related to overall GPA, while only weakly related to time spent preparing for class.</td>
</tr>
<tr>
<td>Author(s), Year</td>
<td>Participants/Country</td>
<td>N</td>
<td>Purpose</td>
<td>Findings</td>
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<tr>
<td>Kirschner &amp; Karpinski, (2010)</td>
<td>Undergraduate &amp; Graduate Students, Midwestern university, the US</td>
<td>219</td>
<td>To examine whether differences exist in the academic performance of college student FB users and nonusers</td>
<td>Facebook® users reported having lower GPAs and spending fewer hours per week on studying than nonusers.</td>
</tr>
<tr>
<td>Lubis et al., (2012)</td>
<td>Biomedical Science students, University Kebangsaan, Malaysia</td>
<td>81</td>
<td>To determine the relationship between time spent on Facebook® and the Cumulative Grade Point Average (CGPA)</td>
<td>Student's CGPA achievement was not significantly associated with the time spent on Facebook®.</td>
</tr>
<tr>
<td>Pasek et al., (2009)</td>
<td>First–year students at the University of Illinois at Chicago, the US</td>
<td>1060</td>
<td>To discern whether or not a relationship indeed exists between Facebook® use and GPA</td>
<td>No negative relationship was found between Facebook® use and academic performance. Facebook® users were no more or less likely to get good grades than non–users and Facebook® use was slightly more common among individuals with higher grades.</td>
</tr>
<tr>
<td>Paul, Baker, &amp; Cochran, (2012).</td>
<td>Undergraduate students in business school courses, the US</td>
<td>340</td>
<td>To develop a general framework or model that defines the key drivers, direct and indirect, of academic performance</td>
<td>Negative relationship was found between time spent by students on online social networks and their academic performance.</td>
</tr>
<tr>
<td>Author(s), Year</td>
<td>Participants/Country</td>
<td>N</td>
<td>Purpose</td>
<td>Findings</td>
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<tr>
<td>-----------------</td>
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<tr>
<td>Rouis et al., (2011)</td>
<td>Undergraduate students, Lulea University of Technology, Sweden.</td>
<td>239</td>
<td>To test the proposed model between the perceived effect of personality traits, self-regulation, and trust on students' achievements.</td>
<td>An extensive use of Facebook® by students with extraverted personalities leading to poor academic performance. However, students who are more self-regulated more effectively control their presence on these platforms.</td>
</tr>
<tr>
<td>Stollak et al., (2011)</td>
<td>Liberal arts college students, Midwestern university, the US</td>
<td>430</td>
<td>To investigate if participating in social media (Facebook®, Twitter®, Myspace®, blogs, YouTube®, etc.) impacts one's academic performance.</td>
<td>The major difference lay in time spent with Facebook®, which did show a negative relationship between time spent on the social network and one’s grades.</td>
</tr>
<tr>
<td>Walsh et al. (2013)</td>
<td>First year female college students, Northeastern university, the US</td>
<td>483</td>
<td>To examine the association between media use and academic outcomes</td>
<td>Social networking had a significant indirect effect on GPA, and cell phone use had a direct impact.</td>
</tr>
<tr>
<td>Wohn &amp; LaRose (2014)</td>
<td>First year students, the US</td>
<td>380</td>
<td>To understand SNS use by studying the relationship between loneliness, varied dimensions of Facebook® use and college adjustment.</td>
<td>Time spent on Facebook® had a small but significant negative association with perceived academic performance.</td>
</tr>
</tbody>
</table>
Ahmed and Qazi (2011) conducted a similar study in Pakistan and found no impact of SNS use on academic performance.

**Multitasking and SNS Use**

Multitasking is defined as the simultaneous execution of two or more processing activities at the same time (Kirschner et al., 2006). Many have assumed that they are capable of doing this without any loss of efficiency or effectiveness, and that there has been a specific evolution of our brains to allow this (Kirschner et al., 2006; Sweller et al., 2007). However, researchers have shown that switching between tasks frequently, when compared to carrying out tasks in sequence, leads to poorer learning results in students and poorer performance on tasks (APA, 2006; Ophira et al., 2009). In addition, studies have shown that multitasking with technology, specifically SNS(s) such as instant messaging (IMing), decreases efficiency and productivity (i.e., amount of time to complete a task) in an academic setting, which has a negative impact on GPA (Fox et al., 2008; Jacobsen & Forste, 2011; Xu, 2008). The opposite has also been found – that productivity does not lack in the face of multitasking (Mark, Gudith, & Klocke, 2008).

Junco and Cotten (2012) conducted a study in a northeastern US university to examine how college students multitask with Information and Communication Technologies (ICTs) and reported the impact of multitasking on GPA. The results showed that using Facebook® and texting while doing school work were negatively associated with GPA, and students’ capacity for cognitive processing and deeper learning was impacted because of multitasking with SNSs (Junco & Cotten, 2012). Gabre and Kumar (2012) investigated the effect of Facebook® usage on students’ academic
performance, and the results showed that students using Facebook® in the background while studying experienced lower academic performance. Further, Wood and colleagues (2012) examined the impact of multitasking activities (i.e., texting using a cell phone, emailing, MSN messaging and Facebook®) while attempting to learn during a classroom. The results showed that students who used Facebook® performed poorly on an exam than those students who did not have the Internet access. Additionally, Wood and colleagues (2012) also reported that students, who did not multitask with digital technologies during the class hour, got higher scores.

In a recent experimental study, researchers observed 263 middle school, high school and university students’ behaviors (Rosen et al., 2013). Findings showed that “Participants averaged less than six minutes on task prior to switching most often due to technological distractions including social media, texting and preference for task-switching” (p.948). Another result demonstrated that students with lower GPAs checked their Facebook® accounts one or more times during the experiment (i.e., during 15 minute observation periods).

**Multitasking and culture.** From a cross-cultural perspective, Hall and Reed (1990) defined monochronic and polychronic time and discussed the cultural differences from an international business view. Monochronic time (M-time) was defined as “paying attention to and doing only one thing at a time” and polychronic time (P-time) as “being involved with many things at once” (Hall, 1959; Hall & Hall, 1987, p.16). Hall mentioned different cultures being either monochronic or polychronic. Specifically, Hall (2000) mentioned that American and Northern European cultures were characteristically
monochronic, and people from other cultures such as Middle East, Southern Europe, and
Central and South America are more likely to engage in two or more activities at the
same time (i.e., polychronic). Hall also emphasized that people within a culture tend to
behave in a monochronic or polychronic pattern, as their society has dictated (Hall &
Hall, 1987; Lindquist & Kaufman-Scarborough, 2007). Hall also defined M-time as a
characteristic of low-involvement people (i.e., compartmentalize time; e.g., emphasizing
schedules, segmentations, and promptness), and P-time as a more involved and tend to
have several operations going at the same time.

Karpinski and colleagues (2013) examined differences between the US and
European students’ SNS use and academic performance (i.e., GPA) moderated by
multitasking and found that the negative relationship was moderated by multitasking in
the US sample. Research conducted by Judd (2013) at one Australian university showed
that the prevalence of multitasking during self-directed learning is high, and “the sessions
that include the use of Facebook® are more likely to include multitasking behavior than
those that don’t” (p.364).

Karpinski et al. (2013) and Ozer et al. (2014) reported qualitative data results
from their exploration of SNS use, multitasking, and academic performance among the
US and European university students. They discussed the student open-ended responses
containing the themes of general multitasking or multitasking with SNSs with the
percentages and frequencies for each group (i.e., the US and Europe). The US students
noted that they felt that multitasking does not interfere with the main task and that they
are more capable at it compared to European students.
Although a direct link between SNS use and GPA is debatable (see Table 2), as discussed above, some have theorized that the negative relationship may be due in part to multitasking (see Table 3). An increasing number of studies have observed that university students engage in several multimedia activities (e.g., IMing, SNS use, YouTube) while simultaneously performing their academic tasks (e.g., studying; Grinter, Palen, & Eldridge, 2006; Huang & Leung, 2009; Junco & Cotten, 2011). Thus, multitasking with SNSs (i.e., while studying, doing homework, or in classroom) may have a direct or indirect negative impact on academic performance (Ellis et al., 2010; Gabre & Kumar, 2012; Golub & Miloloža, 2010; Junco & Cotten, 2012; Karpinski et al., 2013), and that relationship may differ between cultures.

**Research Questions and Hypotheses**

Cross-cultural comparisons are becoming an important research topic in investigating the relationship between SNS use and academic performance. Additionally, the recognition of the negative impact of multitasking on this relationship has been cited numerous times as an important variable to consider. Thus, this pilot study attempted to include all the above information in a series of path models, as it is important to examine these relationships simultaneously with more sophisticated analyses. For this pilot study, a negative relationship was expected between SNS use and academic performance. Additionally, it was anticipated that multitasking (i.e., using SNSs in the background while studying) would have a negative impact on the relationship between SNS use and academic performance.
Table 3

*Summary of Main Findings Related to the Relationship between SNS(s) Use, Multitasking and Academic Performance*

<table>
<thead>
<tr>
<th>Author(s), Year</th>
<th>Participants/Country</th>
<th>N</th>
<th>Purpose</th>
<th>Finding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ellis et al., (2010)</td>
<td>Undergraduate business students, Southeastern, the US</td>
<td>62</td>
<td>To empirically examine whether multitasking in class affects the grade performance of business students.</td>
<td>Multitasking during class is considered a distraction that is likely to result in lower grade performance.</td>
</tr>
<tr>
<td>Gabre &amp; Kumar (2012)</td>
<td>Historically Black College (HBCU), and a metropolitan university, the US</td>
<td>95</td>
<td>To investigate the effect of Facebook® usage on accounting students’ academic performance.</td>
<td>Accounting students who use Facebook® while studying experienced lower academic performance after controlling for stress.</td>
</tr>
<tr>
<td>Golub &amp; Miloloz (2010)</td>
<td>Undergraduate students, Croatia</td>
<td>277</td>
<td>To compare Facebook® users and nonusers on self-esteem and academic achievement variables and to investigate the factors related to perceived positive and/or negative impact of Facebook® on academic performance.</td>
<td>The results showed that active multitasking made a significant contribution, independent of intensity of Facebook® use, to the prediction of negative Facebook® impact on academic performance.</td>
</tr>
<tr>
<td>Junco &amp; Cotten (2012)</td>
<td>4-year, public, primarily residential institution, Northeastern, the US</td>
<td>1839</td>
<td>To examine how college students multitask with ICTs and to determine the impact of this multitasking on their college grade point average (GPA).</td>
<td>Using Facebook® and texting while doing school work were negatively associated with overall college GPA. Engaging in Facebook® use or texting while trying to complete school work may tax students’ capacity for cognitive processing and preclude deeper learning.</td>
</tr>
<tr>
<td>Karpinski et al., (2013)</td>
<td>Undergraduate and graduate students, the US vs. Europe</td>
<td>875</td>
<td>To investigate the impact of multitasking on the relationship between SNS use and GPA in United States and European university students using quantitative and qualitative data analysis.</td>
<td>Moderated Multiple Regression analysis results showed that the negative relationship between SNS use and GPA was moderated by multitasking only in the US sample.</td>
</tr>
</tbody>
</table>
The main research question for the pilot study was “What is the relationship between time spent on SNSs, frequency of SNS use, multitasking with SNSs, time spent studying, and Grade Point Average (GPA)?” The second research question was “What are the differences between the United States (US) and European (EU) models examining the relationship between time spent on SNSs, frequency of SNS use, multitasking with SNSs while studying, time spent studying, and Grade Point Average (GPA)?” The following research hypotheses (e.g., H1 – H4) were investigated:

(H1): Time spent studying has a positive and direct relationship with students’ GPA.

(H2): Time spent on the SNSs has a negative and direct relationship with students’ GPA.

(H3): Having SNSs on in the background while studying has a positive and direct relationship with total social networking hours.

(H4): Using SNSs multiple times per day has a positive and direct relationship with total social networking hours.

As discussed in the literature review, in their first study, Kirschner and Karpinski (2010) found a negative relationship between Facebook® use and academic performance. Following this, Karpinski and colleagues (2013) examined differences between the US and European students’ SNS use and academic performance (i.e., GPA) moderated by multitasking and found that the negative relationship was moderated by multitasking in the US sample. Therefore, current research replicated and extended the findings of the above two studies using Path Analysis.
CHAPTER III

METHODOLOGY OF THE PILOT STUDY

To test the research hypotheses and the model of this study, data were collected from the US and Europe. The measures, data collection procedures, and overview of data analysis methods are described in this chapter.

Participants

Data were collected online from multiple universities in the US and Europe. The sample included both graduate and undergraduate students. The composition of participants will be discussed in the results section.

Measures

The survey (see Appendix A) consisted of five sections: Section 1 was demographic and general in nature (e.g., age, major, multitasking); academic information was provided in Section 2 (e.g., GPA, hours spent studying, involvement); the third section asked about computer and the Internet use (e.g., hours spent on the Internet). Section 4 was specific to SNS use (e.g., SNS accounts, minutes of SNS use, multitasking and SNS use). Finally, Section 5 explored the open-ended student reflections on SNS use. Validity evidence was provided by reviewing the survey for several validity criteria: (a) clarity in wording, (b) relevance of the items, (c) use of standard English, (d) absence of biased words and phrases, (e) formatting of the items, and (f) clarity of the instructions (Fowler, 2002). Two faculty and two graduate students used the above guidelines to review the survey. Based on their comments, it was revised prior to administration.
GPA was self-reported and was placed on a 4.0 scale. Time spent studying and SNSs were open-ended items. The frequency analysis of one of the continuous variables, hours spent studying, showed that participants appeared to be interpreting it as a Likert scale, with responses gathered primarily in five categories. Therefore, time spent studying was transformed into a Likert Scale (i.e., 0 = Less than 1 hour; 1 = Up to 2 hours; 2 = Up to 3 hours, 3 = Up to 4 hours, and 4 = More than or equal to 4 hours; Rasmussen, 1989). The general frequency of SNSs use (i.e., 0 = Every 3 months, 1 = Every month, 2 = Every week, 3 = Daily, 4 = Multiple times per day) was measured on a 5-point Likert scale as well. The act of multitasking with SNSs while studying was collected by asking, “Do you use SNSs or have SNSs on in the background while studying?”, and it was a dichotomous variable (i.e., 0 = No, 1 = Yes).

Junco (2013) tested the criterion validity of measures of Facebook® frequency by comparing self-reported time spent on SNSs and number of logins against actual usage as measured by computer monitoring software. He found a strong positive correlation between self-reported and recorded time spent on Facebook®; however, there was a discrepancy between the average estimates. Recorded data found that students spent an average of 26 min (SD = 30) per day on Facebook®, which was lower than their reported average of 145 (SD = 111) minutes per day. Additionally, he also reported a moderate relationship between frequency of SNSs usage and actual time spent on Facebook®. Therefore, self-reported amount of time is expected to be an indicator of the actual amount of time the participants spent on SNSs.
Procedures

Institutional Review Board (IRB) approval was obtained from Kent State University (see Appendix B). Data ($N = 790$) were collected online through a survey-hosting website from multiple universities in the US and across Europe. Data collection occurred primarily through e-mail invitation to complete a web-based survey. Recruitment e-mails were sent directly to faculty members and instructors at various universities, which included a link to the survey and password that was to be forwarded to the students.

Overview of the Analyses

“Causal modeling” or “the method of path coefficients” (i.e., Path Analysis [PA]) was first defined and developed by an American geneticist, founder of theoretical population genetics, Sewall Wright (1918, 1921a, 1921b, 1923, 1934). Wright (1934) claimed that “there are usually a priori or experimental grounds for believing that certain factors are direct causes of variation in others or that other pairs are related as effects of a common cause,” and suggested that “…causal relationships may be combined with the knowledge of the degree of relationship furnished by the coefficients of correlation” (p.559). In the 1960s, the method became popular with social scientists (Blau & Duncan 1967), and in the mid-70s, the developments continued with the evolution of computer programs. In this pilot study (i.e., Part I), PA was used to examine the relationships between the observed variables.

Path Analysis (PA), an extension of multiple regression models (Klem, 1995), is the appropriate method to examine the hypothesized relationships between the observed
variables as shown in Figure 3 (Lleras, 2005; Schumacker & Lomax, 2010). PA is a statistical technique used to estimate a set of simultaneous regression equations with observed variables assuming measured without error (Schumacker & Lomax, 2010). A path diagram was used to illustrate the hypothesized relationships. In the path diagram, the connections among observed variables are represented by two types of arrows: a straight arrow (i.e., representing the causal relationship between the two variables) and a curved two-headed arrow (i.e., representing the simple correlation between the two; Loehlin, 2012). Descriptive statistics of the data were analyzed using Predictive Analytics Software (PASW) Statistics version 18.0 (SPSS, Inc., 2009). LISREL 8.80 Edition was used for the PA and LISREL-PRELIS, a preprocessor of data prior to running LISREL, was used to render the correlation matrices (Jöreskog & Sörbom, 1996). The common steps used to examine a path model are outlined below.

The Model

Unlike multiple regression analyses, PA can include more than one dependent variable, and the predictive ordering of variables is purposeful (Klem, 1995). The proposed path diagram for the study is illustrated in Figure 3. The variables STUDYHRS, SNSFREQ and SNSBACK are exogenous variables (i.e., independent variables; have paths coming from them and none leading to them); SNSHRS and GPA are endogenous variables (i.e., dependent variables; have at least one path leading to them; Norman & Streiner, 2003).
The list of abbreviations used in the proposed model includes:

- GPA: Self-reported grade point average
- STUDYHRS: The total amount of time spent studying
- SNSHRS: The total amount of time spent on SNSs
- SNSFREQ: The frequency of SNSs use
- SNSBACK: The act of multitasking with SNSs while studying.

The observed variables are illustrated by boxes or rectangles. The straight lines from one observed variable to another denote direct effects (i.e., direct influence of one variable on another). For example, it is hypothesized that time spent on SNSs has a direct impact on students’ GPA, or in other words, time spent on SNSs may negatively influence the students’ grades. A curved line between independent observed variables indicate covariance and in the proposed model STUDYHRS, SNSFREQ and SNSBACK are specified to correlate (Schumacker & Lomax, 2010). Finally, each dependent or endogenous variable (i.e., SNSHRS and GPA) has an error term, or disturbance, denoted by an arrow, pointing toward the variable (Kline, 2011). The error term represents the unexplained variance, meaning an indication of other possible influences on GPA and SNSHRS that are not contained in the specified model (Schumacker & Lomax, 2010).
Figure 3. Proposed conceptual framework. GPA: Self-reported grade point average; STUDYHRS: The total amount of time spent studying; SNSHRS: The total amount of time spent on SNSs; SNSFREQ: The frequency of SNSs use; SNSBACK: The act of multitasking with SNSs while studying.

Model Specification

Previous research plays a significant role in model specification, which includes hypothesizing relationships among observed variables. As an example, previous research has indicated that there might be a relationship between multitasking and SNS use. Therefore, in Figure 3, the act of multitasking with SNSs while studying was shown in the path model to influence the total amount of time spent on SNSs. In the analysis, path coefficients were estimated (i.e., essentially a multiple regression equation) for each endogenous variable (Klem, 1995). Two multiple regression analyses were required to obtain the path coefficients for the proposed model. The variables for each of these regressions are listed in Table 4.
Table 4

Variables Used in Regression Analyses to Obtain Path Coefficients

<table>
<thead>
<tr>
<th>Dependent Variables</th>
<th>Independent Variables</th>
</tr>
</thead>
<tbody>
<tr>
<td>GPA</td>
<td>Time spent studying</td>
</tr>
<tr>
<td></td>
<td>Time spent on SNSs</td>
</tr>
<tr>
<td>Time spent on SNSs</td>
<td>The frequency of SNSs use</td>
</tr>
<tr>
<td></td>
<td>The act of multitasking with SNSs while studying</td>
</tr>
</tbody>
</table>

Note. GPA = Grade Point Average

In terms of variable names, the structural equations are as follows:

- $GPA = STUDYHRS + SNSHRS + error1$
- $SNSHRS = SNSFREQ + SNSBACK + error2$

Model Identification

In the model, some paths are fixed and the others are free. An example of a free parameter is that there is no path or direct relationship between SNS frequency and GPA. An example of a free parameter is that there is a path or direct relationship time spent on SNSs and GPA. For the model identification, the number of free parameters to be estimated must be less than or equal to the number of distinct values in the matrix $S$ (i.e., covariance matrix). In the existing path model, to demonstrate the minimum condition of identification, the number of free parameters and the number of distinct values in the matrix $S$ were calculated. Thus, the number of distinct values in the sample matrix $S$ has to be greater than or at least equal to the number of free parameters to satisfy the minimum condition of identification (Schumacker & Lomax, 2010).
Model Estimation

After model identification, the next step is to estimate the parameters of the proposed model (Schumacker & Lomax, 2010). Parameters can be estimated by different estimation procedures (i.e., Maximum Likelihood (ML); Generalized Least Squares (GLS); Unweighted Least Squares (ULS); Weighted Least Squares (WLS); Schumacker & Lomax, 2010). In case of a normality violation, Schumacker and Lomax (2010) recommended to use the WLS estimation method to handle the nonnormal data (Muthén, 1993). The WLS estimator can be applied to either continuous or ordinal outcomes since it does not assume a particular distributional form (i.e., requires very large sample; Kline, 2011).

A recommended condition for WLS estimation is using an Asymptotic Covariance Matrix (ACM) with the sample covariance matrix in the LISREL-PRELIS program. ACM can be used as a weight matrix in two different ways: (a) when WLS is defined as the estimation method, and (b) when it is necessary to correct for bias in standard errors and fit statistics (i.e., adjusts the normal-theory; Schumacker & Lomax, 2010).

First, the raw data submitted to the PRELIS program (i.e., to estimate polychoric, polyserial, or other types of correlations among the observed variables), then these correlations and other statistical information were used to compute an ACM (i.e., analyzed in LISREL with WLS estimation; Kline, 2011). All different types of correlations (i.e., Pearson, polychoric, polyserial) were used to create an ACM (i.e., necessary for WLS estimation), using the LISREL-PRELIS program. Pearson product-
moment correlations (i.e., correlation between two continuous variables), polyserial (i.e., correlation between a continuous and categorical variable), and polychoric correlations (i.e., correlation between two categorical variables with two or more levels; Kline, 2011) were reported for all observed variables. Table 5 illustrates the scales of measurement for each variable and types of correlation coefficients that were used in the analysis.

Table 5

*Types of Correlation Coefficients*

<table>
<thead>
<tr>
<th>Study Variable / Scale of Measurement</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. GPA (Interval)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Hours of daily studying (Ordinal)</td>
<td>PS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Hours of daily SNS use (Interval)</td>
<td>PE</td>
<td>PE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Frequency of any SNS use (Ordinal)</td>
<td>PS</td>
<td>PC</td>
<td>PS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Multitasking with SNSs (Dichotomous)</td>
<td>PS</td>
<td>PC</td>
<td>PS</td>
<td>PC</td>
<td></td>
</tr>
</tbody>
</table>

*Note.* GPA = Grade Point Average; PE = Pearson Product-Moment; PC = Polychoric; PS = Polyserial.

**Model Testing**

After testing the model, the fit must be examined. A good model fit means “the specified model has been supported by the sample data” (Schumacker & Lomax, 2010, p.154). In order to determine the fit of the proposed model, the following fit indices were reported: Chi-square, the goodness-of-fit index (GFI), the adjusted goodness of fit index (AGFI), the Root Mean Square Error of Approximation (RMSEA), and the Standardized Root Mean Residual (SRMR). Chi-square is a traditional measure of model fit, but is
often influenced by sample size (Kline, 2011). The chi-square fit statistic will likely be
significant with large sample sizes even if the model actually fits the data well.
Therefore, additional fit indices were reported that are not influenced by sample size.
Adequate fit of the model is determined by a non-significant chi-square; an SRMR of .05
or .08 or below; an RMSEA of less than .05 or .08; a GFI and an AGFI of .95 or above
(Kline, 2011; Schumacker & Lomax, 2010). In case of bad fit indices, the researcher is
able to modify the path model, and LISREL provides modification indices and expected
parameter change values to guide modifying a model to obtain better model-fit criteria
(Schumacker & Lomax, 2010).

Model Modification

As stated above, the fit of the path model may not be satisfactory. In this case, the
researcher modifies the model to find a better fitting model (Schumacker & Lomax,
2010). There are several procedures for model modification. For example, to obtain a
better fitting model, the researcher can eliminate parameters that are not significantly
different from zero (e.g., \( t > 1.96 \)), include additional parameters, or examine the
standardized residual matrix (i.e., large residuals, greater than \( \pm 1.96 \) or \( \pm 2.58 \) indicate
that a particular relationship is not well accounted for by the model; Schumacker &
Lomax, 2010). Overall, it is important to modify the poorly fitting model to find a best-
fitting theoretical model using the techniques listed above for model modification, but
only if previous research and theory can support the changes made.
CHAPTER IV
RESULTS OF THE PILOT STUDY

Outliers and Assumptions

The data were screened for outliers in the full sample, and in the US and European samples (i.e., \( z > \pm 2.58 \)). There were no extreme values on any of the main variables. All the variables had some missing data, but this was less than 2%, which is ignorable or not systematic (i.e., less than 5% on a single variable; Kline, 2011). Preliminary examination of the data revealed that the assumption of multivariate normality was not met for the two groups (see Table 6). The normality assumption was also violated for the overall sample (see Table 7) – for each of the variables – were significantly skewed (i.e., lack of symmetry) based on an examination of histograms and skewness statistics (i.e., \( z > \pm 2.58 \)). Therefore, WLS estimation method was appropriate with the asymptotic covariance matrix (Schumacker & Lomax, 2010).

Data from 790 participants who completed the survey were used. WLS estimation was used with the asymptotic covariance matrix, as the multivariate normality assumption was violated. Based on the sample size recommendations by Bentler (2007), the present sample size \((N = 790)\) is sufficient to test the proposed model including covariates with a 50:1 \(N:q\) ratio (where \(q\) represents the number of free parameter estimates) – the recommended ratio is between 5:1 and 10:1 (i.e., 5 to 10 cases for every parameter estimate).
As discussed in the methodology section, only time spent studying was transformed into a 5-point Likert scale. Another item (i.e., “How often do you use it/them?”) with a positive skewness was titled as the frequency of SNS use, which was a 5-point Likert scale item. The responses for this item contained “daily” (n = 314), “multiple times per day” (n = 457) and 14 of the other options (e.g., weekly). To normalize the responses for this item, the standardized scores were used. Examination of the correlation matrix for the overall data set (see Table 7) did not reveal any problems with multicollinearity (i.e., r > .80).

Participants

There were 444 participants (56.2%) from the US (e.g., Ohio, Georgia, New York, etc.) with the remaining participants from European universities (n = 346; 43.8%; e.g., United Kingdom, Germany, Netherlands, Turkey, etc.). There were 513 (64.9%) undergraduate and 277 (35.1%) graduate students with mean ages of 22.41 (SD = 9.42) and 25.54 (SD = 7.08), respectively. Two hundred twenty-two (28.1%) were males and 564 (71.4%) were females. This is “normal” for the primary population, which was predominantly Social Science/Humanities majors (e.g., Sociology, English, Education; n = 491; 62.2%). Others identified themselves as Natural Science/Engineering (e.g., Biology, Chemistry, Economics.) majors. Finally, the majority of participants were White (n = 683; 86.5%).
Descriptive Analysis of the Pilot Study Variables

Descriptive statistics (see Table 6) are displayed for the US and Europe samples. The US students’ GPAs on average were 3.40 ($SD = .53$), and European students’ GPAs, when linearly translated to a US based 4-point scale, were 2.73 ($SD = .54$). Student reports of hours studying per day were higher for the US students compared to European students ($M = 1.56, SD = 1.93$ and $M = 1.33, SD = 1.31$, respectively; $t = 2.42, df = 778, p < .05$). All participants indicated using SNSs with Facebook® being the most popular ($n = 772; 97.7\%)$. Other SNSs used included Twitter®, Hyves®, Myspace®, and Orkut®. In the US, 278 students (62.6\%) and in Europe 179 students (51.7\%) claimed to use SNSs multiple times per day. Additionally, another significant difference between two groups

Table 6

Descriptive Statistics for the Endogenous and Exogenous Variables for the US and European Samples

<table>
<thead>
<tr>
<th>Study Variables</th>
<th>US ($n = 444$)</th>
<th></th>
<th></th>
<th>European ($n = 346$)</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$M$ ($SD$)</td>
<td>Skewness</td>
<td>Kurtosis</td>
<td>$M$ ($SD$)</td>
<td>Skewness</td>
<td>Kurtosis</td>
</tr>
<tr>
<td>----------------------------</td>
<td>---------------</td>
<td>-----------</td>
<td>----------</td>
<td>----------------</td>
<td>-----------</td>
<td>----------</td>
</tr>
<tr>
<td>GPA</td>
<td>3.40 (.53)</td>
<td>-6.03</td>
<td>-2.14</td>
<td>2.73 (.54)</td>
<td>2.08</td>
<td>-1.59</td>
</tr>
<tr>
<td>Hours of daily studying</td>
<td>1.56 (1.31)</td>
<td>3.64</td>
<td>-4.12</td>
<td>1.33 (1.32)</td>
<td>5.52</td>
<td>-2.42</td>
</tr>
<tr>
<td>Hours of daily SNS use</td>
<td>2.41 (1.93)</td>
<td>12.79</td>
<td>13.17</td>
<td>2.11 (1.76)</td>
<td>13.48</td>
<td>14.53</td>
</tr>
<tr>
<td>Frequency of any SNS use</td>
<td>.12 (.91)</td>
<td>-4.61</td>
<td>-7.43</td>
<td>-.16 (1.09)</td>
<td>-4.33</td>
<td>-2.45</td>
</tr>
<tr>
<td>Multitasking with SNSs</td>
<td>.62 (.49)</td>
<td>-4.18</td>
<td>-7.65</td>
<td>.51 (.50)</td>
<td>-.22</td>
<td>-7.66</td>
</tr>
</tbody>
</table>
reported was the time spent on SNSs. The US students claimed to use SNSs slightly more on average ($M = 2.41, SD = 1.92$ hours/day) than European students ($M = 2.11, SD = 1.76$ hours/day). With regard to multitasking with SNSs while studying, the higher number of the US students compared to European students, indicated that they do use SNSs or have them on in the background while studying ($n = 273 \ [61.5\%]$ and $n = 174 \ [50.3\%]$, respectively).

**Data Analysis**

**Model Identification**

For model identification, the number of free parameters to be estimated must be less than or equal to the number of distinct values in the matrix $S$ (i.e., the covariance matrix). The number of free parameters included:

- Four path coefficients
- Two equation error variances
- Three correlations among the independent variables
- Three independent variable variances

Thus, there are a total of 12 free parameters were estimated. The number of distinct values in the matrix $S$ is equal to $[p (p+1)]/2$, where $p$ is the number of observed variables in the matrix. For the proposed model: $[5(5+1)]/2=15$. Thus, the number of distinct values in the sample matrix $S$, 15, is indeed greater than the number of free parameters, 12. The minimum condition of identification is satisfied, and the model is over-identified (Schumacker & Lomax, 2010).
**Model Estimation and Correlations**

Correlations between the variables in the path models and descriptive statistics are displayed in Table 7 for the overall data set. Depending on the level of measurement, different correlations were used: (a) Pearson product-moment correlations for two continuous variables, (b) polyserial correlations to examine the relationship between a continuous and categorical variable, and (c) polychoric correlations for two categorical variables with two or more levels (Kline, 2011). In the overall sample, except the relationships between hours of daily studying and multitasking with SNSs ($r = -.10, p > .05$) and GPA and frequency of any SNS use ($r = -.06, p > .05$); all the relationships between the variables were statistically significant (see Table 7).

**Table 7**

*Correlation Matrix and Descriptive Statistics for the Endogenous and Exogenous Variables for the Overall Data (N=790)*

<table>
<thead>
<tr>
<th>Study Variable</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>M (SD)</th>
<th>Skewness</th>
<th>Kurtosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. GPA</td>
<td>--</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Hours of daily studying</td>
<td>-.27*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3.11</td>
<td>.63</td>
<td>-2.50</td>
</tr>
<tr>
<td>3. Hours of daily SNS use</td>
<td>-.32**</td>
<td>-.11**</td>
<td></td>
<td></td>
<td></td>
<td>1.46</td>
<td>1.32</td>
<td>6.29</td>
</tr>
<tr>
<td>4. Frequency of any SNS use</td>
<td>-.06</td>
<td>-.10*</td>
<td>.44**</td>
<td></td>
<td></td>
<td>2.27</td>
<td>1.86</td>
<td>18.35</td>
</tr>
<tr>
<td>5. Multitasking with SNSs</td>
<td>-.09**</td>
<td>-.10</td>
<td>.45**</td>
<td>.52**</td>
<td>--</td>
<td>0</td>
<td>1</td>
<td>-7.07</td>
</tr>
</tbody>
</table>

*Note.* *p* < .05. **p** < .01. ***p*** < .001
Correlations between the variables in the path models (see Table 8) are displayed for the US and Europe samples. For the main variables of interest, in the US sample, the relationships between hours spent studying per day and GPA ($r = .32, p < .01$), and hours spent using SNSs per day and GPA ($r = -.58, p < .001$) were both significant and in the hypothesized direction. Additionally, the negative relationship between hours per day studying and hours per day of SNS use was significant ($r = -.22, p < .01$). Both variables related to SNS use; frequency of any SNS use and multitasking with SNSs were positively and correlated with time spent on SNSs.

Table 8

**Correlation Matrices for the United States (n = 444) and Europe (n = 346)**

<table>
<thead>
<tr>
<th>Study Variables</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. GPA</td>
<td>--</td>
<td>.32**</td>
<td>-.58***</td>
<td>-.31*</td>
<td>-.36**</td>
</tr>
<tr>
<td>2. Hours of daily studying</td>
<td>.19**</td>
<td>--</td>
<td>-.22**</td>
<td>-.23</td>
<td>-.30</td>
</tr>
<tr>
<td>3. Hours of daily SNS use</td>
<td>-.22**</td>
<td>.02***</td>
<td>--</td>
<td>.47***</td>
<td>.53***</td>
</tr>
<tr>
<td>4. Frequency of any SNS use</td>
<td>-.07</td>
<td>-.01</td>
<td>.40*</td>
<td>--</td>
<td>.58</td>
</tr>
<tr>
<td>5. Multitasking with SNSs</td>
<td>.003*</td>
<td>.14</td>
<td>.34**</td>
<td>.44</td>
<td>--</td>
</tr>
</tbody>
</table>

*Note. The European student correlation matrix is below the diagonal line and the United States student correlation matrix is above the diagonal line.

*p < .05. **p < .01. ***p < .001.

In the European sample, the relationship between hours spent studying per day and GPA ($r = .19, p < .01$) was weaker in magnitude compared to the US sample. The relationship between hours spent using SNSs per day and GPA ($r = -.22, p < .01$) was
significant and negative, but considerably smaller in magnitude compared to the US sample. The relationship between hours per day studying and hours per day of SNS use was significant in the European sample ($r = .02, p < .001$) and smaller in magnitude and in an opposite direction (i.e., positive) compared to the US sample. Finally, frequency of any SNS use and multitasking with SNSs were also both positively correlated with hours spent on SNSs, and the magnitudes were smaller in magnitude compared to the US sample (see Table 8).

**Overall path analysis.** The WLS estimates for the overall, the US and European models are shown in Table 9. The path coefficients are standardized regression coefficients (i.e., beta weights). All paths except, SNSHRS and GPA were hypothesized to be positive in direction and all paths were significant in the model ($p < .01$). These standardized coefficients allow comparisons between the relative magnitude (i.e., strength and sign) of the effects of different explanatory variables in the model. Thus, with standardized path coefficients it is easier to determine which variables are more influential in the model. Time spent studying had a direct and positive impact on students’ GPA whereas time spent on SNSs had a negative direct impact. SNSs frequency and multitasking with SNSs, both had a direct and positive impact on time spent on SNSs.

As shown in Figure 4, the largest standardized path coefficient in the overall model was .30 from multitasking SNSs to time spent on SNSs. In addition, 10% of variability in GPA was explained by time spent studying and SNSs and 25.5% of
variability in time spent on SNSs was explained by the frequency of SNSs use and the act of multitasking with SNSs while studying.

Figure 4. Path model of SNS use on academic performance: Overall data set. GPA = Self-reported grade point average; STUDYHRS = The total amount of time spent studying; SNSHRS = The total amount of time spent on SNSs; SNSFREQ = The frequency of SNSs use; SNSBACK = The act of multitasking with SNSs while studying.

Chi-Square=21.12, df=3, P-value=.0001, RMSEA=.00

The US model. The standardized structural (path) coefficients between the variables were given in Figure 5. All paths, except SNSHRS and GPA were hypothesized to be positive in direction; all paths were significant ($p < .01$). Time spent studying had a direct and positive impact on students’ GPA, whereas time spent on SNSs had negative direct impact. For SNSs frequency and multitasking with SNSs, both had a direct and positive impact on time spent on SNSs. As shown in Figure 5, the largest standardized path coefficient was -0.55 from time spent on SNSs to GPA. In addition, 38.5% of variability in GPA was explained by time spent studying and SNSs and 32.5%
of variability in time spent on SNSs was explained by the frequency of SNSs use and the act of multitasking with SNSs while studying.

**Figure 5.** Path model of SNS use on academic performance: The US students. GPA = Self-reported grade point average; STUDYHRS = The total amount of time spent studying; SNSHRS = The total amount of time spent on SNSs; SNSFREQ = The frequency of SNSs use; SNSBACK = The act of multitasking with SNSs while studying.

**The European model.** The standardized path coefficients between the variables were given in Figure 6. Similarly, all paths were significant \( p < .01 \) and time spent studying had a direct and positive impact on students’ GPA, and this impact was similar to the US sample. However, time spent on SNSs had a negative direct impact, but not as high compared to the US. For SNSs frequency and multitasking with SNSs, both had a direct and positive impact on time spent on SNSs. As displayed in Figure 6, the largest standardized path coefficient was .31 from the frequency of SNSs use to time spent on
SNSs. In addition, 8% of variability in GPA was explained by time spent studying and SNSs and 19.4% of variability in time spent on SNSs was explained by the frequency of SNSs use and the act of multitasking with SNSs while studying.

![Path model of SNS use on academic performance: European students.](image)

**Figure 6.** Path model of SNS use on academic performance: European students. GPA: Self-reported grade point average; STUDYHRS: The total amount of time spent studying; SNSHRS: The total amount of time spent on SNSs; SNSFREQ: The frequency of SNSs use; SNSBACK: The act of multitasking with SNSs while studying.

**Model Testing**

All the fit indices for the overall sample, except the Chi-square statistic, indicated a good fit of the data to the hypothesized model. The chi-square was significant ($\Delta\chi^2_{(3)} = 21.11$, $p < .05$) which indicated a poor fit. The GFI was .99, the AGFI was .98, the SRMR was .03, and the RMSEA was .03. Overall, the fit indices for the overall path model indicated a good fit. The next step included testing two models independently for
Table 9

Weighted Least Squares Estimates and Selected Fit Indices for the Path Models

<table>
<thead>
<tr>
<th>Description</th>
<th>Overall ((N = 790))</th>
<th>US ((n = 444))</th>
<th>European ((n = 346))</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Paths</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Study Hours → GPA</td>
<td>(0.21^{**})</td>
<td>(0.21^{**})</td>
<td>(0.20^{**})</td>
</tr>
<tr>
<td>SNSs Hours → GPA</td>
<td>(-0.22^{**})</td>
<td>(-0.55^{**})</td>
<td>(-0.20^{**})</td>
</tr>
<tr>
<td>SNSs Frequency → SNSs Hours</td>
<td>(0.28^{**})</td>
<td>(0.24^{**})</td>
<td>(0.31^{**})</td>
</tr>
<tr>
<td>SNSs Multitasking → SNSs Hours</td>
<td>(0.30^{**})</td>
<td>(0.40^{**})</td>
<td>(0.21^{**})</td>
</tr>
<tr>
<td><strong>Equation Error Variances</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GPA</td>
<td>21.58</td>
<td>8.91</td>
<td>15.20</td>
</tr>
<tr>
<td>SNSs hours</td>
<td>17.57</td>
<td>11.96</td>
<td>12.77</td>
</tr>
<tr>
<td><strong>Variables</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Variance (Study Hours)</td>
<td>28.20</td>
<td>21.11</td>
<td>18.60</td>
</tr>
<tr>
<td>Variance (SNSs Frequency)</td>
<td>28.09</td>
<td>21.08</td>
<td>18.63</td>
</tr>
<tr>
<td>Variance (SNSs Multitasking)</td>
<td>28.10</td>
<td>21.12</td>
<td>18.66</td>
</tr>
<tr>
<td>Covariance (Study Hours and SNSs Frequency)</td>
<td>(-2.43)</td>
<td>(-4.30)</td>
<td>(-0.9)</td>
</tr>
<tr>
<td>Covariance (Study Hours and SNSs Multitasking)</td>
<td>(-2.06)</td>
<td>(-5.95)</td>
<td>2.13</td>
</tr>
<tr>
<td>Covariance (SNSs Frequency and SNSs Multitasking)</td>
<td>11.51</td>
<td>10.13</td>
<td>6.27</td>
</tr>
<tr>
<td><strong>Selected Fit Indices</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(X^2)</td>
<td>21.11^{**}</td>
<td>2.67</td>
<td>1.58</td>
</tr>
<tr>
<td>Root-Mean-Square Error of Approximation (RMSEA)</td>
<td>0.03</td>
<td>0.00</td>
<td>0.01</td>
</tr>
<tr>
<td>Standardized Root-Mean-Square Residual (SRMR)</td>
<td>0.03</td>
<td>0.01</td>
<td>0.01</td>
</tr>
<tr>
<td>Goodness-of-Fit Index (GFI)</td>
<td>0.99</td>
<td>0.99</td>
<td>0.99</td>
</tr>
<tr>
<td>Adjusted Goodness-of-Fit Index (AGFI)</td>
<td>0.98</td>
<td>0.99</td>
<td>0.99</td>
</tr>
</tbody>
</table>

*Note.* For the paths, the standardized estimates are reported. \(^*p < .01\). \(^{**}p < .001\).
the US and European student groups (see Table 9). All the fit indices in the US sample indicated a good fit of the data to the hypothesized model. The chi-square was not significant \((\Delta \chi^2_{(3)} = 2.67, \ p > .05)\), which indicated a good fit. The GFI was .99, the AGFI was .99, the SRMR was .01, and the RMSEA was .00. Overall, the fit indices indicated a good fit for the US students.

All the fit indices for European sample also indicated a good fit of the data to the hypothesized model. The chi-square was not significant \((\Delta \chi^2_{(3)} = 1.58, \ p > .05)\) and other fit indices were reported. The GFI was .99, the AGFI was .99, the SRMR was .01, and the RMSEA was .01. Similarly, the fit indices indicated a good fit for European students.

**Model Modification**

Across the particular set of model-fit indices, the conclusion is that the data to model fit indicated an acceptable level of fit. There are no suggested modifications for the overall, the US, and European models. First, in looking at the parameters, all were significant. Next, no additional parameters based on the modification indices are recommended to be added to the model. Finally, the standardized residual covariance matrices showed large values \((>2.58)\). The largest standardized residual is between time spent on SNSs and GPA \((-3.30)\). However, the \(t\) statistics did not suggest the elimination of any existing parameters from the path model, since all the parameters were significantly different from zero.

The standardized residual matrices for the US and European samples did not show any unusually large standardized residuals. The largest standardized residual was
between multitasking with SNSs and time spent studying (1.02) in the US sample, and between multitasking with SNSs and GPA in European sample (1.21). However, this standardized residuals were not statistically significant ($p > .01$), and will not be considered further. Therefore, combining all the evidence, the models discussed above have a good fit as evidenced by all the global fit indices and a comparison between the US and European samples is relevant.
CHAPTER V
DISCUSSION OF THE PILOT STUDY

The main objective of this pilot study was to investigate the relationship between time spent on SNSs, frequency of SNS use, multitasking with SNSs, time spent studying, and Grade Point Average (GPA). This study addressed whether time spent on SNSs has an impact on GPA, including other observed variables such as multitasking and hours spent studying. Path models based on previous research and theory were developed to describe the relationships. In addition, two separate path models were compared for the United States (US) and Europe as a pilot study examining cross-cultural differences.

Results of this pilot study for the overall data showed that time spent studying has a positive impact on students’ GPAs and time spent on SNSs has a significant negative impact. Furthermore, frequency of SNS use and multitasking with SNSs while studying had an impact on the amount of time spent on SNSs in a positive manner. In other words, the active SNS users spent more hours on SNSs, and that had a negative impact on their GPAs.

As discussed above, the cross-cultural differences between the US and European college students were examined. According to the pilot study, results indicated that there were some similarities and differences between student groups from different world regions. Students in the US sample had significantly higher GPAs and reported higher amount of time spent studying compared to European students. However, the impact of time spent studying on students’ GPAs did not differ between the two world regions.
While the frequency of SNS use and multitasking with SNSs were found to impact the time spent on SNSs, differences were found between the two samples. Multitasking with SNSs had a higher impact on the total amount of time spent on SNSs in the US sample, whereas the frequency of use was relatively small compared to the Europeans.

A significant difference between the two samples was found between time spent on SNSs and GPA. The negative impact of SNS use on their academic performance was stronger for the US students. This result indicated the extensive use of SNSs had a negative impact on the academic performance for both groups, but especially for the US students. Those findings were also parallel to the qualitative data analysis presented in Ozer and colleagues (2014). The researchers reported a higher number of European students’ perceptions about the positive impact of SNSs on academic performance. European students stated that they were using SNSs for school work and the patterns included sending messages to their classmates, easily connecting with their friends, and communicating for school projects. Additionally, in the same study, most of the US students discussed the negative impact, and mentioned SNSs being time consuming and distracting (Ozer, Karpinski, & Kirschner, 2014).

**Implications**

Results of the pilot study highlight a negative relationship between time spent on SNSs and GPA for all students whether from a European country or the US. SNS use is something done concurrently with studying, or other academic activities in the classroom or at home. The negative relationship between time spent on SNSs and GPAs may be an
indication of a harmful effect of trying to carry out these two automatized processing processes at the same time. In other words, it is not only the time spent on SNSs, but also SNS habits of students. Thus, any task done concurrently with studying may have this same impact. As discussed in the literature review, controlled processing occurs when continuous attention is given to only one task at a time, whereas automatic processing occurs unconsciously. Therefore, for the learning purposes, it is important to give continuous attention to studying, while avoiding automatized reactions (i.e., multitasking). However, with the popularity of SNSs and the increase of Mobile-Social Networking, it became easier for college students to engage in such activities while studying. The results from this pilot study provide valuable cautionary information about the impact of multitasking and using SNS(s) in a learning environment on students’ GPA.

**Limitations**

Due to the design of this research, this pilot study has some limitations. The results may have low generalizability for all countries in Europe and all states in the US. Although generalization to the US and Europe as a whole is nearly impossible, few studies have examined cultural differences even though this could play an important role in SNS use. Culture shapes the way that people behave, the way that they interact and communicate with each other, and how they build relationships with each other (Gudykunst et al., 1996; Hofstede, 2001). Research has shown that cultures or cultural contexts can influence both the patterns of media usage (i.e., amount and/or duration of use) and attitudes toward them (Garramone et al., 1986; Papacharissi & Rubin, 2000).
Future studies should consider examining SNS use, specifically taking culture and cultural differences into account.

The voluntary response sample also is a limitation in that there is no way to corroborate self-reported information; unfortunately, this is often the nature of Internet-based survey research (Karpinski et al., 2013). Additionally, recruiting methods may have biased sample towards individuals who use social media, since recruiting and data collection were both electronic. Future studies should find alternative methods of collecting data (e.g., transcripts for student GPAs; time spent data reports from Facebook® Inc.).

Another limitation for the pilot study was the education level of the participants. The existing study involved the use of survey research methods to collect information from both undergraduate and graduate level students in the US and Europe. It should be mentioned that when a sample includes both undergraduate and graduate students, GPA cannot be counted as an appropriate criterion to measure academic performance (Santeusanio, 1974). The ability to discriminate between the best students is diminished because of the higher GPA scores of graduate students. Therefore, the level of education should be controlled, or the data has to be analyzed separately for those two groups.

Another potential limitation of the study was the measurement of variables as were reported as respondents’ perceptions (i.e., self-reported time spent studying and on SNSs per day, multitasking with SNSs while studying, SNS use frequency). In essence, this pilot study does not have the data of the actual times spent studying or on SNSs. The possible invalidity of individual reports of their time studying and SNS use may be
problematic. In reality, participants in this study may not know how much time they spent studying or using SNSs, whereas there may also be some bias in willingness to report honestly. Junco (2013) found a strong positive correlation between self-reported and recorded time spent on Facebook®; self-reported amount of time is expected to be an indicator of the actual amount of time the participants spent on SNSs. Those finding may also be relevant for study time. Determining the most accurate ways to collect these data (i.e., using additional standardized measures) will heighten the validity of future studies’ findings.

**Future Directions**

Research and the media have shown that students from any part of the world use SNSs extensively and some individuals addictively use SNSs (ComScore, 2013). Thus, it is not unreasonable to assume that students may use SNSs while partaking in academically related activities (i.e., studying), which may have an impact on their academic performance. The goal of the current study was to examine the relationships among the time spent on SNSs, frequency of SNSs use, multitasking with SNSs, time spent studying, and GPA using PA. The current pilot study aimed to add to the burgeoning body of theoretical and empirical literature examining the relationship between SNS use, multitasking, and academic performance from a cross-cultural perspective using path analysis method. Furthermore, this pilot study served as a basis for conducting SEM using latent variables of Facebook® addiction, SNS use, attitudes towards multitasking, and academic performance.
The relationships between latent variables are discussed in Part II. The path analysis method underlies the SEM approach. However, SEM provides a more powerful alternative to PA and other regression techniques and it allows more flexible assumptions (i.e., explicitly correlated error terms, interactions, nonlinearities, and data level).

Additionally, while PA accommodates only measured variables, SEM can model latent variables that cannot be directly observed in data but rather are inferred from measured variables. The use of multiple indicators of a construct helps to reduce measurement error and increase reliability. Thus, using standardized measures of the variables discussed in Part I, the relationships between the latent variables are discussed in Part II.
PART II
CHAPTER VI
INTRODUCTION TO THE MAIN STUDY

The pilot study in Part I addressed whether time spent on SNSs had an impact on university students’ GPAs, including other observed variables such as multitasking with SNSs while studying, and hours spent studying. Path models based on previous research and theory were developed to describe the above relationships. In addition, two separate path models were compared for the US and Europe as a pilot study examining cross-cultural differences.

In Part I, limitations of the pilot study has been discussed. In this section, additional variables were added and the path model in Part I was improved using a new survey study. The purpose of the main study discussed in Part II was to define constructs or latent factors using observed variables. These constructs were Facebook® addiction, the amount of time spent on SNSs, using SNSs for school work, multitasking with SNSs while studying, college self-efficacy and academic performance. For the new model, general use of SNSs is discussed; however, as the leading SNS (e.g., more than one billion users around the world), Facebook® addiction is specifically included in the model (ComScore, 2013). In this section, statement of problem for the main study, research questions and hypotheses, and new variables included in the hypothesized model will be discussed in detail.
Problem Statement

As discussed in Part I, cross-cultural studies examining SNS use are beginning to emerge in the literature. Methodologically, there is a lack of research using different statistical methods to examine the relationship between latent variables of multitasking with SNSs, Facebook® addiction, using SNSs for school work, the amount of time spent on SNSs, college self-efficacy, and academic performance. Therefore, the relationships between variables listed above were examined using SEM, and the differences between two countries: United States and Turkey were discussed.

Research Questions and Hypotheses

This preliminary investigation focused on the following main goals: (a) testing if Facebook® addiction and intensive SNS use impact academic performance, (b) identifying the variables that directly or indirectly impact SNS use and academic performance, (c) understanding the impact of Facebook® addiction on general SNS use and academic performance, (d) indicating relationships between the variables, and (e) probing the differences between university students from different cultures (i.e., the US and TR). From the previous literature, a negative relationship is expected between general SNS use and academic performance. Thus, the following research questions were investigated in the US and TR models (see Figure 7):

(Q1): Does the level of Facebook® addiction predict using SNSs for school work?

(Q2): Does the level of Facebook® addiction predict multitasking with SNSs while studying?
(Q3): Does the level of Facebook® addiction predict the time spent on SNSs?

(Q4): Does using SNSs for school work predict time spent on SNSs?

(Q5): Does using SNSs for school work predict multitasking with SNSs while studying?

(Q6): Does using SNSs for school work predict students’ academic performance?

(Q7): Does multitasking with SNSs while studying predict time spent on SNSs?

(Q8): Does multitasking with SNSs while studying predict students’ academic performance?

(Q9): Does time spent on SNSs predict students’ academic performance?

(Q10): Does college self-efficacy predict students’ academic performance?

**Identification of the Variables**

In Figure 7, hypothesized structural model is shown with two observed and four latent variables. Multitasking with SNSs while studying, the amount of time spent on SNSs, using SNSs for school work, and academic performance are the dependent variables (i.e., endogenous variables that have at least one path leading to it). Facebook® addiction and college self-efficacy are the independent variables (i.e., observed variables; exogenous variables that have paths coming from it and none leading to it).

For the main variables of interest in the current study, the indicators of the academic performance was measured using, self-reported GPAs (i.e., high school and current GPA), scholarship, and time spent studying. For instance, participants responded to the open-ended item “What is your current cumulative grade point average?”
Figure 7. Hypothesized structural model. The rectangles represent observed variables. The ovals represent unobserved latent variables.
The indicators for multitasking with SNSs (e.g., I multitask with my SNS account while studying) and the use of SNSs for school work (e.g., I use my SNS account to communicate for group projects) were developed using the qualitative data analysis findings (Ozer et al., 2014). The general use of SNSs was also another interest of this study. Participants responded to questions related to the amount of time spent on SNSs (i.e., approximately how many hours/minutes per DAY, do you spend using SNSs?).

Facebook® addiction (Andreassen, Torsheim, Brunborg, & Pallesen, 2012) indicated the level of agreement with specific statements related to addiction level. Variables were measured asking a series of statements, in terms of the extent to which the participants agree or disagree with a particular statement. The total score out of 6 items indicates the level addiction. A predictor of academic performance, another observed variable in this study, was the total score of College Self-Efficacy Inventory (CSEI; Solberg, O'Brien, Villareal, Kennel, & Davis, 1993). All the observed and latent variables will be discussed in Methodology chapter.

**Organization of the Remaining Document**

The next section of Part II (i.e., Chapter 7: Literature Review of the Main Study) will include a literature review in addition to the research in Part I. The new sections include SNS use in Turkey, using SNSs for school work, college self-efficacy, and measuring Facebook® addiction. Chapter 8 (i.e., Methodology of the Main Study) will preview an in-depth description of the methods that were used to address the study’s main goals. This section will provide extensive descriptions of the variables, measures,
and details of the statistical analyses. The results (i.e., Chapter 9) and research hypotheses will be discussed in the final section.
CHAPTER VII

LITERATURE REVIEW OF THE MAIN STUDY

In Part I (i.e., Chapter II), the literature prior to the existing study were discussed. In this section, only additional variables that were included in the new model are discussed in detail. Those include SNS use in Turkey, using SNSs for school work, college self-efficacy, measuring Facebook® addiction, and cultural differences.

SNS Use in Turkey

There are over 7 billion people in the world, more than 2.5 million of those are on the Internet, and nearly 2 million are using social media on a regular basis. According to Kemp’s (2014) report, the average number of hours per day spent on the Internet is 1.9 hours through mobile devices, and 4.9 hours through laptop or desktops in Turkey. Turkey is the 6th largest country after the United States, Brazil, India, Indonesia, and Mexico with respect to the total number of Facebook® accounts (Quintly, 2013). The total number of Facebook® users in Turkey is about 34 million and the demographic statistical analyses from 2012 demonstrate that more than eight million Facebook® users were between the ages of 18-24 (CheckFacebook.com, 2013). Today, active social media users in Turkey spent 2.5 hours per day on average on social channels (Kemp, 2014). These statistics show that Facebook® is generally preferred by undergraduate-level students. Overall, Turkey has a large amount of total number of user accounts, in addition to an increasing number of users.
A recent study from the Ministry of Youth and Sports of Turkish Republic (2013) illustrated that two-third of the participants (i.e., 15-29 age group; N = 2057) check their SNSs more than one time in a day, and almost 30% of the participants mentioned spending at least three hours on SNSs, whereas 13% of the participants mentioned spending six hours or more on SNSs. In the same report, 60% of the participants mentioned using SNSs for entertainment and sharing/receiving information (Bulut, 2013). On average 45% of the participants mentioned using social media for education and research. More than half of the participants agreed on social media as being “a social or political platform” and “a replacement for traditional media” (p.18). The major reason of this replacement was because through the various social media channels participants are able to reach the current news that traditional media does not provide.

With regards to the research on social networking conducted in Turkey, one study examined students’ opinions towards social networking (Vural & Bat, 2010). The participants included 319 undergraduate students from Turkey with an age range of 19 to 28. The findings showed that 36.7% of the participants use the Internet to share information, 26.6% for social networks, and 25.4% for entertainment. Sixty-seven percent of the participants connect to the Internet every day, and 53.6% of all the participants generally spend one to three hours online. Eighty-five point nine percent of the students have a social network account, and 82.4% of them spend more time on Facebook® with respect to other networks (Vural & Bat, 2010). The results from this survey study and demographic statistical analysis indicated that Turkish undergraduate
students use spend at least one to three hours on SNSs each day, and SNSs have become a routine of their lives.

Using SNSs for School Work

SNSs have also been discussed for the use of education-related purposes. In his qualitative data analysis findings, Selwyn (2009) described that Facebook® is a platform of sharing university experiences, exchanging academic and practical information besides socializing. For instance, students mentioned using Facebook® to exchange practical or logistical (i.e., scheduling, location of lectures/seminars; examinations and coursework assignments) and academic information (i.e., required reading for seminars; content of examinations/essays, and other assessment tasks; Selwyn, 2009).

In other research, Ozer and colleagues (2014) examined the negative and positive impact of SNSs on students’ academic performance via open-ended survey responses in the United States (US) and Europe. Most of the US students discussed the negative impact of SNSs. They mentioned SNSs being a distraction and time consuming, and that SNSs were related to academic procrastination. One-third of the US students claimed being responsible in using SNSs and having good time management skills. Compared to European students, the US students were more vocal of the negative impact of excessive SNS use, but they defended being a responsible student and good at multitasking while studying. The most common response regarding positive impact of SNSs on academic performance was using SNSs for school work. The theme was cited by 11.3% \((n = 51)\) of the respondents in the US sample, whereas 130 students (32%) from European countries
specifically mentioned using SNSs for school related work. Sample responses included in this study were:

"It has allowed me to chat with other students in classes if I am having a difficult time with an assignment, or even provide a short break from what I am doing. Although this is quite viable through e-mail, I don't know everyone's e-mail, but I am typically their Facebook® friend." (Undergraduate student from the US)

"It has made getting answers to questions I have easier. If I have a question or need materials for one of my classes, I can post a status update with my question and get quick answers." (Undergraduate student from a European country).

Researchers examined how students use SNSs for academic purposes. In their experimental study, Junco, Heiberger and Loken (2011) found that Twitter® can be used as an educational tool to help engage students and to mobilize faculty into a more active and participatory role. However, the primary use of SNSs is still for communication, and not for school work. SNSs are still predominantly a social tool unrelated to school. However, SNSs (e.g., Facebook®) may “facilitate informal communication around classroom activities” (Lampe, Wohn, Vitak, Ellison, & Wasch, 2011, p.331).

Accordingly, students use Facebook® for educational goals, such as sharing information about their classroom activities, collaborating with their peers on assignments, and arranging study groups (Lampe et al., 2011).

**College Self-Efficacy**

Self-efficacy (SE) is defined as “the strength of a person’s belief that they are able to produce a given behavior,” and college self-efficacy is a student’s degree of
confidence to successfully complete a college-related task (e.g., researching a term paper, writing course papers, doing well on exams, etc.; Solberg et al., 1993). Specifically, previous research has shown that academic self-efficacy is positively related with GPA (Pajares & Schunk, 2001; Vuong, Brown-Welty, & Tracz, 2010). Multon, Brown, and Lent (1991) found a moderate (i.e., effect size of .35) relationship between self-efficacy and college performance in a meta-analysis. Pajares and Schunk (2001) stated that “it is not simply a matter of how capable one is, but of how capable one believes oneself to be” (p.250).

Vuong and colleagues (2010) found that SE (i.e., measured by SE Course, SE Social, and SE Roommate subscales; Solberg et al., 1993) has a direct impact on GPA and persistence rates (i.e., the likelihood of completing the current term, and pursuing the following term). Similarly, Pajares and Schunk (2001) discussed how self-efficacy beliefs had a powerful and independent contribution to predict academic performance. Zajacova, Lynch, and Espenshade (2005) investigated the relationship between self-efficacy, stress, and academic success in college. The results showed a negative relationship between self-efficacy and stress, while academic self-efficacy (i.e., the strongest predictor of GPA) had a strong effect on grades.

**Measuring Facebook® Addiction**

“Addictive behavior” (e.g., smoking, eating, gambling, relationships, etc.) is defined as follows: “a repetitive habit pattern that increases the risk of disease and/or associated personal and social problems” or “the behavior continues to occur despite volitional attempts to abstain or moderate use” (Marlatt, Baer, Donovan, & Divlahan,
Recent literature also uses compulsive, excessive, impulsive, uncontrolled, and indulgent instead of the term “addictive” (Griffiths, 2012; Kuss & Griffiths, 2011). Over the last decade, other addictive behaviors have become a part of our lives, such as Internet addiction, excessive use of the Internet or SNSs. The term “Internet addiction” was defined as “an impulse-control disorder which does not involve an intoxicant” (Young, 1996, p.238). It is also used for the excessive, problematic, or pathological use of the Internet. Young (1996) interpreted the pathological nature of Internet use as parallel to pathological gambling that was the closest in nature to extensive or problematic Internet use. From a general perspective, Griffiths (2013) discussed the emerging evidence of social network users’ addiction like symptoms and claimed that SNS addiction has been incorporating the experience of the ‘classic’ addiction symptoms. Those symptoms were listed as:

1. Mood modification (i.e., favorable change in emotional states while on SNSs),
2. Salience (i.e., behavioral, cognitive, and emotional preoccupation),
3. Tolerance (i.e., increasing the time spent on SNSs over time),
4. Withdrawal symptoms (i.e., experiencing unpleasant physical and emotional symptoms when SNS use is restricted or stopped),
5. Conflict (i.e., interpersonal problems because of extensive SNS usage), and
6. Relapse (i.e., addicts quickly revert back to their excessive SNS usage after an abstinence period; Griffiths, 2013, p.1).

With Facebook’s rapid growth in recent years, researchers have questioned the definition of “Facebook® addiction” (Bugeja, 2006, p.1). It was classified as a specific
form of Internet addiction (Andreassen et al., 2012; Griffiths, 2013). Andreassen and colleagues developed Bergen Facebook® Addiction Scale (BFAS). In the same study, a relationship between BFAS scores and problematic Facebook® use was found to be positive, whereas scores reflecting general use and attitudes toward Facebook® and BFAS had a weaker relationship. As a result, BFAS indicated acceptable psychometric properties (e.g., internal consistency, factor structure, and reliability, validity) to measure Facebook® addiction.

**Examining Cultural Differences**

In Chapter 2, cultural differences regarding SNS use and multitasking have been discussed in detail. Hofstede, Hofstede and Minkov (2010) defined culture as “the unwritten rules of the social game” or “the collective programming of the mind that distinguishes the members of one group or category of people from others” (p. 6), where category refers to nations, regions within or across nations, ethnicities, religions, organizations, genders, etc. Hofstede’s (1980) research identified four dimensions (i.e., power distance; individualism versus collectivism; masculinity versus femininity; uncertainty avoidance) of national culture. Hofstede and colleagues (2010) calculated the country culture scores (i.e., 76 countries) depending on the four dimensions. Out of Hofstede’s (1980) four dimensions, individualism versus collectivism was deemed the most important framework to understand cultural similarities and differences in communication as it reflects the position of culture on a continuum (Gudykunst & Kim, 1997; Hofstede, 2001). Hofstede and Bond (1984) defined individualism as “a situation in which people are supposed to look after themselves and their immediate family only,”
and collectivism as “a situation in which people belong to in-groups or collectivities which are supposed to look after them in exchange for loyalty” (p. 419). According to Hofstede and colleagues’ (2010) individualism index scores, the US scored 91, and the country was listed as the most individualistic culture, while Turkey scored 37, and was listed as a collectivist society.

The key differences between collectivist and individualistic societies related to workplace and the Internet were listed by Hofstede et al. (2010). The cultural differences that are related to the existing study can be listed as follows: (a) task prevails over relationship in individualistic, and in opposite, relationship prevails over tasks in collectivist societies; (b) the primary source of information is media in individualistic, and social network in collectivistic; and (c) the Internet and e-mail hold strong appeal and are frequently used to link individuals, whereas they are less attractive and less frequently used by collectivist cultures.

In his studies, Hall differentiated cultures using a communication-based framework that dominates in the culture (Hall, 1959; Hall & Hall, 1987), and clarified three major influences on intercultural communication based on cultures’ use of context, time, and space (Hall, 1989). Hall defined two orientations toward time: monochronic (i.e., doing only one thing at a time), and polychronic time (i.e., multitasking; being involved with many things at once). Hall (1989) also differentiated monochronic cultures as being low-context (i.e., LC; the mass of the information is vested in the explicit code), and polychronic cultures as being high-context (i.e., HC; most of the information is either
in the physical context or internalized in person, where very little is in the coded, explicit, transmitted part of the message).

In addition to time and context, Hall (1989) classified space as high-space cultures are described as being more task-oriented, and maintaining social distance, while low-space cultures are relationship-related (Holtbrügge, Weldon, & Rogers, 2013). Hall (2000) mentioned that people from the US were more likely doing only one thing at a time, and people from other cultures such as the Middle East, and Southern Europe were more likely to engage in two or more activities at the same time. In their study, Holtbrügge and colleagues (2013) showed the classification list of cultures (i.e., M-time and P-time), and the US is listed as a low-context, M-time, and high-space country, while Turkey is listed as high-context, P-time, and low-space country (Rosenbloom & Larsen, 2003).

Hofstede and colleagues (2010) posed an important question related to the existing study: “Will the Web and mobile communication networks lead to one worldwide culture?” (p. 471), as the speed of adoption of social network software has been “staggering” since 1997. The researchers also noted that cultures may suffer a social cost by not mastering or using the new technologic communicational tools and added:

…groups that use the new technologies to good purposes will perform better in terms of cohesion… In cultures in which education is important, new technologies are used for education, and in groups in which socializing is important, they will be used for that… these advances in communication
technologies will not eliminate group boundaries, but they will enable existing
groups to organize more effectively, building on existing culture. (Hofstede et al.,
2010, p. 472)

In summary, according to Hofstede and colleagues (2010), the US is an
individualistic society and TR is a collectivist society. On the other hand, according to
Hall’s (2000) theory, Americans are monochronic (i.e., low-involvement;
compartmentalize time) people, whereas Turks are classified as polychronic (i.e., highly
involved; several operations going at the same time). Thus, with respect to the previous
literature on cultures, there are reasons to expect cultural differences in Facebook®
addiction, social media use and motives for using SNSs, and the impact on academic
performance between the US and TR. Hofstede and colleagues’ (2010) question was
broadened and altered to understand the cultural differences on social media use and its
impact on academic performance.

Research Questions and Hypotheses

This preliminary investigation focused on the following main goals: (a) testing if
Facebook® addiction and intensive SNS use impact academic performance, (b)
identifying the variables that directly or indirectly impact SNS use and academic
performance, (c) understanding the impact of Facebook® addiction on general SNS use,
and academic performance, (d) indicating relationships between the variables, and (e)
probing the differences between university students from different cultures: the United
States (US) and Turkey (TR). Consequently, the following research hypotheses were
investigated in the US and TR models:
(H1): Facebook® addiction has a significant positive impact on using SNSs for school work.

(H2): Facebook® addiction has a significant positive impact on multitasking with SNSs while studying.

(H3): Facebook® addiction has a significant positive impact on time spent on SNSs.

(H4): Using SNSs for school work has a significant positive impact on time spent on SNSs.

(H5): Using SNSs for school work has a significant positive impact on multitasking with SNSs while studying.

(H6): Using SNSs for school work has a significant positive impact on students’ academic performance.

(H7): Multitasking with SNSs while studying has a significant positive impact on time spent on SNSs.

(H8): Multitasking with SNSs while studying has a significant negative impact on students’ academic performance.

(H9): Time spent on SNSs has a significant negative impact on students’ academic performance.

(H10): College self-efficacy has a significant positive impact on students’ academic performance.
CHAPTER VIII

METHODOLOGY OF THE MAIN STUDY

To test the research hypotheses and theoretical structural model of this research, data were collected from university students in the United States and Turkey. The participants, procedures, instrumentation, and detailed description of data analysis are described below.

Participants and Procedures

The existing study involved the use of survey research methods to collect information from undergraduate level students in the US and TR. It should be mentioned that when a sample includes graduate students, GPA cannot be counted as an appropriate criterion to measure the academic performance (Santeusanio, 1974). Most graduate schools require students to maintain a minimum average of "B" (3.0) before they graduate. Because of the ceiling effect (i.e., produces a restriction in variance of GPA and grades heavily distributed in the “A” or “B” ranges) and grade inflation (Sabot & Wakeman-Linn, 1991), the ability to discriminate between the best students would be diminished.

Following IRB approval, the author uploaded questions addressing participant demographics, and other sections related to SNS use onto a survey-hosting website (i.e., SurveyMonkey). The data were collected from undergraduate and graduate students in the Fall of 2013 and Spring of 2014. Undergraduate participants were recruited by sending e-mails. An e-mail list of students was accessed through universities’ student
services. An e-mail was sent to all students informing them of the purpose of the study. Instructors and students were encouraged to pass the survey information along to other university students who were eligible to participate. Thus, the sampling method began as convenience sampling, which developed into snowball sampling (Goodman, 1961) as more instructors and students recommended other participants.

Details for participating in the study were included in the e-mail. A description of the instructions was also included at the top of the survey. The survey took approximately 20–25 min to complete. SurveyMonkey was used to create the web-based survey and a copy of the survey link was also included in the recruiting e-mail. Thus, recruitment of undergraduate students occurred via e-mail. Institutional Review Board (IRB) approval was obtained from Kent State University (see Appendix D and Appendix E). Participants were anonymous, and data were reported collectively. Identity was protected through the use of a waiver of consent and basic survey research methods that do not include any identifying information. The surveys did not ask the respondent to provide a name or other personal information.

Measures Development

For the purposes of Part II, new survey items were developed for the participants (see Appendix C). Validity evidence once again was provided by reviewing the survey for several validity criteria: (1) clarity in wording, (2) relevance of the items, (3) use of standard English, (4) absence of biased words and phrases, (5) formatting of items, and (6) clarity of the instructions (Fowler, 2002). Two faculty and the author used Fowler’s
guidelines to review the survey. Based on their comments, it was revised prior to administration.

The survey was first prepared in English, and then it was translated into Turkish by the author who is a bilingual. Items of the scales were examined by a Turkish language expert and evaluated related to design (e.g., Introduction, Instructions, Formatting, etc.). Needed corrections were made according to these views. To verify Turkish content approval of the scale, items of the Turkish form of the scale were blind back-translated into English by another bilingual (Brislin, 1970; Sperber, Devellis, & Boehlecke, 1994; Werner & Campbell, 1970). The items were examined for Turkish-English equivalency. According to item by item comparing results, two forms of the survey were found to be identical in meaning (Brislin, Lonner, & Thorndike, 1973). The analysis by the experts confirmed that Turkish and English versions of the scales are equivalent.

The survey consisted of a set of questions related to SNSs and specifically Facebook® usage, the amount of time spent studying, college self-efficacy and the impact on academic performance. Students were asked questions related to their academic performance (e.g., GPA, type of scholarship, time spent studying), college self-efficacy (Solberg et al., 1993), Facebook® use (e.g., addiction; Andreassen et al., 2012), time spent on SNSs, patterns of using SNSs for school work and multitasking with SNSs while studying (Ozer et al., 2014).

The survey for Part II had eight sections: Section 1 was demographic and general in nature (e.g., age, major); academic information was provided in Section 2 (e.g., GPA,
hours spent studying); the third section was the College Self-Efficacy Inventory (e.g., confidence level to successfully complete tasks related to school work). Sections 4 and 5 were specific to Facebook® use (e.g., minutes of Facebook® use, number of Facebook® friends, Facebook® use). In addition to general Facebook® use, two validated scales were administered: Facebook® Intensity Scale (Ellison, Steinfield, & Lampe, 2007) and BFAS (Andreassen et al., 2012). Section 6 was the Smartphone addiction scale (e.g., time spent using Smartphones). Section 7 included items of the PMTS (e.g., I like to juggle two or more activities at the same time). Finally, the last section had 5-point Likert scale items. Those items included general information related to SNS use and academic performance (e.g., I use my SNS account for school work; Ozer et al., 2014).

The following instruments (i.e., Facebook® addiction, college self-efficacy, using SNSs for school work, multitasking with SNSs while studying, time spent on SNSs, and academic performance) were used to develop and test the hypothesized SEM. The latent variables and corresponding items included in the model are discussed in detail.

**Facebook® Addiction**

BFAS, a 6-item instrument, was used to measure the level of Facebook® addiction. All items were scored on the 5-point Likert scale (i.e., 1 = Very rarely, 2 = Rarely, 3 = Sometimes, 4 = Often, 5 = Very often) and yielded an overall score ranging from 6 to 30 (Andreassen et al., 2012). The scale was designed to facilitate treatment research, clinical assessment, but also BFAS was suggested to be used in epidemiological settings (i.e., the estimation of Facebook® addiction prevalence in the general population worldwide). Andreassen’s study shows that scoring of “often” or “very often” on at least
four of the six items may suggest high level of addiction. Thus, total scores were obtained by summing 6 item responses, with higher scores indicating higher levels of Facebook® addiction. Coefficient alpha (α) for the total instrument was .83 (Andreassen et al., 2012) and .86 (Andreassen et al., 2013).

BFAS1: I spend a lot of time thinking about Facebook® or planning your use of Facebook®.

BFAS2: I feel an urge to use Facebook® more and more.

BFAS3: I use Facebook® in order to forget about personal problems.

BFAS4: I have tried to cut down on my use of Facebook® without success.

BFAS5: I have become restless or troubled if you are prohibited from using Facebook®.

BFAS6: I use Facebook® so much that it has had a negative impact on my job or studies.

**College Self-Efficacy Inventory (CSEI)**

The items for the CSEI (Solberg et al., 1993; α = .93) were rated on a 10-point Likert scale ranging from 0 (*not at all confident*) to 10 (*extremely confident*). For the purpose of this study, only course efficacy subscale items were included in the analysis. Total scores ranged from zero to 70. Total scores were obtained by summing the CSEI course items, with higher scores indicating higher levels of college self-efficacy (i.e., a student’s degree of confidence to successfully perform a variety of college related tasks, Solberg et al., 1993). In this study, CSEI total scores were computed by averaging the item total scores (Gore, Leuwerke, & Turley, 2005).
Items listed below were given to follow the statement: “How confident are you that you could successfully complete the following tasks…” (Solberg et al., 1993) and the tasks were listed below:

- CSEI1: Research a term paper
- CSEI2: Write course papers
- CSEI3: Do well on your exams
- CSEI4: Take good class notes
- CSEI5: Keep up to date with your school work.
- CSEI6: Manage time effectively
- CSEI7: Understand your textbooks.

**Using SNSs for School Work**

This measure was developed using a previous study. Ozer and colleagues (2014) discussed the negative and positive impact of SNSs on students’ achievement in their qualitative analysis. In this study, the authors reported using SNSs for school work as one of the major themes that students commonly discussed (e.g., Communicate with classmates for school projects using SNSs). As a result of this qualitative study, the items listed below were used to measure the use of SNSs for school work. All items are scored on the 5-point Likert scale (i.e., 1 = *Very rarely*, 2 = *Rarely*, 3 = *Sometimes*, 4 = *Often*, 5 = *Very often*).

- SNSSCHQ1: I use my SNS account for school work.
- SNSSCHQ2: I use my SNS account to communicate with my classmates.
- SNSSCHQ3: I use my SNS account to communicate for group projects.
Multitasking with SNSs

The act of multitasking with SNSs while studying was measured using the items listed below. All the items were measured on a 5-point strongly-disagree to strongly-agree scale (i.e., MULTSNS3 was reverse-coded). The items were ordinally scaled items (e.g., 1 = Strongly disagree, 2 = Disagree, 3 = Neither agree nor disagree, 4 = Agree, 5 = Strongly agree).

MULTSNS1: I multitask with my SNS account while studying.

MULTSNS2: I have SNS(s) up while doing homework.

MULTSNS3: I do not check my SNS account if I am doing my work for school.

Time spent on SNSs

General SNS use or time spent on SNSs factor was measured with the total amount of hours spent on any SNS per day, the frequency of SNS use, and SNS use priority in daily routine. Time spent on SNSs (i.e., SNSUSE1) was asked as an open-ended item (i.e., approximately how many hours/minutes per day do you spend using SNSs). The frequency analysis of times spent on SNSs showed that participants appeared to be interpreting the continuous scale as a Likert scale, with responses gathered primarily in seven categories. Therefore, time spent on SNSs (SNSUSE1) was transformed into a 7-point Likert Scale (i.e., 0 = Less than half an hour; 1 = Between 30 to 59 minutes; 2 = 1 hour, 3 = 2 hours, 4 = 3 hours, 5 = More than 3, less than 6 hours; 6 = More than or equal to 6 hours per day).

The general frequency of SNSs use (i.e., SNSUSE2) was measured on a 5-point Likert scale (i.e., 1 = Less than 5 times in a week, 2 = Just one time in a day, 3 = No more
than 5 times in a day, 4 = Between 5-10 times in a day, 5 = More than 10 times in a day).

Lastly, the third variable measuring the SNS use priority in daily routine (i.e., SNSUSE3) was measured on a 5-point Likert scale (i.e., How soon after you wake up do you check your social networking account(s)?; 1 = More than 120 minutes, 2 = Between 61 - 120 minutes, 3 = Between 31 - 60 minutes, 4 = Between 6-30 minutes, 5 = In less than 5 minutes).

**Academic Performance**

The academic performance factor includes self-reported high school and college (i.e., current) GPA, time spent studying, and level of scholarship. GPA scores were self-reported and placed on a scale from 0 to 4.0, and scholarship is a categorical item (i.e., 1 = No scholarship, 2 = Partial Scholarship, 3 = Full Scholarship). Time spent studying is an open-ended item asking the respondents to self-report time spent studying in a day (i.e., Approximately how many hours per DAY do you spend studying). The frequency analysis of this continuous variable, hours spent studying, showed that participants more often than not responded as if the item was a Likert scale, with responses gathered primarily in five categories (i.e., continuously-distributed data are naturally categorized and collected on a discrete ordinal scale; Metz, Herman, & Shen, 1998; Rasmussen, 1989). Therefore, time spent studying was transformed into a Likert scale (i.e., 1 = Less than an hour; 2 = 1 hour; 3 = 2 hours, 4 = 3 hours, and 5 = More than or equal to 4 hours).
Overview of the Data Analyses

In this study, the main research question was to understand the differences between the US and TR college students, and explore the impact of SNS use on academic performance. Structural equation modeling (SEM), which incorporates and integrates path analysis and factor analysis, was used for this study. SEM is similar to multiple regression, but in a more powerful way (i.e., takes into account the modeling of interactions, nonlinearities, correlated independents, measurement error, correlated error terms, multiple latent independents each measured by multiple indicators, and one or more latent dependents also each with multiple indicators; Garson, 2009).

Maximum likelihood estimation, which is a common estimation method, requires the normal distribution of continuous variables (Flora & Curan, 2004). In a case of violating the normality assumption, asymptotically distribution free estimates should be used (Browne, 1984; Jöreskog, 1990; Schumacker & Lomax, 2010). Jöreskog and Sörbom (1996) recommend using WLS estimation. As a first step, the polychoric, polyserial or other correlations between observed variables (i.e., ordinal level) have to be estimated (i.e., PM matrix in PRESLIS; Jöreskog, 1990). Then, Jöreskog recommends estimating the model parameters by WLS using a weight matrix (i.e., consistent estimate of the ACM of the correlations).

The ACM and polychronic correlation matrix was obtained by PRELIS, and WLS estimation method was used for CFA and SEM (Flora & Curan, 2004; Schumacker & Lomax, 2010). Suggested minimum sample size to compute an ACM is \((k+1)(k+2)/2\) observations, where \(k\) is the number of variables (Jöreskog & Sörbom, 1996).
structural model, 15 observed variables were used, and the minimum sample size required to run the SEM is almost 140.

This method includes flexible assumptions, use of Confirmatory Factor Analysis (CFA) to reduce measurement error by having multiple indicators per latent variable, the graphical modeling interface, the ease of testing the model overall rather than individual coefficients, and the ability to test path coefficients and invariance of factor loadings across multiple groups (Kaplan, 1995; Wong & Jeffrey, 2002). The SEM process centers around two steps: validating the measurement model and fitting the structural model (Schumacker & Lomax, 2010). Thus, in this section two major steps will be discussed in detail.

**Variables and the Measurement Model**

The measurement model (i.e., Confirmatory Factor Model [CFM]) is specified to define the relationships between the latent and observed variables. Conceptually, a factor or latent variable represents the common variation among a set of observed variables. Thus, for example, the Facebook® addiction factor represents the common variation among the items: BFAS 1, BFAS 2, BFAS 3, BFAS 4, BFAS 5, and BFAS 6.

The observed variables are enclosed by boxes or rectangles, and the factors (latent variables) are enclosed by circles or ellipses (Schumacker & Lomax, 2010). Lines directed from a factor to a particular observed variable donate the relationship between that factor and that observed variable. These relationships are interpreted as factor loadings with the square of the factor loading called the commonality estimate of the variable (Schumacker & Lomax, 2010). The measurement errors (i.e., represent the
unique variation for a particular observed variable beyond the variation due to the relevant factor) are denoted by smaller ellipses and indicate that some portion of each observed variable is measuring something other than the hypothesized factor and the variance of each measurement error is estimated (i.e., measurement error variance; denoted by a curved, double headed line). Lastly, a curved, double-headed line between two factors indicates the shared variance or correlation.

**Figure 8.** The proposed confirmatory factor model. The rectangles represent observed variables. The ovals represent unobserved latent variables. Asterisks represent the paths freely estimated, 1 is used for fixed variables.
In this study, two factors, Facebook® addiction (BFAS) and college self-efficacy (CSEI) were analyzed separately for the 2 models. The total scores for both BFAS and CSEI were used in the structural model. Then, data (i.e., for the US and TR separately) was evaluated using an approach recommended by Anderson and Gerbing (1988). CFA was used to confirm the four major latent factors of the hypothesized model: (a) using SNSs for school work, (b) multitasking with SNSs, (c) time spent on SNSs, and (d) academic performance. The major CFA model (see in Figure 8) consists of 13 observed variables (e.g., SNSSCH, MULTSNS, SNSUSE, and ACAD).

**Structural Model**

After showing the latent variables were measured well, a structural model with set of exogenous and endogenous variables was specified for two groups (see Figure 9). The direction of the arrows shows the specified relationships between the latent variables. As shown in the figure, for example, it is hypothesized that time spent on SNSs predicts academic performance. The hypothesized structural model was specified and tested to determine the extent to which these a priori hypothesized relationships are supported by the sample data.

The structural equations specified the estimation of the structure coefficients to indicate the magnitude (i.e., strength and statistical significance) and direction (i.e., negative or positive) of the prediction. Each structural equation also contains a prediction error or disturbance term that indicates the portion of the latent dependent variable that is not explained or predicted by other latent variables in the equation. SEM has similar
**Figure 9.** The hypothesized structural equation model. The rectangles represent observed variables. The ovals represent unobserved latent variables. Asterisks represent the paths freely estimated, 1 is used for fixed variables.
Table 10

*Types of Correlation Coefficients in the Structural Equation Model*

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<td>PC</td>
<td>PC</td>
<td>PS</td>
<td>PS</td>
<td></td>
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</tr>
<tr>
<td>(10) ACADPRF1 (Interval)</td>
<td>PS</td>
<td>PS</td>
<td>PS</td>
<td>PS</td>
<td>PS</td>
<td>PS</td>
<td>PS</td>
<td>PE</td>
<td>PE</td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>(11) ACADPRF2 (Interval)</td>
<td>PS</td>
<td>PS</td>
<td>PS</td>
<td>PS</td>
<td>PS</td>
<td>PS</td>
<td>PS</td>
<td>PE</td>
<td>PE</td>
<td>PS</td>
<td>PE</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(12) ACADPRF3 (Ordinal)</td>
<td>PC</td>
<td>PC</td>
<td>PC</td>
<td>PC</td>
<td>PC</td>
<td>PC</td>
<td>PC</td>
<td>PS</td>
<td>PS</td>
<td>PC</td>
<td>PS</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>(13) ACADPRF4 (Ordinal)</td>
<td>PC</td>
<td>PC</td>
<td>PC</td>
<td>PC</td>
<td>PC</td>
<td>PC</td>
<td>PC</td>
<td>PS</td>
<td>PS</td>
<td>PC</td>
<td>PS</td>
<td>PC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(14) BFAS (Interval)</td>
<td>PS</td>
<td>PS</td>
<td>PS</td>
<td>PS</td>
<td>PS</td>
<td>PS</td>
<td>PS</td>
<td>PE</td>
<td>PE</td>
<td>PS</td>
<td>PE</td>
<td>PS</td>
<td>PS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(15) CSEI (Interval)</td>
<td>PS</td>
<td>PS</td>
<td>PS</td>
<td>PS</td>
<td>PS</td>
<td>PS</td>
<td>PS</td>
<td>PE</td>
<td>PE</td>
<td>PS</td>
<td>PE</td>
<td>PS</td>
<td>PE</td>
<td>PS</td>
<td>--</td>
</tr>
</tbody>
</table>

*Note.* PE = Pearson Product-Moment, PC = Polychoric, PS = Polyserial
steps as was specified in Part I using PA: model specification, model estimation, model testing and model modification (Schumacker & Lomax, 2010).

First, raw data was submitted to the PRELIS program (i.e., to estimate PM matrix among the observed variables), then these correlations and other statistical information were used to compute an ACM (i.e., analyzed in LISREL with WLS estimation; Kline, 2011). Pearson product-moment correlations (i.e., correlation between two continuous variables), polyserial (i.e., correlation between a continuous and categorical variable), and polychoric correlations (i.e., correlation between two categorical variables with two or more levels; Kline, 2011) were reported for all observed variables. Table 10 illustrates the scales of measurement for each variable and types of correlation coefficients that were used in the analysis.

**Model specification.** The first step in SEM is model specification. Previous research studies play a significant role, which includes hypothesizing relationships among latent variables. Therefore, as shown in Figure 9, structural model was specified using the theoretical knowledge. The latent variables in a model are unobserved (i.e., does not have definite scale of measurement). Therefore, the origin and unit of measurement (i.e., usually assumed to have a mean of 0) for each factor has to be defined. A common unit of measurement for latent variables is defined to compare the factor loadings (interpret the parameter estimates). In other words, the factor loading coefficient of an observed variable (i.e., reference or fixed variable) for each factor is set to 1. The reference variable is hypothesized to be the best indicator of the specific latent variable, since all other observed variables are interpreted in relation to its unit of
measurement. The path for hours spent on SNS (i.e., SNSUSE2) was fixed at 1.0, as it accounted for the most variance in the SNSs use latent factor. The other latent, academic performance was consisted of GPA scores, scholarship, and hours spent studying; whereas the path for college GPA (i.e., ACADPRF2) was fixed at 1.0. The other fixed paths were MULTSNS1 (i.e., I multitask with my SNS account while studying) and SNSSCHQ3 (i.e., I use my SNS account to communicate for group projects).

**Model identification.** For the model identification, the number of free parameters to be estimated must be less than or equal to the number of distinct values in the matrix $S$ (i.e., sample variance-covariance matrix). In the existing SEM, to demonstrate the minimum condition of identification, the number of free parameters (i.e., number of factor loadings, measurement error variances, measurement error covariance terms, latent independent variable variances, latent independent variable covariance, structure coefficients, equation prediction error variances, and equation prediction error covariance terms) and the number of distinct values (i.e., $[p(p+1)/2]$; $p$ is the number of observed variables) in the matrix $S$ were calculated. Thus, the number of distinct values in the sample matrix $S$ has to be greater than or at least equal to the number of free parameters to satisfy the minimum condition of identification (Schumacker & Lomax, 2010).

**Model testing.** In order to determine the fit of the proposed model, the following fit indices were reported: Chi-square ($\chi^2$), the Goodness-of-Fit Index (GFI), the Adjusted Goodness of Fit Index (AGFI), the Comparative Fit Index (CFI), the Root Mean Square Error of Approximation (RMSEA), and the Standardized Root Mean Residual (SRMR). Chi-square is a traditional measure of badness of fit, but is often influenced by sample
size (Kline, 2011). The chi-square fit statistic will likely be significant with large sample sizes, and with the estimation method of WLS, even if the model actually fits the data well. Therefore, additional fit indices were reported that are not influenced by sample size.

Table 11

Model Fit Indices for Model Evaluation

<table>
<thead>
<tr>
<th>Fit Measure</th>
<th>Acceptable Fit</th>
<th>Good Fit</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\chi^2$</td>
<td>$2df \leq \chi^2 \leq 3df$</td>
<td>$0 \leq \chi^2 \leq 2df$</td>
</tr>
<tr>
<td>$p$ value</td>
<td>$.01 \leq p \leq .05$</td>
<td>$.05 &lt; p \leq 1.00$</td>
</tr>
<tr>
<td>$\chi^2/df$</td>
<td>$2 \leq \chi^2/df \leq 3$</td>
<td>$0 \leq \chi^2/df \leq 2$</td>
</tr>
<tr>
<td>RMSEA</td>
<td>$.05 &lt; \text{RMSEA} \leq .08$</td>
<td>$0 \leq \text{RMSEA} \leq .05$</td>
</tr>
<tr>
<td>SRMR</td>
<td>$0 &lt; \text{SRMR} \leq .10$</td>
<td>$0 \leq \text{SRMR} \leq .05$</td>
</tr>
<tr>
<td>CFI</td>
<td>$.95 \leq \text{CFI} &lt; .97$</td>
<td>$.97 \leq \text{CFI} \leq 1.00$</td>
</tr>
<tr>
<td>GFI</td>
<td>$.90 \leq \text{GFI} &lt; .95$</td>
<td>$.95 \leq \text{GFI} \leq 1.00$</td>
</tr>
<tr>
<td>AGFI</td>
<td>$.85 \leq \text{AGFI} &lt; .90$</td>
<td>$.90 \leq \text{AGFI} \leq 1.00$</td>
</tr>
</tbody>
</table>


Adequate fit of the model is determined by a non-significant chi-square, an SRMR of .10 or below, an RMSEA of less than .05, a GFI and an AGFI of .95 or above (Schumacker & Lomax, 2010). Hu and Bentler (1999) also reported a cutoff value close to .08 for SRMR; and .06 for RMSEA resulted in lower Type II error rates and acceptable costs of Type-I error rates). A cutoff value close to .95 for CFI with a cutoff value close
to .09 for SRMR (i.e., least sum of Type I and Type II error rates); or RMSEA > .05 (or .06) with SRMR > .06 (i.e., .07, .08, .09, .10, or .11; acceptable Type II error rates for simple and complex misspecified models under both robustness and nonrobustness conditions) were recommended by Hu and Bentler (1999). Some rule of thumb criteria for goodness-of-fit indices are listed in Table 11 (Schermelleh-Engel, Moosbrugger, & Müller, 2003).

**Multiple-Group Analysis**

Theoretical measurement and structural models can be examined across groups (i.e., to determine the degree of invariance in fit indices, parameter estimates, and standard errors). CFA studies of factorial invariance test the structure of a model or its individual parameters for equivalence across subgroups or conditions (Marsh, 1994). When parallel data exist for more than one group, CFA provides a particularly powerful test of the equivalence of solutions across the multiple groups. The researchers are able to fit the data subject to the constraint that any one, any set, or all parameters are equal in the multiple groups. The measurement invariance analysis conducted utilized LISREL 8.3.

Using LISREL (Jöreskog & Sörbom, 1996), multi-group analysis was performed to assess whether the constructs being measured, in this study had the same meaning across American and Turkish students (Schumacker & Lomax, 2010; Steinmetz, Schmidt, Tina-Booh, Wieczorek, & Schwartz, 2009). Item level equivalence indicates that the items in a construct measure the same meaning across groups. The initial measurement model was estimated by constraining all structural paths to be equal across
the two groups. In particular, the factor loadings of each latent variable were initially tested for their equivalence across the groups (Byrne, Shavelson, & Muthén, 1989). The analyses were performed simultaneously for the two groups to show the invariance of factor loadings in the two separate measurement models (Kline, 2011).

Then, the structural estimate of the paths between the latent variables was unconstrained across the two groups, and the differences in the fit between two nested models were compared with the constrained model using the comparative fit indices (CFIs). When comparing two groups and testing measurement invariance, the fit of the model with specific parameters fixed to be equal across groups (i.e., constrained) is compared to the model with those parameters free to vary (i.e., unconstrained).

The hypothesis of invariance was accepted if the difference in CFI between a hypothetical model ($H_1$), in which all factor-loading parameters are equal across groups, and an unconstrained multi-group model ($H_0$) was smaller than or equal to .01. If the hypothesis of metric invariance cannot be confirmed, a series of tests will be performed to locate items responsible for overall noninvariance (Byrne et al., 1989).

Measurement invariance between groups is commonly evaluated by chi-square difference test. However, chi-square tests are sensitive to sample size and to a violation of the normality assumption, thus a number of goodness of fit indices has been used to judge the model fit (Chen, 2007). Cheung and Rensvold (2002) reported that $\Delta$CFI is a robust statistics for testing the between-group invariance of CFA models. $\Delta$CFI is an alternative to $\Delta$$\chi^2$, and it is defined as

$$\Delta$$CFI = CFI_{constrained} − CFI_{unconstrained}
A value of $\Delta$CFI smaller than or equal to -.01 indicates that the null hypothesis of invariance should not be rejected (i.e., $\Delta$Gamma hat and $\Delta$McDonald’s NCI, the critical values are −.001 and −.02, respectively; Cheung & Rensvold, 2002). Chen (2007) recommended that when sample sizes are unequal, the following cut-off criteria were used to test the loading invariance: (a) change of $\geq$ -.005 in CFI, (b) change of $\geq$ .010 in RMSEA, or (c) change of $\geq$ .025 in SRMR. The criteria listed above would indicate measurement noninvariance.

In this study, the sample sizes were not equal between the two groups, thus a $\Delta$CFI value of -.005 was set as a cut-off value that indicates the measurement invariance between the two groups (Chen, 2007). Then, the unstandardized path estimates will be compared for two separate groups to compare the strength of the relationships between the latent variables (Schumacker & Lomax, 2010).
CHAPTER IX
RESULTS OF THE MAIN STUDY

The groups were analyzed independently using the US and TR data sets. Research findings presented in this chapter consist of two main parts. The first part of this chapter represents description and descriptive statistics of data (e.g., Outliers and assumptions, participants) of the US and TR samples included in this study.

The second part of this chapter discussed the details of data analysis. In data analysis section, the following findings were reported:

1. Validation of BFAS and CSEI (i.e., CFA, reliability, testing for measurement invariance across groups),
2. CFA of the measurement model,
3. Testing for structural invariance across the groups,
4. Structural model (i.e., hypothesized structural equation models were tested for the US and TR independently).

Outliers and Assumptions

The data were screened for outliers in the full sample and in the US and Turkey samples (i.e., \( z > \pm 2.58 \)). There were extreme values on most the variables. All the variables had some missing data, but this was less than 1%, which was ignorable or not systematic (i.e., less than 5% on a single variable; Kline, 2011). The normality assumption was also violated in that the data in each group – for each of the variables – were significantly
skewed (i.e., lack of symmetry) based on an examination of histograms and skewness statistics (i.e., $z > \pm 2.58$). The results and details are given in the data analysis section.

CFA is widely used to examine the hypothesized relations among continuous or ordinal types of variables. In this survey study, a set of ordinally scaled items (e.g., 1 = *Strongly disagree*, 2 = *Disagree*, 3 = *Neither agree nor disagree*, 4 = *Agree*, 5 = *Strongly agree*) were used. For ordinal variables, Jöreskog and Sörbom (1996) recommend using WLS estimation with polychoric correlation matrices and corresponding asymptotic covariance weight matrices, where maximum likelihood estimation requires normal distribution and continuous variables (Jöreskog, 1994).

Instead of Pearson product-moment correlations, the polychoric correlation matrix was computed using Lisrel 8.3 (PM; Jöreskog & Sörbom, 1996). PM matrix estimates the linear relationship between two observed ordinal variables (i.e., underlying continuous variables; Jöreskog, 1990), and when ordinal variables present, polychoric and polyserial correlations are the least biased, and robust against departures from bivariate normality (Jöreskog & Sörbom, 1996). Maximum likelihood estimation is not appropriate for SEM when a polychoric correlation matrix is used (Flora & Curan, 2004). Flora and Curan (2004) discussed that the WLS estimation method is known to produce biased chi-square test statistics and parameter standard error estimates, and moderate nonnormality of latent response distributions did not significantly impact the accuracy of estimation of polychoric correlations. The ACM and polychronic correlation matrix was obtained by PRELIS, and WLS estimation method was used for CFA and SEM (Flora & Curan, 2004; Schumacker & Lomax, 2010).
The final sample included 426 undergraduate students from the US and TR who completed the survey was used. Using LISREL, WLS estimation was used with the asymptotic covariance matrix, as the multivariate normality assumption was violated. Based on the sample size recommendations by Bentler (2007), the sample sizes for the US and TR \((n = 226; n = 200, \text{respectively})\) were sufficient to test the hypothesized model including covariates with a 15:1 \(N:q\) ratio (where \(q\) represents the number of free parameter estimates; in this case 13 free parameters) – the recommended ratio is between 5:1 and 10:1 (i.e., 5 to 10 cases for every parameter estimate). The \(N:q\) ratio is considered a good assessment of power since it considers the complexity of model to be estimated, rather than simply the number of observed/measured variables in the model (Jackson, 2003). From another perspective, Jöreskog and Sörbom (1996) suggest to have a minimum sample size of 140 for the calculation of ACM with 15 observed variables. In this study, sample sizes for two groups exceed the minimum sample size requirement separately.

**Participants**

There were 226 participants (53.1\%) from the US (e.g., Ohio, Georgia, Arkansas, Illinois, etc.) with the remaining participants from TR \((n = 200; \text{e.g., from various cities Istanbul, Duzce, Ankara})\). Only undergraduate students included in the analysis. The mean ages of students were 21.34 \((SD = 1.93)\) for the US and TR 22.65 \((SD = 1.74)\), respectively. 157 (36.9\%) were males and 266 (62.4\%) were females. This is “normal” for the primary population, which was predominantly Social Science/Humanities majors (e.g., Sociology, English, Education; \(n = 197; 46.2\%\)). Secondary population were from
College of Engineering (e.g., \( n = 111; 26.1\% \)). Others identified themselves as Natural Science or Business (e.g., Biology, Chemistry, Economics, etc.) majors. Finally, the majority of participants were White (\( n = 347; 81.5\% \)). The majority of students were single (\( n = 253, 59\% \)), and 35% mentioned being in a relationship.

**Descriptive Analysis of the Main Study Variables**

Descriptive statistics of the main variables used are displayed in Table 12 for the US, and in Table 13 for the TR samples. Then, the frequencies of the ordinal variables (see Table 14), and correlations between the main variables (see Table 15) used in the data analyses are given. The important differences between the groups and additional variables that were related to the results of this study are discussed below.

The US students’ current GPAs on average were 3.24 (\( SD = .49 \)), and Turkish students’ GPAs, when linearly translated to a US based 4- point scale, were 2.68 (\( SD = .58 \)). Similar to their current GPAs, the US students’ high school GPAs on average were higher compared to the TR (\( M = 3.45, SD = .39 \)), and Turkish students’ GPAs, when linearly translated to a US based 4- point scale, were 3.31 (\( SD = .46 \)). Both GPA scores (i.e., high school and college/current) were significantly higher in the US sample (\( t = 3.43, df = 424, p < .01; t = 10.77, df = 424, p < .001 \); respectively).

One-hundred thirty-six students in the US sample (60.0%) reported having partial or full scholarships and 95 students in the TR sample (47.5%). Student report of hours spent studying per day was higher for the US students compared to students from TR (\( M = 2.67, SD = 1.46 \) and \( M = 1.67, SD = 1.08 \), respectively; \( t = 7.92, df = 424, p < .05 \)). Similarly, student reports of hours studying per day during finals week were higher for
### Table 12

**Descriptive Statistics for the US Sample**

<table>
<thead>
<tr>
<th>Items</th>
<th>Description</th>
<th>M (SD)</th>
<th>Min</th>
<th>Max</th>
<th>Skewness</th>
<th>Kurtosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) SNSSCH1</td>
<td>I use my SNS account for school work.</td>
<td>2.23 (1.07)</td>
<td>1</td>
<td>5</td>
<td>2.57</td>
<td>-1.97</td>
</tr>
<tr>
<td>(2) SNSSCH2</td>
<td>I use my SNS account to communicate with my classmates.</td>
<td>3.10 (1.08)</td>
<td>1</td>
<td>5</td>
<td>-1.79</td>
<td>-1.02</td>
</tr>
<tr>
<td>(3) SNSSCH3</td>
<td>I use my SNS account to communicate for group projects.</td>
<td>2.86 (1.12)</td>
<td>1.4</td>
<td>5</td>
<td>-1.79</td>
<td>-1.53</td>
</tr>
<tr>
<td>(4) MULTSNS1</td>
<td>I multitask with my SNS account while studying.</td>
<td>3.11 (1.22)</td>
<td>1</td>
<td>5</td>
<td>-2.15</td>
<td>-3.10</td>
</tr>
<tr>
<td>(5) MULTSNS2</td>
<td>I have SNS(s) up while doing homework.</td>
<td>2.95 (1.15)</td>
<td>1</td>
<td>5</td>
<td>-0.78</td>
<td>-3.53</td>
</tr>
<tr>
<td>(6) MULTSNS3</td>
<td>I check my SNS account if I am doing my work for school.</td>
<td>3.16 (1.11)</td>
<td>1</td>
<td>5</td>
<td>-2.88</td>
<td>-2.19</td>
</tr>
<tr>
<td>(7) SNSUSE1</td>
<td>Frequency of any SNS use</td>
<td>3.54 (2.18)</td>
<td>1</td>
<td>8</td>
<td>4.07</td>
<td>-2.53</td>
</tr>
<tr>
<td>(8) SNSUSE2</td>
<td>Hours of daily SNS use</td>
<td>2.65 (1.50)</td>
<td>0.4</td>
<td>6</td>
<td>1.47</td>
<td>-1.31</td>
</tr>
<tr>
<td>(9) SNSUSE3</td>
<td>SNS use priority in daily routine</td>
<td>3.49 (1.42)</td>
<td>1</td>
<td>5</td>
<td>-3.28</td>
<td>-3.24</td>
</tr>
<tr>
<td>(10) ACADPRF1</td>
<td>High School GPA</td>
<td>3.45 (.40)</td>
<td>2.10</td>
<td>4.00</td>
<td>-4.72</td>
<td>.76</td>
</tr>
<tr>
<td>(11) ACADPRF2</td>
<td>College GPA (Current)</td>
<td>3.23 (1.49)</td>
<td>1.70</td>
<td>4.00</td>
<td>-3.02</td>
<td>-1.02</td>
</tr>
<tr>
<td>(12) ACADPRF3</td>
<td>Hours of daily studying</td>
<td>3.53 (1.07)</td>
<td>1</td>
<td>5</td>
<td>-1.19</td>
<td>-1.93</td>
</tr>
<tr>
<td>(13) ACADPRF4</td>
<td>Scholarship Status</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>(14) BFAS</td>
<td>Facebook® Addiction Total Score</td>
<td>9.63 (3.79)</td>
<td>6</td>
<td>24</td>
<td>7.64</td>
<td>4.74</td>
</tr>
<tr>
<td>(15) CSEI</td>
<td>College Self-Efficacy score (average)</td>
<td>8.9 (1.53)</td>
<td>3.20</td>
<td>11.00</td>
<td>-6.31</td>
<td>4.35</td>
</tr>
</tbody>
</table>
Table 13

*Descriptive Statistics for the TR Sample*

<table>
<thead>
<tr>
<th>Items</th>
<th>TR (n = 200)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M (SD)</td>
</tr>
<tr>
<td>(1) SNSSCH1: I use my SNS account for school work.</td>
<td>2.96 (1.08)</td>
</tr>
<tr>
<td>(2) SNSSCH2: I use my SNS account to communicate with my classmates.</td>
<td>3.50 (.99)</td>
</tr>
<tr>
<td>(3) SNSSCH3: I use my SNS account to communicate for group projects.</td>
<td>3.33 (1.07)</td>
</tr>
<tr>
<td>(4) MULTSNS1: I multitask with my SNS account while studying.</td>
<td>2.82 (1.16)</td>
</tr>
<tr>
<td>(5) MULTSNS2: I have SNS(s) up while doing homework.</td>
<td>2.95 (1.12)</td>
</tr>
<tr>
<td>(6) MULTSNS3: I check my SNS account if I am doing my work for school.</td>
<td>2.78 (1.03)</td>
</tr>
<tr>
<td>(7) SNSUSE1: Frequency of any SNS use</td>
<td>3.20 (2.18)</td>
</tr>
<tr>
<td>(8) SNSUSE2: Hours of daily SNS use</td>
<td>2.92 (1.51)</td>
</tr>
<tr>
<td>(9) SNSUSE3: SNS use priority in daily routine</td>
<td>2.62 (1.49)</td>
</tr>
<tr>
<td>(10) ACADPRF1: High School GPA</td>
<td>3.31 (.46)</td>
</tr>
<tr>
<td>(11) ACADPRF2: College GPA (Current)</td>
<td>2.68 (.58)</td>
</tr>
<tr>
<td>(12) ACADPRF3: Hours of daily studying</td>
<td>2.64 (1.09)</td>
</tr>
<tr>
<td>(13) ACADPRF4: Scholarship Status</td>
<td>--</td>
</tr>
<tr>
<td>(14) BFAS: Facebook® Addiction Total Score</td>
<td>11.02 (4.78)</td>
</tr>
<tr>
<td>(15) CSEI: College Self-Efficacy score (average)</td>
<td>8.09 (1.68)</td>
</tr>
</tbody>
</table>
Table 14

Frequency Statistics for the Ordinal Variables

<table>
<thead>
<tr>
<th>Items</th>
<th>US (n = 226)</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>(1) SNSSCH1</td>
<td>73 (32.3)</td>
<td>58 (25.7)</td>
<td>70 (31.1)</td>
<td>20 (8.9)</td>
<td>5 (2.21)</td>
<td>21 (10.5)</td>
<td>45 (22.5)</td>
<td>67 (33.5)</td>
<td>55 (27.5)</td>
<td>12 (6.0)</td>
<td></td>
</tr>
<tr>
<td>(2) SNSSCH2</td>
<td>24 (10.6)</td>
<td>29 (12.8)</td>
<td>93 (41.2)</td>
<td>60 (26.6)</td>
<td>20 (8.9)</td>
<td>5 (2.5)</td>
<td>29 (14.5)</td>
<td>57 (28.5)</td>
<td>80 (40.0)</td>
<td>29 (14.5)</td>
<td></td>
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<tr>
<td>(3) SNSSCH3</td>
<td>32 (14.2)</td>
<td>43 (19.0)</td>
<td>94 (41.6)</td>
<td>38 (16.8)</td>
<td>19 (8.4)</td>
<td>12 (6.0)</td>
<td>33 (16.5)</td>
<td>55 (27.5)</td>
<td>77 (38.5)</td>
<td>23 (11.5)</td>
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</tr>
<tr>
<td>(4) MULTSNS1</td>
<td>30 (13.3)</td>
<td>45 (19.9)</td>
<td>42 (18.6)</td>
<td>88 (39)</td>
<td>21 (9.3)</td>
<td>32 (16.0)</td>
<td>50 (25.0)</td>
<td>50 (25.0)</td>
<td>59 (29.5)</td>
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<td>(5) MULTSNS2</td>
<td>25 (11.1)</td>
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<td>39 (17.3)</td>
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<td>12 (5.3)</td>
<td>22 (11.0)</td>
<td>50 (25.0)</td>
<td>55 (27.5)</td>
<td>62 (31.0)</td>
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<tr>
<td>(6) MULTSNS3</td>
<td>22 (9.7)</td>
<td>42 (18.6)</td>
<td>54 (23.9)</td>
<td>93 (41.2)</td>
<td>15 (6.7)</td>
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<td>(9) SNSUSE3</td>
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<td>73 (32.2)</td>
<td>67 (33.5)</td>
<td>40 (20.0)</td>
<td>29 (14.5)</td>
<td>31 (15.5)</td>
<td>33 (16.5)</td>
<td></td>
</tr>
</tbody>
</table>

Note. The items are scored on the following scales: SNSSCH (1 = Very rarely, 2 = Rarely, 3 = Sometimes, 4 = Often, 5 = Very often); MULTSNS (1 = Strongly disagree, 2 = Disagree, 3 = Neither agree nor disagree, 4 = Agree, 5 = Strongly agree); SNSUSE3 (1 = More than 120 minutes, 2 = Between 61 - 120 minutes, 3 = Between 31 - 60 minutes, 4 = Between 6-30 minutes, 5 = In Less than 5 minutes). US = United States; TR = Turkey. Percentages of n appear in parentheses next to frequencies of variables.
Table 15

**Correlation Matrix for the US and TR Samples**

<table>
<thead>
<tr>
<th>Items</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
<th>(6)</th>
<th>(7)</th>
<th>(8)</th>
<th>(9)</th>
<th>(10)</th>
<th>(11)</th>
<th>(12)</th>
<th>(13)</th>
<th>(14)</th>
<th>(15)</th>
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<tbody>
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<td>.23**</td>
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<td>.20</td>
<td>.15</td>
<td>.14</td>
<td>.12</td>
<td>.15*</td>
<td>.18</td>
<td>.10</td>
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<td>.01</td>
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<td>.23**</td>
<td>.20**</td>
<td>.11</td>
<td>.07</td>
<td>.02</td>
<td>.09**</td>
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<tr>
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<td>.58**</td>
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<td>.44**</td>
<td>.46**</td>
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<td>.01</td>
<td>.03</td>
<td>.06</td>
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<td>(6) MULTSNS3</td>
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<td>.31**</td>
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<td>.33**</td>
<td>.46**</td>
<td>-.12</td>
<td>-.07</td>
<td>-.23**</td>
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<td>(7) SNSUSE1</td>
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<td>.24**</td>
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<td>.53**</td>
<td>.56**</td>
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<td>(8) SNSUSE2</td>
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<td>.17**</td>
<td>.44**</td>
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<td>.50**</td>
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<td>.25**</td>
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<td>.22**</td>
<td>.53**</td>
<td>.43**</td>
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<td>-.15</td>
<td>-.15</td>
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<td>.03</td>
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<td>-.08</td>
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<td>-.01</td>
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<td>-.03</td>
<td>-.103</td>
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<td>.01</td>
<td>.02</td>
<td>-.02</td>
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<td>.43**</td>
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<td>.43**</td>
<td>.38**</td>
<td>-.04</td>
<td>.29**</td>
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<tr>
<td>(12) ACADPRF3</td>
<td>-.09</td>
<td>-.09</td>
<td>-.08</td>
<td>-.22*</td>
<td>-.08</td>
<td>-.12</td>
<td>-.23**</td>
<td>-.21**</td>
<td>-.10</td>
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<td>(13) ACADPRF4</td>
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<td>.05</td>
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<td>-.03</td>
<td>.02</td>
<td>.24**</td>
<td>.34**</td>
<td>.29**</td>
<td>--</td>
<td>-.01</td>
<td>.18**</td>
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<td>(14) BFAS</td>
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<td>.18**</td>
<td>.16**</td>
<td>.081</td>
<td>.30**</td>
<td>.47</td>
<td>.34**</td>
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<td>.01</td>
<td>-.14</td>
<td>.05</td>
<td>--</td>
<td>-.12</td>
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<td>(15) CSEI</td>
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<td>.07</td>
<td>.04</td>
<td>-.09</td>
<td>-.049</td>
<td>-.18**</td>
<td>-.19**</td>
<td>-.14</td>
<td>.13</td>
<td>.47**</td>
<td>.36</td>
<td>.76</td>
<td>-.08</td>
<td>--</td>
</tr>
</tbody>
</table>

*Note. The Turkish student correlation matrix is above, and the United States’ is below the diagonal line. US = United States; TR = Turkey. 
*p < .05.  **p < .01.  ***p < .001
students from the US compared to students from TR ($M = 5.40$, $SD = 2.62$ and $M = 4.70$, $SD = 2.70$, respectively; $t = 2.73$, $df = 424$, $p < .05$). Overall, the average credit hours students are registered for the semester was significantly higher in the TR sample compared to the US ($M = 19.25$, $SD = 3.97$ and $M = 15.33$, $SD = 2.07$, respectively; $t = 12.48$, $df = 374$, $p < .001$).

All participants indicated using SNSs, and only Facebook® users included in the study. Other SNSs used included Twitter® (65.7%) and LinkedIn® (14.8%). In the US, 209 students (92.5%) and in the TR sample 154 students (77%) claimed to use SNSs more than 5 times per day. Additionally, two groups reported the time spent on SNSs. According to the self-reported, untransformed answers, the US students claimed to use SNSs slightly less on average ($M = 2.03$, $SD = 2.21$ hours/day) than students from TR ($M = 2.41$, $SD = 2.60$ hours/day). More than half of the US Facebook® users ($n = 125$; 55.3%) have more than 500 friends, 27.9% ($n = 63$) have 251-500 friends, and 16.8% ($n = 38$) have less than or equal to 250 Facebook® friends. On the other hands, only 14% of the TR Facebook® users ($n = 28$) reported having more than 500 friends, 71% ($n = 142$) have 251-500 friends, and 15% ($n = 30$) have less than or equal to 250 Facebook® friends.

The number of students who mentioned having a Smartphone (i.e., iPhone, BlackBerry, or Android based phones that can access the Web, and SNS applications) was 206 (91%) from the US sample, and 142 students (71%) students from the TR sample. The overall time students spent using their smartphones (i.e., on average, about how many hours per DAY do you spend using your Smartphone?) did not differ
between the groups. Students from TR claimed to use Smartphones slightly more, but not significantly higher on average ($M = 6.08, SD = 5.22$ hours/day) than the US students ($M = 5.67, SD = 4.31$ hours/day).

**Data Analyses**

Selection of appropriate measurement for a factor is the initial and important step in a structural equation model. The theoretical model includes latent variables that are represented by observed indicators. Those indicators are determined through (a) theoretical or empirical references in the previous literature, and (b) using standardized measures. In this study, both standardized measures and new scales from previous literature were included.

The survey was translated into Turkish and it is important to examine the validity and reliability of the variables with the results of confirmatory factor analysis. Therefore, in this section CFA results were reported separately for the two groups. In addition, coefficient’s alpha values were calculated to evaluate the reliability for the two measures separately (i.e., BFAS and CSEI).

**Validation of the Scales Assessing Facebook® Addiction and College Self-Efficacy**

For the purposes of this study, total scores of Facebook® addiction and college self-efficacy inventories were used. Before using the total scores for those scales, a CFA was carried out on the scales prior to the structural equation modelling to test the theoretical model and research hypotheses (Schumacker & Lomax, 2010). CFA was used to assess the measurement model underlying the BFAS and CSEI using a representative sample drawn in the United States. The same model was then evaluated for its fit to the
data collected in Turkey. Therefore, this part had two objectives; (a) to establish BFAS and CESI scale’s structure using a representative the US and TR samples, and (b) to compare the US and TR samples to assess the extent to which the scale’s structure is robust to cross-national comparisons.

**Bergen Facebook® addiction scale (BFAS).** BFAS was used to measure the level of Facebook® addiction, and all of the scale items are scored on a 5-point Likert scale (i.e., 1 = Very rarely, 2 = Rarely, 3 = Sometimes, 4 = Often, 5 = Very often). The means, standard deviations, ranges, and coefficient alpha for the BFAS factor structure hypothesized by Andreassen and colleagues (2012), and all six items are listed in Table 16.

In the US sample, the item with the lowest mean was BFAS 5 (i.e., “I have become restless or troubled if I am prohibited from using Facebook.”; \(M = 1.34, SD = .68\)) and the item with the highest mean was BFAS 4 (i.e., “I have tried to cut down on my use of Facebook® without success.”; \(M = 1.79, SD = .98\)). In the TR sample, the item with the lowest mean was BFAS 1 (i.e., “I spend a lot of time thinking about Facebook® or planning use of Facebook.”; \(M = 1.64, SD = .86\)), and the item with the highest mean was BFAS 5 (i.e., “I have become restless or troubled if you are prohibited from using Facebook®.”; \(M = 2.02, SD = 1.15\)).

All BFAS items are yielded an overall score ranging from 6 to 30 (Andreassen et al., 2012). Andreassen and colleagues’ study showed that scoring of “often” or “very often” on at least four of the six items may suggest a high level of addiction. Thus, total scores were obtained by summing 6 item responses, with higher scores indicating higher
Table 16

*Descriptive Statistics and Internal Consistency Reliability for BFAS*

<table>
<thead>
<tr>
<th>BFAS</th>
<th>$M$</th>
<th>$SD$</th>
<th>Skewness</th>
<th>Kurtosis</th>
<th>Min</th>
<th>Max</th>
<th>$\alpha$</th>
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</thead>
<tbody>
<tr>
<td>US</td>
<td>9.63</td>
<td>3.79</td>
<td>7.64</td>
<td>4.74</td>
<td>6</td>
<td>24</td>
<td>.84</td>
</tr>
<tr>
<td>BFAS 1</td>
<td>1.75</td>
<td>.84</td>
<td>6.77</td>
<td>3.72</td>
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<td>5</td>
<td></td>
</tr>
<tr>
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<td>7.68</td>
<td>4.51</td>
<td>1</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>BFAS 3</td>
<td>1.60</td>
<td>.94</td>
<td>10.49</td>
<td>7.64</td>
<td>1</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>BFAS 4</td>
<td>1.79</td>
<td>.98</td>
<td>8.37</td>
<td>4.61</td>
<td>1</td>
<td>5</td>
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</tr>
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<td>BFAS 5</td>
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<td>17.00</td>
<td>30.88</td>
<td>1</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>BFAS 6</td>
<td>1.36</td>
<td>.68</td>
<td>12.77</td>
<td>14.28</td>
<td>1</td>
<td>5</td>
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<tr>
<td>TR</td>
<td>11.02</td>
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<td>.88</td>
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<td>4.29</td>
<td>- .42</td>
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<td></td>
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<td>6.47</td>
<td>.21</td>
<td>1</td>
<td>5</td>
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<tr>
<td>BFAS 5</td>
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<td>5.08</td>
<td>- .83</td>
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<td>8.86</td>
<td>4.63</td>
<td>1</td>
<td>5</td>
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</tbody>
</table>

*Note.* BFAS1: I spend a lot of time thinking about Facebook® or planning your use of Facebook®. BFAS2: I feel an urge to use Facebook® more and more. BFAS3: I use Facebook® in order to forget about personal problems. BFAS4: I have tried to cut down on my use of Facebook® without success. BFAS5: I have become restless or troubled if you are prohibited from using Facebook®. BFAS6: I use Facebook® so much that it has had a negative impact on my job or studies. $\alpha = $ Coefficient alpha. US = United States; TR = Turkey.
levels of Facebook® addiction. Student reports of overall Facebook® addiction scores were significantly lower for the US students compared to Turkish students ($M = 9.63, SD = 3.79$ and $M = 11.02, SD = 4.78$, respectively; $t = -1.38, df = 424, p < .001$).

The correlations between all BFAS items ($n = 6$) for both groups are presented in Table 17. Examination of the correlation matrix for the two data sets did not reveal any problems with multicollinearity (i.e., $r > .80$).

Table 17

Correlations between the Items on the BFAS

<table>
<thead>
<tr>
<th>BFAS</th>
<th>BFAS 1</th>
<th>BFAS 2</th>
<th>BFAS 3</th>
<th>BFAS 4</th>
<th>BFAS 5</th>
<th>BFAS 6</th>
</tr>
</thead>
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<tr>
<td>BFAS 1</td>
<td>--</td>
<td>.71</td>
<td>.66</td>
<td>.58</td>
<td>.69</td>
<td>.67</td>
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<tr>
<td>BFAS 2</td>
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<td>.61</td>
<td>.48</td>
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<td>.62</td>
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<tr>
<td>BFAS 3</td>
<td>.72</td>
<td>.65</td>
<td>--</td>
<td>.60</td>
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<td>.63</td>
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<td>BFAS 4</td>
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<td>.57</td>
<td>--</td>
<td>.60</td>
<td>.74</td>
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<td>.75</td>
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<td>BFAS 6</td>
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<td>.63</td>
<td>.59</td>
<td>.55</td>
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</tbody>
</table>

Note. BFAS1: I spend a lot of time thinking about Facebook® or planning your use of Facebook®. BFAS2: I feel an urge to use Facebook® more and more. BFAS3: I use Facebook® in order to forget about personal problems. BFAS4: I have tried to cut down on my use of Facebook® without success. BFAS5: I have become restless or troubled if you are prohibited from using Facebook®. BFAS6: I use Facebook® so much that it has had a negative impact on my job or studies. The Turkish student correlation matrix is above the diagonal line and the United States student correlation matrix is below the diagonal line. All correlations were statistically significant at $p < .01$.

Confirmatory factor analysis for BFAS. Before conducting the CFA for the BFAS, the assumptions of univariate and multivariate normality (e.g., skewness and kurtosis) were examined. Initial data screening indicated departures from a normal
distribution with some items having skewness (>2), especially in the US sample, and kurtosis (>5; West, Finch, & Curran, 1995). At the item level, participants used every Likert category option available for all the items; however, use of the Likert categories “Sometimes”, “Often” and “Very often” (i.e., coded 3, 4, and 5) were not endorsed as frequently as “Very rarely” and “Rarely” (i.e., coded 1 and 2). Therefore, WLS estimation method was used with the asymptotic covariance matrix (Schumacker & Lomax, 2010). The hypothesized model proposed by Andreassen and colleagues (2012) did fit the data well for the US and TR samples. The fit indices for both groups are shown in Table 18. No modification indices were suggested by the LISREL software.

Table 18

*Summary of the Model Fit Indices for Two Datasets – BFAS*

<table>
<thead>
<tr>
<th>Model</th>
<th>$\chi^2$</th>
<th>df</th>
<th>GFI</th>
<th>AGFI</th>
<th>SRMR</th>
<th>CFI</th>
<th>RMSEA</th>
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<td>.98</td>
<td>.99</td>
<td>.04</td>
<td>.93</td>
<td>.00</td>
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<tr>
<td>TR</td>
<td>101.36</td>
<td>9</td>
<td>.99</td>
<td>.98</td>
<td>.07</td>
<td>.87</td>
<td>.00</td>
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</tbody>
</table>

*Note.* $\chi^2$ = Chi-Square Test (i.e., Minimum Fit Function); GFI = Goodness-of-Fit Index; AGFI = Adjusted Goodness-of-Fit Index; SRMR = Standardized Root-Mean-Square Residual index; CFI = Comparative Fit Index; RMSEA = Root-Mean-Square-Error of Approximation. US = United States; TR = Turkey. ***$p < .001$.

The standardized loadings represent the correlation between each observed variable and the corresponding factor (Schumacker & Lomax, 2010). In the US sample, all standardized factor loadings were large and statistically significant ($p < .001$). Item factor loadings ranged from .71 to .91 (see in Figure 10). A moderate amount of the
variance in each observed variable, ranging from 50% to 83%, was accounted for. No modification indices were suggested by the LISREL software in the US model.

Figure 10. The confirmatory factor model for BFAS (The US sample). BFAS: Bergen-Facebook® Addiction Scale; In accordance with identification procedures, BFAS4 was fixed, as it accounted for the most variance in the latent factor. The standardized parameter estimates for the factor structure of the BFAS are listed above. Rectangles indicate the 6 items on the BFAS, the oval represent the latent factor. Parameter estimates (e.g., factor loadings, correlations among factors, and residual variances) are based on a sample of 226 undergraduate students at universities in the US.
Figure 11. The confirmatory factor model for BFAS (The TR sample). BFAS: Bergen-Facebook® Addiction Scale; In accordance with identification procedures, BFAS4 was fixed, as it accounted for the most variance in the latent factor. The standardized parameter estimates for the factor structure of the BFAS are listed above. Rectangles indicate the 6 items on the BFAS, the oval represent the latent factor. Parameter estimates (e.g., factor loadings, correlations among factors, and residual variances) are based on a sample of 200 undergraduate students from universities in Turkey.

Chi-Square=101.33, df=9, P-value=.00, RMSEA=.00
In the TR sample, all standardized factor loadings were large and statistically significant ($p < .001$). BFAS standardized factor loading values ranged from .80 to .93. A large amount of the variance in each observed variable, ranging from 65% to 87%, was accounted for.

**Reliability.** Internal consistency was assessed by using coefficient alpha for the BFAS factor hypothesized by Andreassen and colleagues (2012). In previous studies, coefficient alpha for the total instrument was found to be equal to .83 (Andreassen et al., 2012) and .86 (Andreassen et al., 2013). In this study, the 6-item BFAS had an overall coefficient alpha value of .84 in the US sample and .88 in the TR sample.

**Testing for measurement invariance across groups (BFAS).** Since it was found that measurement models for two groups were established separately, “measurement invariance” was tested to determine whether the scores on BFAS construct have the same meaning for the US and TR samples (Dimitrov, 2006). Measurement invariance is evaluating the invariance of the factor loadings of BFAS for the students from the US and TR. The identical factor loadings are across two groups is expected in this case, in other words, accepting the null hypothesis (i.e., $H_0$: The measurement model is identical across two groups/countries).

A Chi-square difference test is a common method to assess whether or not the factor loadings of the measurement model are invariant across two groups (Kline, 2011). However, the comparative fit indices difference test [$\Delta$CFI] - a robust statistics for testing the between-group invariance of CFA models - was used for the comparison (Cheung & Rensvold, 2002). A value of $\Delta$CFI smaller than or equal to -.005 indicates that the null
hypothesis of invariance should not be rejected (Chen, 2007). Then, comparing the two measurement models, it was found that the change in comparative fit index ($\Delta$CFI = -.05) did not reveal a significant difference between the unconstrained (CFI = .90) and constrained-equal (CFI = .85) models. Thus, the constrained and unconstrained models show the comparable results, and the factor loadings are similar to each other for two diverse groups. The measurement models for two separate models showed a good fit.

**College self-efficacy inventory (CSEI).** College self-efficacy, a student’s degree of confidence to successfully complete a college-related task, was measured using the CSEI (Solberg et al., 1993). The means, standard deviations, ranges, and coefficient alpha for the CSEI factor hypothesized by Solberg and colleagues (1993) and all the individual items are listed in Table 19.

In the US sample, as shown in Table 19, the item with the lowest mean was CSEI 7 (i.e., Understand your textbooks) and the item with the highest mean was CSEI 5 (i.e., Keep up to date with your school work). The correlations between all the items ($n = 7$) were significant ranging between .35 and .81 and are presented in Table 20. In the TR sample, the item with the lowest mean was CSEI 5 (i.e., Keep up to date with your school work), and the item with the highest mean was CSEI 3 (i.e., Do well on your exams). The correlations between all the items ($n = 7$) were significant ranging between .30 and .96 and are presented in Table 20.

Means of all of the items, except CSEI 6 (i.e., Manage time effectively), significantly differed between the two groups. Students in the US sample had higher mean scores for all other six items compared to the TR sample, and those differences
were statistically significant \((p < .001)\). Student reports of total score on being confident to successfully complete a college-related task were higher for the US students compared to Turkish students \((M = 62.87, SD = 10.56 \text{ and } M = 56.17, SD = 11.94, \text{ respectively}; t = 6.15, df = 424, p < .001)\).

Table 19

*Descriptive Statistics and Internal Consistency Reliability for CSEI*

<table>
<thead>
<tr>
<th>CSEI</th>
<th>(M)</th>
<th>(SD)</th>
<th>Skewness</th>
<th>Kurtosis</th>
<th>Min</th>
<th>Max</th>
<th>(\alpha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>US</td>
<td>62.87</td>
<td>10.56</td>
<td>-6.11</td>
<td>3.86</td>
<td>21</td>
<td>77</td>
<td>.86</td>
</tr>
<tr>
<td>CSEI1</td>
<td>8.80</td>
<td>2.29</td>
<td>-7.51</td>
<td>3.90</td>
<td>1</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>CSEI2</td>
<td>9.10</td>
<td>2.13</td>
<td>-8.00</td>
<td>4.66</td>
<td>1</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>CSEI3</td>
<td>8.98</td>
<td>1.87</td>
<td>-8.10</td>
<td>6.94</td>
<td>1</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>CSEI4</td>
<td>9.50</td>
<td>1.80</td>
<td>-8.08</td>
<td>3.23</td>
<td>4</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>CSEI5</td>
<td>9.56</td>
<td>1.80</td>
<td>-11.34</td>
<td>12.67</td>
<td>1</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>CSEI6</td>
<td>8.60</td>
<td>2.23</td>
<td>-6.78</td>
<td>3.74</td>
<td>1</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>CSEI7</td>
<td>8.33</td>
<td>2.13</td>
<td>-5.98</td>
<td>3.05</td>
<td>1</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>TR</td>
<td>56.16</td>
<td>11.93</td>
<td>-3.66</td>
<td>-.29</td>
<td>19</td>
<td>77</td>
<td>.86</td>
</tr>
<tr>
<td>CSEI1</td>
<td>8.07</td>
<td>2.14</td>
<td>-4.05</td>
<td>.31</td>
<td>1</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>CSEI2</td>
<td>7.64</td>
<td>2.21</td>
<td>-3.48</td>
<td>.13</td>
<td>1</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>CSEI3</td>
<td>8.55</td>
<td>2.19</td>
<td>-5.00</td>
<td>.21</td>
<td>2</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>CSEI4</td>
<td>8.17</td>
<td>1.99</td>
<td>-6.37</td>
<td>4.93</td>
<td>1</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>CSEI5</td>
<td>7.63</td>
<td>2.97</td>
<td>-3.71</td>
<td>-2.05</td>
<td>1</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>CSEI6</td>
<td>8.35</td>
<td>2.30</td>
<td>-4.97</td>
<td>.50</td>
<td>2</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>CSEI7</td>
<td>7.77</td>
<td>2.24</td>
<td>-3.80</td>
<td>.51</td>
<td>1</td>
<td>11</td>
<td></td>
</tr>
</tbody>
</table>

*Note.* CSEI1: Research a term paper; CSEI2: Write course papers; CSEI3: Do well on your exams; CSEI4: Take good class notes; CSEI5: Keep up to date with your school work; CSEI6: Manage time effectively; CSEI7: Understand your textbooks. \(\alpha = \) Coefficient alpha. US = United States; TR = Turkey.
Table 20

Correlation between the Items on the CSEI

<table>
<thead>
<tr>
<th></th>
<th>CSEI 1</th>
<th>CSEI 2</th>
<th>CSEI 3</th>
<th>CSEI 4</th>
<th>CSEI 5</th>
<th>CSEI 6</th>
<th>CSEI 7</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSEI 1</td>
<td>--</td>
<td>.96</td>
<td>.58</td>
<td>.34</td>
<td>.33</td>
<td>.46</td>
<td>.45</td>
</tr>
<tr>
<td>CSEI 2</td>
<td>.89</td>
<td>--</td>
<td>.56</td>
<td>.38</td>
<td>.30</td>
<td>.39</td>
<td>.41</td>
</tr>
<tr>
<td>CSEI 3</td>
<td>.53</td>
<td>.52</td>
<td>--</td>
<td>.51</td>
<td>.60</td>
<td>.67</td>
<td>.54</td>
</tr>
<tr>
<td>CSEI 4</td>
<td>.35</td>
<td>.35</td>
<td>.50</td>
<td>--</td>
<td>.41</td>
<td>.51</td>
<td>.56</td>
</tr>
<tr>
<td>CSEI 5</td>
<td>.37</td>
<td>.38</td>
<td>.55</td>
<td>.65</td>
<td>--</td>
<td>.66</td>
<td>.51</td>
</tr>
<tr>
<td>CSEI 6</td>
<td>.47</td>
<td>.43</td>
<td>.53</td>
<td>.57</td>
<td>.81</td>
<td>--</td>
<td>.62</td>
</tr>
<tr>
<td>CSEI 7</td>
<td>.51</td>
<td>.52</td>
<td>.65</td>
<td>.47</td>
<td>.58</td>
<td>.59</td>
<td>--</td>
</tr>
</tbody>
</table>

Note. CSEI1: Research a term paper; CSEI2: Write course papers; CSEI3: Do well on your exams; CSEI4: Take good class notes; CSEI5: Keep up to date with your school work; CSEI6: Manage time effectively; CSEI7: Understand your textbooks. $\alpha =$ Coefficient alpha. The Turkish student correlation matrix is above the diagonal line and the United States student correlation matrix is below the diagonal line. All correlations were statistically significant at $p < .01$.

Confirmatory factor analysis for CSEI. The assumptions of univariate and multivariate normality (i.e., skewness and kurtosis) were examined. Initial data screening indicated departures from a normal distribution with some items having moderate skewness (>2) and kurtosis (>5; West, Finch, & Curran, 1995). There were departures from univariate and multivariate normality, with participants frequently endorsing the higher categories (Extremely confident) compared to those lower (not at all confident). As shown in Table 19, the normality assumption was violated in each group. Therefore, WLS estimation method was used with the ACM (Schumacker & Lomax, 2010).
Table 21

Summary of the Model Fit Indices for Two Datasets - CSEI

<table>
<thead>
<tr>
<th>Model</th>
<th>( \chi^2 )</th>
<th>df</th>
<th>GFI</th>
<th>AGFI</th>
<th>SRMR</th>
<th>CFI</th>
<th>RMSEA</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>US</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Original model</td>
<td>1741.01***</td>
<td>14</td>
<td>.96</td>
<td>.98</td>
<td>.25</td>
<td>.50</td>
<td>.00</td>
</tr>
<tr>
<td>2. Items 1 and 5 removed</td>
<td>21.92**</td>
<td>5</td>
<td>.99</td>
<td>.99</td>
<td>.05</td>
<td>.95</td>
<td>.00</td>
</tr>
<tr>
<td><strong>TR</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Original model</td>
<td>524.90***</td>
<td>14</td>
<td>.98</td>
<td>.96</td>
<td>.18</td>
<td>.73</td>
<td>.00</td>
</tr>
<tr>
<td>2. Items 1 and 5 removed</td>
<td>36.50***</td>
<td>5</td>
<td>.99</td>
<td>.96</td>
<td>.06</td>
<td>.93</td>
<td>.00</td>
</tr>
<tr>
<td>3. Error covariance</td>
<td>14.62**</td>
<td>4</td>
<td>.99</td>
<td>.98</td>
<td>.03</td>
<td>.98</td>
<td>.00</td>
</tr>
</tbody>
</table>

*Note:* ***\( p < .001 \), **\( p < .01 \). \( \chi^2 \) = Chi-Square Test (i.e., Minimum Fit Function); GFI = Goodness-of-Fit Index; AGFI = Adjusted Goodness-of-Fit Index; SRMR = Standardized Root-Mean-Square Residual index; CFI = Comparative Fit Index; RMSEA = Root-Mean-Square-Error of Approximation.

The hypothesized model proposed by Solberg and colleagues (1993) did not fit the data well for both the US and TR samples. The fit indices before and after modification for both groups are shown in Table 21. CSEI 1 and CSEI 5 were removed from CSEI for the US and TR samples.

The finalized the US model (i.e., Model 2) is illustrated in Figure 12, and the standardized loadings factor loadings were large and statistically significant (\( p < .001 \)) for all five items. Item factor loadings ranged from .60 to .83. The amount of variance accounted for in each observed variables ranged from 36% to 69%, was accounted for. The LISREL software suggested no additional modification indices.
Figure 12. Confirmatory factor model for CSEI (The US sample). In accordance with identification procedures, CSEI 3 was fixed, as it accounted for the most variance in the latent factor. The standardized parameter estimates for the factor structure of the CSEI are listed above. Rectangles indicate the five items on the CSEI, the oval represent the latent factor. Parameter estimates (e.g., factor loadings, correlations among factors, and residual variances) are based on a sample of 226 undergraduate students from universities in the US.
The finalized TR model (i.e., Model 3) is illustrated (see in Figure 13). The standardized loadings factor loadings were large and statistically significant ($p < .001$). Item factor loadings ranged from .64 to .85. The amount of variance accounted for in each observed variables ranged from 42% to 79%, was accounted for. The LISREL software suggested no additional modification indices.

**Figure 13.** Confirmatory factor model for CSEI (The TR sample). In accordance with identification procedures, CSEI 3 was fixed, as it accounted for the most variance in the latent factor. The standardized parameter estimates for the factor structure of the CSEI are listed above. Rectangles indicate the five items on the CSEI, the oval represent the latent factor. Parameter estimates (e.g., factor loadings, correlations among factors, and residual variances) are based on a sample of 200 undergraduate students from universities in Turkey.
Reliability. Internal consistency was assessed by using coefficient alpha for the CSEI factor hypothesized by Solberg and colleagues (1993). The 7-item CSEI had an overall $\alpha$ of .86 in the US sample and .86 in the TR sample. After eliminating two items from the model, the 5-item CSEI had an overall $\alpha$ value of .81 in the US sample and .83 in the TR sample.

Testing for measurement invariance across groups (CSEI). Since it was found that measurement models for two groups were established separately, “measurement invariance” was tested to determine whether the scores on CSEI construct have the same meaning for the US and TR samples (Dimitrov, 2006). Measurement invariance is evaluating the invariance of the factor loadings of CSEI for the students from the US and TR. The identical factor loadings are across two groups is expected.

The comparative fit indices difference test [$\Delta$CFI] was used for the comparison (Cheung & Rensvold, 2002). The null hypothesis of invariance should not be rejected when a value of $\Delta$CFI is smaller than or equal to -.005 (Chen, 2007). Then, comparing the two measurement models, it was found that the change in comparative fit index ($\Delta$CFI = -.007) did not reveal a significant difference between the unconstrained (CFI = .964) and constrained-equal (CFI = .957) models. Thus, the constrained and unconstrained models show the comparable results, and the factor loadings are similar to each other for two diverse groups. The measurement models for two separate models showed a good fit.
Confirmatory Factor Analysis for the Measurement Model

CFA was performed on the polychoric correlation matrix of the items in the current data sets (i.e., the US and TR). The model parameters were estimated using WLS estimation. The initial model included each item loading on only one of the four latent factors corresponding to its dimension (i.e., there were no cross-loadings or correlated errors). Thus, the confirmatory factor model was identified (i.e., the number of elements in the input variance/covariance matrix exceeds the number of freely estimated parameters), and as Brown (2003) suggests correlated errors can be specified among the indicator residuals, since types of method effects (high content overlap, similar phrasings, reverse coded items) can cause correlation.

Another reason can be an unobserved confounding variable that connect two or more manifest variables (i.e., method factor), since error covariances can explain the error covariances between manifest variables caused by method factors, where common factors cannot usually explain (Kano, 2007). Kano (2007) also reports that in case of fitting a model without error covariances, the model fit would be poor, and the factor loadings (i.e., estimates are boosted for positively correlated errors and reduced for negatively correlated errors), communality estimates, and reliability coefficients can be biased. Thus, a reasonable theoretical reason has to be discussed to explain how error covariances are introduced.

The modification indices (MIs) suggested by the LISREL software were used to improve the model with (i.e., correlated error variances; Lomax, 1982). Further evaluation of the model revealed large values representing error covariances between
several items. A modification index estimates the decrease of $\chi^2$ when suggested parameters are freed in the model (Jöreskog & Sörbom, 1996). However, on the other side, freeing a parameter without theoretical support would improve the poor fit (Cliff, 1983).

Items 1 through 3 loaded on the factor “SNSSCH,” Items 4 through 6 loaded on the factor “MULTI,” Items 7 through 9 loaded on the factor “SNSUSE”, and Items 10 through 13 loaded on the factor “ACADPERF.” The hypothesized four-factor model moderately fit the data before model modifications in both the US ($\chi^2 = 270.60$, $df = 59$, $p < .001$; GFI = .98, AGFI = .97, CFI = .93, RMSEA = .00, and SRMR = .09) and the TR sample ($\chi^2 = 198.07$, $df = 59$, $p < .001$; GFI = .97, AGFI = .96, CFI = .91, RMSEA = .00, and SRMR = .10). A comparison of the initial and the final model (i.e., error covariances added) fit indices is presented in Table 22.

The CFA literature is mixed regarding the causes and interpretations of error covariances between items. Literature has suggested that forcing all error terms to be uncorrelated is rarely, if ever, appropriate with actual data (Bentler & Chou, 1987). In a CFA model, all measurement error is presumed to be random (Brown, 2012). However, common assessment methods (i.e., observer ratings, questionnaires), reversed or similarly worded items, or differential susceptibility to other influences (i.e., response set, demand characteristics, acquiescence, reading difficulty, or social desirability) may cause specification of correlated errors.

The post hoc modifications for a better fitting model were inspected (Lance & Vandenberg, 2009). After examining the modification indices of the error variances, the
Table 22

*Summary of the Model Fit Indices for the Initial and Final Models*

<table>
<thead>
<tr>
<th>Model</th>
<th>$\chi^2$</th>
<th>df</th>
<th>GFI</th>
<th>AGFI</th>
<th>SRMR</th>
<th>CFI</th>
<th>RMSEA</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>US</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Original 4-Factor$^a$</td>
<td>270.60***</td>
<td>59</td>
<td>.98</td>
<td>.97</td>
<td>.09</td>
<td>.93</td>
<td>.00</td>
</tr>
<tr>
<td>2. Error Covariances$^a$</td>
<td>111.41***</td>
<td>54</td>
<td>.99</td>
<td>.98</td>
<td>.07</td>
<td>.98</td>
<td>.00</td>
</tr>
<tr>
<td><strong>TR</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Original 4-Factor$^b$</td>
<td>198.07***</td>
<td>59</td>
<td>.97</td>
<td>.96</td>
<td>.10</td>
<td>.91</td>
<td>.00</td>
</tr>
<tr>
<td>2. Error Covariances$^b$</td>
<td>76.33*</td>
<td>53</td>
<td>.99</td>
<td>.98</td>
<td>.06</td>
<td>.99</td>
<td>.00</td>
</tr>
</tbody>
</table>

*Note.* $\chi^2$ = Chi-Square Test (i.e., Minimum Fit Function); GFI = Goodness-of-Fit Index; AGFI = Adjusted Goodness-of-Fit Index; SRMR = Standardized Root-Mean-Square Residual index; CFI = Comparative Fit Index; RMSEA = Root-Mean-Square-Error of Approximation. US = United States; TR = Turkey.

$^a$Model 1: The Original 4-Factor Model

$^b$Model 2: Error Covariances = Error covariance terms were freely estimated until model fit was achieved.

*** $p < .001$; * $p < .05$

Model was modified by freeing error covariance terms sequentially (i.e., 5 error covariance terms were freed in the US sample, see in Figure 14; 6 error covariance terms were freed in TR, see in Figure 15). This process continued until freeing more parameters did not produce a significant improvement in model fit (e.g., the $\chi^2$ became non-significant). For both samples, the suggested modifications did not drop $\chi^2$ to a non-significant value; however, other fit indices (i.e., CFI) were improved (Lance & Vandenberg, 2009).
Figure 14. The final confirmatory factor model for the US sample. In accordance with identification procedures, SNSSCH3, MULTSNS1, SNSUSE2, and ACADPRF2 were fixed to 1, as each of them were accounted for the most variance in each latent factor. Five error covariances were freed. The unstandardized parameter estimates for the factor structures of the SNSSCH, MULTI, SNSUSE, and ACADPERF are listed above. Rectangles indicate the observed variables; the ovals represent the four latent factors associated with the subscales. Parameter estimates (e.g., factor loadings, correlations among factors, and residual variances) are based on a sample of 226 undergraduate students from universities in the US.
Figure 15. The final confirmatory factor model for the TR sample. SNSSCH: Using SNSs for school work; SNSUSE: Time spent on SNSs; MULTI: Multitasking with SNSs while studying; ACADPERF: Academic Performance. In accordance with identification procedures, SNSSCH3, MULTSNS1, SNSUSE2, and ACADPRF2 were fixed to 1, as each of them were accounted for the most variance in each latent factor. Six error covariances were freed. The unstandardized parameter estimates for the factor structures of the SNSSCH, MULTI, SNSUSE, and ACADPERF are listed above. Rectangles indicate the observed variables; the ovals represent the four latent factors associated with the subscales. Parameter estimates (e.g., factor loadings, correlations among factors, and residual variances) are based on a sample of 200 undergraduate students from universities in the TR.
The hypothesized four-factor model moderately fit the data after modification indices (see Table 24) were included sequentially in both the US ($\chi^2 = 111.41, df = 55, p < .001; \text{GFI} = .99, \text{AGFI} = .98, \text{CFI} = .98, \text{RMSEA} = .00, \text{and SRMR} = .07$) and the TR sample ($\chi^2 = 76.33, df = 53, p < .05; \text{GFI} = .99, \text{AGFI} = .98, \text{CFI} = .99, \text{RMSEA} = .00, \text{and SRMR} = .06$). Overall, model-fit indices were reported (i.e., Model 2 for both groups), and a majority of those fit indices indicated an acceptable model, so the theoretical model is supported by the data (Schumacker & Lomax, 2010).

The standardized loadings represent the correlation between each observed variable and the corresponding factor (Schumacker & Lomax, 2010). All standardized factor loadings were medium to large and statistically significant ($p < .001$) for all factors (see Table 24 for a summary of all factor loadings observed in the two models). The interfactor correlations were also not too large and statistically significant between ACADPERF and MULTI ($r = .04, p > .05$), and ACADPERF and SNSUSE ($r = .06, p > .05$) in the US sample. Similarly, the correlation between ACADPERF and MULTI ($r = .01, p > .05$) was positive but not significant in the TR sample (see Table 23).

**Testing for measurement invariance across groups.** Since the measurement models for two groups were established, the comparative fit indices difference test [$\Delta\text{CFI}$] was used for the comparison (Cheung & Rensvold, 2002). A value of $\Delta\text{CFI}$ smaller than or equal to .005 indicates that the null hypothesis of invariance should not be rejected (Chen, 2007). Then, comparing the two measurement models, it was found that the change in comparative fit index ($\Delta\text{CFI} = -.01$) did not reveal a significant difference between the unconstrained (CFI = .98) and constrained-equal (CFI = .97)
models. Thus, the constrained and unconstrained models show the comparable results, and the factor loadings are similar to each other for two diverse groups. Therefore, based on those findings further analysis can be examined.

Table 23

*Interfactor Correlations*

<table>
<thead>
<tr>
<th>Factor</th>
<th>SNSSCH</th>
<th>MULTI</th>
<th>SNSUSE</th>
<th>ACADPERF</th>
</tr>
</thead>
<tbody>
<tr>
<td>SNSSCH</td>
<td>--</td>
<td>.49*</td>
<td>.51*</td>
<td>-.31*</td>
</tr>
<tr>
<td>MULTI</td>
<td>.44*</td>
<td>--</td>
<td>.69*</td>
<td>.01</td>
</tr>
<tr>
<td>SNSUSE</td>
<td>.39*</td>
<td>.78*</td>
<td>--</td>
<td>-.17*</td>
</tr>
<tr>
<td>ACADPERF</td>
<td>.14*</td>
<td>-.04</td>
<td>-.06</td>
<td>--</td>
</tr>
</tbody>
</table>

*Note.* The Turkish student correlation matrix is above the diagonal line and the United States student correlation matrix is below the diagonal line. *p* < .05.

**Testing for Structural Invariance across Groups**

The structural invariance test measures whether a hypothesized structural model is equivalent across two groups: the US and TR (Byrne & Van De Vijver, 2010). To test the invariance of all the paths simultaneously, the “unconstrained” structural model (i.e., all path coefficients and factor loadings were allowed to vary across the two groups) was compared with the “fully constrained” model (i.e., all path coefficients were fixed to be equal) in both groups (Byrne, 1994). Byrne et al. (1989) reported that cross-group invariance for the parameters is supported when the hypothesis of equal structural parameters is not rejected (i.e., chi-square test exhibited no significant difference between
Table 24

*Unstandardized Loadings (Standard Errors) and Standardized Loadings, \( R^2 \) for CFMs*

<table>
<thead>
<tr>
<th>Item</th>
<th>Model 1</th>
<th></th>
<th>Model 2</th>
<th></th>
<th>Model 1</th>
<th></th>
<th>Model 2</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B (SE)</td>
<td>( \beta )</td>
<td>( R^2 )</td>
<td>B (SE)</td>
<td>( \beta )</td>
<td>( R^2 )</td>
<td>B (SE)</td>
<td>( \beta )</td>
</tr>
<tr>
<td>(1) SNSSCH1</td>
<td>.84 (.05)</td>
<td>.70</td>
<td>.49</td>
<td>.82 (.06)</td>
<td>.67</td>
<td>.45</td>
<td>.87 (.07)</td>
<td>.70</td>
</tr>
<tr>
<td>(2) SNSSCH2</td>
<td>1.14 (.06)</td>
<td>.94</td>
<td>.89</td>
<td>1.09 (.07)</td>
<td>.89</td>
<td>.79</td>
<td>.81 (.07)</td>
<td>.65</td>
</tr>
<tr>
<td>(3) SNSSCH3</td>
<td>1.00</td>
<td>.83</td>
<td>.69</td>
<td>1.00</td>
<td>.81</td>
<td>.66</td>
<td>1.00</td>
<td>.80</td>
</tr>
<tr>
<td>(4) MULTSNS1</td>
<td>1.00</td>
<td>.86</td>
<td>.74</td>
<td>1.00</td>
<td>.80</td>
<td>.63</td>
<td>1.00</td>
<td>.59</td>
</tr>
<tr>
<td>(5) MULTSNS2</td>
<td>1.03 (.05)</td>
<td>.89</td>
<td>.79</td>
<td>1.06 (.06)</td>
<td>.85</td>
<td>.72</td>
<td>1.21 (.17)</td>
<td>.72</td>
</tr>
<tr>
<td>(6) MULTSNS3</td>
<td>1.03 (.06)</td>
<td>.88</td>
<td>.78</td>
<td>.99 (.07)</td>
<td>.78</td>
<td>.62</td>
<td>.9 (.14)</td>
<td>.53</td>
</tr>
<tr>
<td>(7) SNSUSE1</td>
<td>1.12 (.07)</td>
<td>.80</td>
<td>.64</td>
<td>1.12 (.08)</td>
<td>.80</td>
<td>.64</td>
<td>1.13 (.11)</td>
<td>.82</td>
</tr>
<tr>
<td>(8) SNSUSE2</td>
<td>1.00</td>
<td>.71</td>
<td>.50</td>
<td>1.00</td>
<td>.71</td>
<td>.51</td>
<td>1.00</td>
<td>.73</td>
</tr>
<tr>
<td>(9) SNSUSE3</td>
<td>1.11 (.07)</td>
<td>.79</td>
<td>.62</td>
<td>1.02 (.07)</td>
<td>.73</td>
<td>.53</td>
<td>1.01 (.09)</td>
<td>.74</td>
</tr>
<tr>
<td>(10) ACADPRF1</td>
<td>1.16 (.15)</td>
<td>.69</td>
<td>.48</td>
<td>1.2 (.17)</td>
<td>.70</td>
<td>.49</td>
<td>.62 (.08)</td>
<td>.51</td>
</tr>
<tr>
<td>(11) ACADPRF2</td>
<td>1.00</td>
<td>.60</td>
<td>.36</td>
<td>1.00</td>
<td>.59</td>
<td>.34</td>
<td>1.00</td>
<td>.82</td>
</tr>
<tr>
<td>(12) ACADPRF3</td>
<td>.66 (.13)</td>
<td>.39</td>
<td>.15</td>
<td>.57 (.14)</td>
<td>.34</td>
<td>.11</td>
<td>1.11 (.11)</td>
<td>.90</td>
</tr>
<tr>
<td>(13) ACADPRF4</td>
<td>1.11 (.13)</td>
<td>.66</td>
<td>.43</td>
<td>1.03 (.13)</td>
<td>.60</td>
<td>.36</td>
<td>.47 (.08)</td>
<td>.39</td>
</tr>
</tbody>
</table>

*Note.* Unstandardized loadings (B) are reported and the standard errors are in parentheses (SE). This is followed by the standardized loadings (\( \beta \)). The amount of variance accounted for by the observed variable (\( R^2 \)).

Model 1: The Original 4-Factor Model; Model 2: Error Covariances = Error covariance terms were freed sequentially until model fit was achieved.
the two models). The unconstrained and full-constrained models were compared to evaluate the structural invariance across the groups.

Then comparing the unconstrained and full-constrained models, the unconstrained structural model resulted in $\chi^2 (169) = 413.39$, $\chi^2/df = 2.45$, CFI = .95, SRMR = .06, and RMSEA = .00. The estimation of the fully constrained structural model resulted in $\chi^2 (188) = 456.37$, $\chi^2/df = 2.42$, CFI = .95, SRMR = .08, and RMSEA = .00. Therefore, the difference tests ($\Delta \chi^2 (19) = 42.98; p < .05; \Delta \chi^2/\Delta df = 2.26, \Delta CFI = .00$) lead to rejection of the null hypothesis (i.e., an invariant pattern of causal paths; Chen, 2007; Cheung & Rensvold, 2002).

In this case, the fully unconstrained model fit significantly better, as evidenced by the statistically significant change in chi-square, the ratio of the change in chi-square to the change in degrees of freedom between the two models ($\Delta \chi^2/\Delta df$), and change in CFI (Byrne, 1994; Cheung & Rensvold, 2002; Schermelleh-Engel, Moosbrugger, & Müller, 2003; Rosay, Gottfredson, Armstrong, & Harmon, 2000). Therefore, the findings indicate that at least one of path coefficients was not equal across the two groups or the relationships between the latent variables differ across the students from the US and TR.

**Structural Model**

After finding a significant difference between the structural models of the two groups, the next step was testing two models independently for the US and TR student groups. Thus, both of the hypothesized structural models were analyzed independently within the US (see in Figure 16) and TR (see in Figure 17) samples, and the results are presented separately. According to the hypothesized and tested structural model, BFAS
and CSEI were treated as observed variables. As discussed, the sum of the items included in the scales indicates the levels of Facebook® addiction and college self-efficacy. On the other hand, the ovals represented the latent factors (i.e., SNSSCH: Using SNSs for school work; MULTI: Multitasking with SNSs while studying; SNSUSE: Time spent on SNSs; ACADPERF: Academic Performance). The observed variables (e.g., SNSSCH1, SNSSCH2) that are included in the analysis are not represented in the figures for ease of presentation.

For the structural model to be identified, the minimum condition of identifiability (i.e., $q > p$) must hold; $q = k (k - 1)/2$, where $k$ is the number of measured variables ($k = 15$) in the structural model (Kenny & Milan, 2001). In this case, $q$ is 105; and $p$ (i.e., the sum of number of paths, correlations between exogenous variables, number of correlations between the disturbance and exogenous variables, and number of correlations between disturbances) is equal to 36. Therefore, structural model is classified as identified. With a sample size this large, the significance of the chi-square test is not a reliable way to measure fit of the model (West, Finch, & Curran, 1995). Additionally, WLS estimation method is also inflating the chi-square (Cortina, 2002). As suggested, it is more appropriate to examine other fit indices (i.e., GFI, AGFI and the RMSEA; Byrne, 1994, Mueller, 1996, Schumacker & Lomax, 2010).

The structural model (see Figure 16) results indicate that the initial model before modification had an acceptable fit to the US data, with $\chi^2 = 363.93, df = 81, \chi^2/df = 4.49$, GFI = .98, AGFI = .97, CFI = .93, SRMR = .09, RMSEA = .00. However, as illustrated
Figure 16. Structural equation model for the US sample with unstandardized estimates. BFAS: Bergen-Facebook® Addiction Scale; SNSSCH: Using SNSs for school work; SNSUSE: Time spent on SNSs; MULTI: Multitasking with SNSs while studying; ACADPERF: Academic Performance; CSEI: College Self-Efficacy Inventory.
in Figure 16, not all the hypothesized paths were significant in the US sample. Therefore, non-significant paths were removed from the model, and the new model (see Figure 17) without non-significant paths was analyzed with correlated errors. Cole, Ciesla and Steiger (2007) suggest improving the model fit while adding correlated measurement errors (or residuals) even among different latent factors. Cortina (2002) also discussed the modification of correlating the error variances when the variables “share components” (p. 353).

The new SEM for the US was evaluated using the goodness of fit indices. The second model (see Figure 17) resulted a good fit to the US data, with $\chi^2 = 172.31$, $df = 78$, $\chi^2/df = 2.21$, GFI = .99, AGFI = .98, CFI = .98, SRMR = .07, RMSEA = .00. See Figure 17 (i.e., unstandardized estimates) and Table 25 for the standardized and unstandardized estimates with model fit indices.

The structural equation modelling results indicate that the initial model before modification indices had an acceptable fit to the TR data, with $\chi^2 = 294.86$, $df = 81$, $\chi^2/df = 3.64$, GFI = .96, AGFI = .94, CFI = .91, SRMR = .09, RMSEA = .00. Then, after correlating the suggested errors, the model resulted a good fit to the TR data (see Figure 18), with $\chi^2 = 206.85$, $df = 77$, $\chi^2/df = 2.68$, GFI = .97, AGFI = .96, CFI = .95, SRMR = .08, RMSEA = .00.
Figure 17. Final SEM for the US sample with unstandardized estimates. BFAS: Bergen-Facebook® Addiction Scale; SNSSCH: Using SNSs for school work; SNSUSE: Time spent on SNSs; MULTI: Multitasking with SNSs while studying; ACADPERF: Academic Performance; CSEI: College Self-Efficacy Inventory.
Figure 18. Final SEM for the TR sample with unstandardized estimates. BFAS: Bergen-Facebook® Addiction Scale; SNSSCH: Using SNSs for school work; SNSUSE: Time spent on SNSs; MULTI: Multitasking with SNSs while studying; ACADPERF: Academic Performance; CSEI: College Self-Efficacy Inventory.
Table 25

*Weighted Least Squares Estimates and Selected Fit Indices for SEMs*

<table>
<thead>
<tr>
<th>Description</th>
<th>US Model 1</th>
<th>US Model 2</th>
<th>TR Model 1</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B (SE) β</td>
<td>B (SE) β</td>
<td>B (SE) β</td>
</tr>
<tr>
<td>Paths</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BFAS → SNSSCH</td>
<td>.17 (.05) .20</td>
<td>.19 (.05) .22</td>
<td>.10 (.05) .13</td>
</tr>
<tr>
<td>BFAS → MULTI</td>
<td>.15 (.06) .20</td>
<td>.16 (.05) .19</td>
<td>.08 (.03) .13</td>
</tr>
<tr>
<td>BFAS → SNSUSE</td>
<td>.002 (.06) .00</td>
<td>-- --</td>
<td>.09 (.05) .15</td>
</tr>
<tr>
<td>SNSSCH → SNSUSE</td>
<td>.03 (.06) .03</td>
<td>-- --</td>
<td>.20 (.05) .50</td>
</tr>
<tr>
<td>SNSSCH → MULTI</td>
<td>.36 (.06) .41</td>
<td>.41 (.06) .43</td>
<td>.33 (.06) .45</td>
</tr>
<tr>
<td>SNSSCH → ACADPERF</td>
<td>.14 (.07) .23</td>
<td>.25 (.07) .28</td>
<td>-.17 (.08) -.16</td>
</tr>
<tr>
<td>MULTI → SNSUSE</td>
<td>.85 (.07) .85</td>
<td>.78 (.06) .85</td>
<td>.49 (.10) .31</td>
</tr>
<tr>
<td>MULTI → ACADPERF</td>
<td>.50 (.29) .46</td>
<td>-- --</td>
<td>.46 (.17) .31</td>
</tr>
<tr>
<td>SNSUSE → ACADPERF</td>
<td>-.64 (.31) -.60</td>
<td>-.20 (.08) -.20</td>
<td>-.54 (.14) -.36</td>
</tr>
<tr>
<td>CSEI → ACADPERF</td>
<td>.26 (.04) .36</td>
<td>.28 (.04) .37</td>
<td>.30 (.06) .34</td>
</tr>
<tr>
<td>Selected Fit Indices</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\chi^2$ (df)</td>
<td>180.00 (75)</td>
<td>172.31 (78)</td>
<td>206.85 (77)</td>
</tr>
<tr>
<td>Goodness-of-Fit Index (GFI)</td>
<td>.99</td>
<td>.99</td>
<td>.97</td>
</tr>
<tr>
<td>Adjusted Goodness-of-Fit Index (AGFI)</td>
<td>.98</td>
<td>.98</td>
<td>.96</td>
</tr>
<tr>
<td>Standardized Root-Mean-Square Residual (SRMR)</td>
<td>.08</td>
<td>.07</td>
<td>.08</td>
</tr>
<tr>
<td>Root-Mean-Square Error of Approximation (RMSEA)</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
</tr>
<tr>
<td>Comparative Fit Index (CFI)</td>
<td>.97</td>
<td>.98</td>
<td>.95</td>
</tr>
</tbody>
</table>

*Note.* BFAS: Bergen-Facebook® Addiction Scale; SNSSCH: Using SNSs for school work; SNSUSE: Time spent on SNSs; MULTI: Multitasking with SNSs while studying; ACADPERF: Academic Performance; CSEI: College Self-Efficacy Inventory. Unstandardized loadings (B) are reported and the standard errors are in parentheses (SE). This is followed by the standardized loadings (β).
CHAPTER X

DISCUSSION OF THE MAIN STUDY

First, the findings in the US and Turkey is discussed individually. Then, a comparison between the two groups is offered. The implications of the main study findings are presented along with the limitations of the study.

Discussion

In this chapter, the findings are summarized in relation to the objectives of the second part of this study, and are discussed with reference to previous research. The limitations and the implications of the findings are presented prior to the summary conclusion. The main objective of the second part of this study was to investigate the direct effects of Facebook® addiction on using SNSs for school work, multitasking with SNSs while studying, time spent on SNSs, and how those variables and college self-efficacy predict academic performance.

In the first part of this study, the impact that time spent on SNSs has on GPA, including other observed variables such as multitasking and hours spent studying were addressed and compared in two groups: United States and European countries. Path models based on previous research and theory were developed to describe the relationships. Two separate path models were compared for the United States (US) and Europe as a pilot study examining cross-cultural differences. In the second part, due to the potential limitation of having all European countries in one sample, data were collected from university students in one country – Turkey. In 2013, Turkey was listed
as the 7th largest country after the United States, Brazil, India, Indonesia, Mexico, and the United Kingdom with respect to the total number of Facebook® accounts. Therefore, as top 10 countries in number of Facebook® users, both the United States and Turkey were included in this study.

For the main study, a new survey was administered to students via e-mail. Structural equation modeling (SEM) was used to compare the relationships between the two groups. SEM provides a more powerful alternative to path analysis (PA) and other regression techniques where it allows more flexible assumptions (i.e., explicitly correlated error terms, interactions, nonlinearities, and data level). Additionally, while PA accommodates only measured variables, SEM can model latent variables that cannot be directly observed in data, but rather are inferred from measured variables. The use of multiple indicators of a construct helps to reduce measurement error and increase reliability. Thus, the relationships between the unobserved variables will be discussed.

In general, the main goals of this study included: (a) testing if Facebook® addiction and intensive SNS use impact academic performance, (b) identifying the variables that directly or indirectly impact SNS use and academic performance, (c) understanding the impact of Facebook® addiction on general SNS use and academic performance, (d) indicating relationships between the variables, and (e) probing the differences between university students from different cultures (i.e., United States [US] and Turkey [TR]). Before examining the hypotheses included in the structural model, the following steps were discussed: (a) summarizing data, (b) assessment of BFAS and CSEI, (c) major CFM, and (d) the structural model.
Summary of the Data

Four hundred twenty-six undergraduate students participated in this study from the US and TR. The US students’ college and high school GPA scores were significantly higher than Turkish students. However, this finding might be a result of “grade inflation” in the US. Grade inflation implies an increase in a GPA; hence, grades as an instrument for measuring students’ performance may lose their precision in the US sample (Babcock, 2010; Oleinik, 2009; Sabot & Wakeman-Linn, 1991). Sixty percent of the US students reported having partial or full scholarships, and almost half of the students in the TR reported the same. Similar to GPAs, the US students reported significantly higher hours spent studying per day during the semester and during midterm/finals week. Additionally, the average credit hours that students are registered for during any given semester were significantly higher in the TR sample compared to the US sample.

All of the participants in the study had a Facebook® account. According to the self-reported time spent on SNSs, the US students claimed to use SNSs slightly less on average than students from TR; however, the difference was not significant. More than half of the US Facebook® users reported having more than 500 friends, almost one-fourth of the students have 251-500 friends, and almost 16% have less than or equal to 250 Facebook® friends. On the other hand, only 14% of the TR Facebook® users reported having more than 500 friends, 71% have 251-500 friends, and 15% have less than or equal to 250 Facebook® friends. Thus, students in the TR sample have a lower number of friends on average compared to the US students.
Besides the variables used in the structural models, there were additional variables of interest. Although, Smartphone use is not included in the results section of this study, it is an important tool for young generation to connect to the social media. Lepp, Barkley and Karpinski (2014) found that cell phone use was negatively related GPA. Specifically, the US college students who reported high frequency cell phone use tended to have lower academic performance (i.e., GPA), higher anxiety, and lower satisfaction with life relative to their peers who used the cell phone less often (Lepp et al., 2014).

In the current study, 91% of the US students and 71% of the TR students mentioned having a Smartphone (i.e., iPhone, BlackBerry, or Android phones that can access the Internet and SNS applications). Almost 80% of the students from the US and TR reported checking their Smartphones within 30 minutes after they wake up. Another item that was included in the survey was using a Smartphone for social media accounts (i.e., “I use my cell phone/Smartphone more than my computer to check my SNS accounts.”). A high percentage (86%) in the US sample selected either strongly agree (51.8%) or agree (25.7%) and 49% selected the same Likert ratings in the TR sample. Thus, both students from the US and TR reported high levels of Smartphone use.

Assessing Facebook® Addiction (BFAS) and College Self-Efficacy (CSEI)

For the purpose of this study, total scores of the two scales, BFAS and CSEI were used in the structural model. To compare two different groups, it was also important to evaluate the invariance of the factor loadings of BFAS for the students from the US and TR. The CFAs and reliability analyses showed that the item meanings did not differ between the two groups for BFAS. Therefore, the six items (i.e., BFAS1, BFAS2,
BFAS3, BFAS4, BFAS5, and BFAS6) were used to calculate Facebook® addiction level. Overall analyses demonstrated that students from the US had significantly lower Facebook® addiction total scores compared to students from TR. The same procedure was followed for the CSEI, to show that items had the same meanings across the two groups. Items CSEI1 and CSEI5 were removed from the 7-item scale, and the total scores for college self-efficacy were computed. The results showed that students from the US reported significantly higher confidence levels regarding college self-efficacy (i.e., course efficacy) compared to students from TR.

**Major Confirmatory Factor Model**

The major measurement models for the US and TR samples were analyzed, and measurement invariance was tested. CFA was used to confirm the four major latent factors (i.e., using SNSs for school work, multitasking with SNSs while studying, time spent on SNSs and academic performance). Chen (2008) explains the details of the importance of measurement invariance for cross-cultural research (i.e., the equivalence of a measured construct in two or more groups - from different cultures). After the comparison of constrained and unconstrained measurement models, the measurement invariance across the US and TR indicated measurement equivalence of the items across groups (Vandenberg & Lance, 2000).

**Structural Model**

The goal of this study was to examine the hypothesized structural model, and compare two groups from different cultures. Before comparing the impact of the relationships between the groups, it was important to test for structural invariance across
groups (Byrne et al., 1989). It was found that at least one of path coefficients was not equal across the two groups, and the relationships between the latent variables differed across the students from the US and TR.

As expected, differences were observed between the US and Turkey. Using the statistical results presented in Table 25, the research questions were answered. The hypotheses listed in Table 26 were analyzed using SEM, and compared between the two groups. The research hypotheses are discussed in detail in the following paragraphs.

**Facebook® addiction and intensive SNS use.** Marlatt and colleagues (1988) defined addictive behavior as “a repetitive habit pattern that increases the risk of disease and/or associated personal and social problems” or “the behavior continues to occur despite volitional attempts to abstain or moderate use” (p. 224). Compulsive, excessive, impulsive, uncontrolled, and indulgent were also listed instead of the term “addictive.” Internet addiction, excessive use of the Internet or SNSs, Facebook® addiction have been discussed, and the amount of time spent on SNSs, checking social media frequently, the negative impact have been the emerging evidence of social network users’ addiction like symptoms. Because the reality of addictive behaviors on SNSs, or Facebook® is a growing problem for many users, it is essential to understand how the level of addiction predicted the other factors.

The total score from BFAS was used to measure the level of Facebook® addiction among university students (i.e., Total scores were obtained by summing six items, with higher scores indicating higher levels of Facebook® addiction; Andreassen et al., 2012). Student reports of overall Facebook® addiction scores were significantly
lower for the US students compared to Turkish. Overall, students most likely scored “very rarely” or “rarely” on most of the items, that suggested lower levels of addiction in the two groups.

The hypothesized relationships between Facebook® addiction and three other latent variables were estimated and found to be positive in direction. For instance, both H1 and H2 were found to be statistically significant for students from the US and TR. Thus, Facebook® addiction is a significant indicator of using SNSs for school work and multitasking with SNSs while studying. When the unstandardized estimates are compared, the impact of addiction level was stronger for the US students compared to TR. Consequently, the students with higher Facebook® addiction levels tend use SNSs for school (i.e., to communicate for group projects) and multitask with SNSs while studying. Lastly, H3 (i.e., Facebook® addiction has a significant positive impact on time spent on SNSs) was found to be positive but non-significant in the US sample, and the impact was low in the TR sample. Thus, level of Facebook® addiction significantly influenced time spent on SNSs only in the TR sample. The results of the analysis (i.e., three hypotheses) depict that the hypotheses were supported by the data for the both groups.
### Research Hypotheses and Comparison of Results – The United States versus Turkey

<table>
<thead>
<tr>
<th>No.</th>
<th>Definition of the Hypotheses</th>
<th>US B</th>
<th>TR B</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1</td>
<td>Facebook® addiction has a significant positive impact on using SNSs for school work.</td>
<td>S*</td>
<td>S*</td>
</tr>
<tr>
<td>H2</td>
<td>Facebook® addiction has a significant positive impact on multitasking with SNSs while studying.</td>
<td>S*</td>
<td>S*</td>
</tr>
<tr>
<td>H3</td>
<td>Facebook® addiction has a significant positive impact on time spent on SNSs.</td>
<td></td>
<td>S*</td>
</tr>
<tr>
<td>H4</td>
<td>Using SNSs for school work has a significant positive impact on time spent on SNSs.</td>
<td></td>
<td>S*</td>
</tr>
<tr>
<td>H5</td>
<td>Using SNSs for school work has a significant positive impact on multitasking with SNSs while studying.</td>
<td></td>
<td>S*</td>
</tr>
<tr>
<td>H6</td>
<td>Using SNSs for school work has a significant positive impact on students’ academic performance.</td>
<td>S*</td>
<td>NS*</td>
</tr>
<tr>
<td>H7</td>
<td>Multitasking with SNSs while studying has a significant positive impact on time spent on SNSs.</td>
<td>S*</td>
<td>S*</td>
</tr>
<tr>
<td>H8</td>
<td>Multitasking with SNSs while studying has a significant negative impact on students’ academic performance.</td>
<td>NS</td>
<td>NS*</td>
</tr>
<tr>
<td>H9</td>
<td>Time spent on SNSs has a significant negative impact on students’ academic performance.</td>
<td>S*</td>
<td>S*</td>
</tr>
<tr>
<td>H10</td>
<td>College self-efficacy has a significant positive impact on students’ academic performance.</td>
<td>S*</td>
<td>S*</td>
</tr>
</tbody>
</table>

*Note.*  
S = Supported; NS = Not Supported; *the path is significant.
**Using SNSs for school work and time spent on SNSs.** A positive and statistically significant relationship was reported between using SNSs for school work and time spent on SNSs only in the TR sample. The same relationship was also positive in the US sample, but it was not statistically significant. This finding is parallel with the findings of the previous qualitative research (Ozer et al., 2014). Researchers reported that “using SNSs for school work” was one of the most common responses regarding the positive impact of SNSs on academic performance. The theme was cited by 11.3% ($n = 51$) of the US respondents, whereas 130 students (32%) from European countries specifically mentioned using SNSs for school-related work. Accordingly, analyses showed that students from the US do not use SNSs “extensively” for their school work (i.e., informal communication tool for educational purposes) to have an impact on their overall time spent on SNSs, and not as much as students from TR.

As discussed in the literature review (i.e., Chapter 7), the values of the cultural dimensions for the US and TR differ. According to Hofstede et al. (2010), the US is an individualistic society and TR is a collectivist society. The individualistic cultures value self more than others, tend to have more friends but looser connections, and friendships are temporary, where collectivist societies value family, friends, and groups over self, and tend to have less, but enduring friendships (Jackson & Wang, 2013). The positive impact of using SNSs for school work on time spent on SNSs could be explained by this cultural dimension. With respect to that comparison, Turkish college students may be using SNSs for school or at least as a communication tool for school work. However, because of their “collectivist” characteristics, Turkish students may be more prone to engage in
online conversations with classmates, and they may not prefer to log out of their SNS account once they start the conversation. On the other hand, American students also use SNSs for school, but as a result of being from an individualistic society, they might log out of their SNS account right after getting an answer about their school project or group work.

**Using SNSs for school work and multitasking while studying.** The positive impact of using SNSs for school work on multitasking with SNSs while studying was statistically significant in both samples, and the relation was slightly stronger in the US sample. Using SNSs for school-related purposes predicts the level of multitasking with SNSs while studying. Studies have shown that college students frequently use SNSs, e-mails, talk on their cell phones, and text while doing school (Junco & Cotten, 2012). In their study, Junco and Cotten (2012) reported multitasking with SNSs had an impact on students’ capacity for cognitive processing and deeper learning and overall GPAs, and pointed out “Facebooking and texting are social activities that are used frequently, students are dividing their attention between their school work and communicating with friends” (p.512). However, while studying some students may be using SNSs for academic purposes and that might drive the level of multitasking with SNSs while studying. Therefore, it is important to examine different SNS activities to understand to what extent students use SNSs for academic purposes, and the reasons for multitasking with SNSs while studying or listening to a lecture.

**Using SNSs for school work and academic performance.** The impact of using SNSs for school work on academic performance was statistically significant in both
samples. However, surprisingly, the impact was positive in the US, and negative in the TR sample. In the US, students who mentioned using SNSs for informal educational communication (e.g., group projects, school-related work) had higher academic performance. This finding is supported by Junco and colleagues (2011) – Twitter® can be used as an educational tool to help engage students. Therefore, it is possible that some of the US students use Facebook® for educational goals, such as sharing information about their classroom activities, collaborating with their peers on assignments, and arranging study groups (Lampe et al., 2011).

In the TR sample, using SNSs for school (e.g., communicating for group projects) was found to be negatively related to students’ academic performance. The primary function of SNSs is predominantly social communication, and not for academic or educational purposes (Junco et al., 2011; Junco & Cotten, 2012). That is, students consider SNSs a social tool mostly unrelated to school. Even if students indicate using SNSs for educational purposes, this is still a small fraction of the amount of time spent using their SNSs in general. Additionally, students (and especially in the TR sample as evidenced in the current study) spend an extensive amount of time on SNSs. Therefore, the negative relationship mentioned about in TR students could be a product of spending a considerable amount of time on SNSs and most likely for informal communication more so than educational purposes.

**Multitasking while studying and time spent on SNSs.** There was a positive and statistically significant impact of multitasking with SNSs while studying on time spent on SNSs, in both samples. The impact was stronger in the US sample. Higher levels of
multitasking with SNSs while studying predicted the amount of time spent on SNSs. In a recent experimental study, Rosen and colleagues (2013) reported that “Participants averaged less than six minutes on task prior to switching most often due to technological distractions including social media, texting and preference for task-switching” (p. 948), and students with lower GPAs checked their Facebook® accounts one or more times during the experiment (i.e., during 15 minute observation periods). Therefore, the relation between multitasking and time spent using SNSs was expected for both groups.

According to Hall (1989), the US was classified as a low-context and monochronic country, whereas TR was listed as high-context and polychronic (Rosenbloom & Larsen, 2003). Thus, the stronger relationship in the US sample may be due to the fact that the US participants might be slightly more monochronic, which means Americans are more comfortable with doing only one job at a time, and separating task-oriented time from social time (Gudykunst, 1998). Therefore, the participants of this study who multitask with SNSs while studying spend more time on SNSs.

**Multitasking while studying and academic performance.** The results indicated a positive relationship between multitasking with SNSs and academic performance, and this relationship was only significant in the TR sample, and the hypothesis was not supported for the two groups. The relationship between multitasking and academic performance was hypothesized to be negative. There may be cultural issues to consider. One conclusion is that this may be due to TR students being less prone to what can be called “disruptive” multitasking (Karpinski et al., 2013). They may have SNS(s) active a larger percentage of the time when studying, inducing less attention division, task
switching, and task interference. Previous research has shown that switching between tasks frequently leads to poorer learning results and performance (American Psychological Association [APA], 2006; Ophira et al., 2009). Thus, perceived level of multitasking with SNSs while studying or in a classroom setting may have a direct or indirect negative impact on academic performance (Ellis et al., 2010; Gabre & Kumar, 2012; Golub & Miloloža, 2010; Junco & Cotten, 2012; Karpinski et al., 2013; Wood et al., 2012).

In a recent experimental study, Wood et al. (2012) found that students, who were multitasking with Facebook® during a lecture, scored significantly lower on tests of lecture material. As a result, students who did not use technology got better scores compared to those students who did use technology during lectures (i.e., non-multitaskers scored better than multitaskers; Wood et al. 2012). In another study, Rosen et al. (2011) found that students who received more text message interruptions during a lecture performed worse on an information posttest. Similarly, Junco and Cotten (2011) found that students who reported doing more multitasking by doing school work while instant messaging were more likely to report that their school work had suffered. Junco and Cotten (2012) reported that engaging in social media accounts or constantly using technology while trying to complete school work may tax students’ capacity for cognitive processing and prevent deeper learning (Junco & Cotten, 2012).

To probe the above finding further, the data in this study were re-analyzed using only three latent variables (i.e., multitasking, time spent on SNSs, and academic performance). As demonstrated in Was and Woltz (2007), the mediation analysis was
implemented to compare the CFI difference test between the freely estimated mediation model, and the constrained model (i.e., fixing the path coefficient between multitasking and academic performance). For both groups (i.e., the US and TR), the hypothesized model indicated a good fit to describe the data. The primary interest for the mediation hypothesis was to illustrate a change in the direct predictive relationship between time spent on SNSs and academic performance in the presence of the indirect relationship through multitasking. The analysis showed that there was reliable shrinkage of the direct negative relationship between time spent on SNSs and academic performance due to the addition of the indirect path through multitasking. Thus, multitasking negatively mediated the relationship between time spent on SNSs and academic performance in the US and TR samples.

**Time spent on SNSs and academic performance.** How students use SNSs and how the uses of SNSs impact their academic performance have been discussed since 2009. In most of these research studies, correlational design was used to investigate the relationship. The majority of the studies has demonstrated a negative relationship between time spent on SNSs and academic performance (i.e., GPA; Bjerregaard, 2010; Ellis et al., 2010; Gabre & Kumar, 2012; Junco, 2012c; Junco & Cotten, 2012; Karpinski et al., 2013; Kirschner & Karpinski, 2010; Lee, 2014; Paul et al., 2012; Stollak et al., 2011; Walsh et al., 2013; Woon & LaRose, 2014). A few studies also found no relationship (Ahmed & Qazi, 2011; Hargittai & Hsieh, 2010; Lubis et al., 2012; Pasek et al., 2009; Shah et al., 2012). The details of those studies are illustrated in Table 27, where the majority of previous research (i.e., mostly conducted in the US) reported a
negative relationship between time spent on SNSs and academic performance (e.g., GPA). In this study, the negative impact of time spent on SNSs on academic performance was statistically significant in both samples.

From another perspective, almost 80% of the students from the US and TR reported checking their Smartphones within 30 minutes after they wake up, and a high percentage, 86% of the US sample, mentioned using their cell phone/Smartphones more than their computer to check their SNS accounts (i.e., 49% in the sample). Lepp and colleagues (2014) found that cell phone use was negatively related GPA, and positively related to anxiety. Thus, college students from the US who reported high frequency cell phone use tended to have lower academic performance (i.e., GPA), higher anxiety, and lower satisfaction with life relative to their peers who used the cell phone less often (Lepp et al., 2014). Thus, students from the US and TR reported high levels of Smartphone use, that may also be influencing the relationship.

Another interesting finding was related to the hours of daily studying and SNS use. Compared to the Turkish students, the US students reported spending higher amount of time studying during the semester and midterm/finals week. In opposite, the self-reported time spent on SNSs was higher for the TR sample. On average, American students reported spending 3.5 hours for studying and 2.6 hours for SNSs during a regular day while Turkish students reported 2.6 hours of daily studying and 2.9 hours of daily SNS use. In summary, another reason of the negative impact might be due to the amount of time on social media.
Table 27

*The Impact of SNS Use on University Students’ Academic Performance*

<table>
<thead>
<tr>
<th>Author(s), Year</th>
<th>Country</th>
<th>N</th>
<th>Finding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bjerregaard (2010)</td>
<td>US</td>
<td>130</td>
<td>Negative</td>
</tr>
<tr>
<td>Ellis et al. (2010)</td>
<td>US</td>
<td>62</td>
<td>Negative</td>
</tr>
<tr>
<td>Gabre &amp; Kumar (2012)</td>
<td>US</td>
<td>95</td>
<td>Negative</td>
</tr>
<tr>
<td>Harrigattai &amp; Hsieh (2010)</td>
<td>US</td>
<td>1060</td>
<td>-</td>
</tr>
<tr>
<td>Junco (2012c)</td>
<td>US</td>
<td>1839</td>
<td>Negative</td>
</tr>
<tr>
<td>Junco &amp; Cotten (2012)</td>
<td>US</td>
<td>1839</td>
<td>Negative</td>
</tr>
<tr>
<td>Karpinski et al. (2013)</td>
<td>US</td>
<td>451</td>
<td>Negative</td>
</tr>
<tr>
<td>Kirschner &amp; Karpinski (2010)</td>
<td>US</td>
<td>219</td>
<td>Negative</td>
</tr>
<tr>
<td>Lee (2014)</td>
<td>US</td>
<td>314</td>
<td>Negative</td>
</tr>
<tr>
<td>Pasek et al. (2009)</td>
<td>US</td>
<td>835</td>
<td>-</td>
</tr>
<tr>
<td>Paul et al. (2012)</td>
<td>US</td>
<td>240</td>
<td>Negative</td>
</tr>
<tr>
<td>Shah et al. (2012)</td>
<td>US</td>
<td>94</td>
<td>-</td>
</tr>
<tr>
<td>Stollak et al. (2011)</td>
<td>US</td>
<td>430</td>
<td>Negative</td>
</tr>
<tr>
<td>Walsh et al. (2013)</td>
<td>US</td>
<td>483</td>
<td>Negative</td>
</tr>
<tr>
<td>Wohn &amp; LaRose (2014)</td>
<td>US</td>
<td>380</td>
<td>Negative</td>
</tr>
<tr>
<td>Rouis et al. (2011)</td>
<td>Sweden</td>
<td>239</td>
<td>Negative</td>
</tr>
<tr>
<td>Ahmed &amp; Qazi (2011)</td>
<td>Pakistan</td>
<td>730</td>
<td>-</td>
</tr>
<tr>
<td>Golub &amp; Miloloža (2010)</td>
<td>Croatia</td>
<td>277</td>
<td>Negative</td>
</tr>
<tr>
<td>Karpinski et al. (2013)</td>
<td>Europe</td>
<td>406</td>
<td>Negative</td>
</tr>
<tr>
<td>Lubis et al. (2012)</td>
<td>Malaysia</td>
<td>81</td>
<td>-</td>
</tr>
<tr>
<td>Bijari et al. (2013)</td>
<td>Iran</td>
<td>210</td>
<td>Negative</td>
</tr>
</tbody>
</table>

*Note.* US = United States
In a recent study by the Turkish government, more than half of the participants evaluated social media as being a social or political platform and a replacement for traditional media (i.e., through social media channels, participants were able to reach the current news that traditional media does not provide; Bulut, 2013). Starting in May 2013, Turks were faced with many political issues and protests, and as reported in the research, SNSs (e.g., Twitter® and Facebook played a crucial role during the demonstrations and civil unrest) were the primary communication platforms. Thus, Turkish college students, as being from a collectivist society that value family, friends, and groups over self might have been spending more time on SNSs because of the seasonal problems in the country. Since college students in Turkey use SNSs as a replacement of traditional media, students may have tended to spend more time on SNSs to get and share information (e.g., sending messages/tweets related to politics; sharing news, videos, photos) related to the concerns in the country. Therefore, the extensive amount of time spent on SNSs may be due to the latest unrest in the country, and that political issues might have had an indirect negative impact on students’ academic performance (e.g., low GPAs).

**College self-efficacy and academic performance.** The positive impact of college self-efficacy on academic performance was statistically significant in both samples. The size of the impact was similar in the two groups. Pajares and Schunk (2001) discussed how self-efficacy had a powerful and independent contribution to predict academic performance. Additionally, Zajacova et al. (2005) investigated academic self-efficacy (i.e., the strongest predictor of GPA) and found that it had a strong effect on grades. In a similar fashion, Gore and colleagues (2005) and Barry and Finney
(2009) reported that course efficacy (Solberg et al., 1993) was positively correlated with GPA. Thus, this finding in the current study has strong support in the literature.

**Implications**

Results highlight a negative relationship between time spent on SNSs and academic performance for all students, especially for students from TR. Previous literature and current statistics around the world (e.g., time spent on SNSs, number of Facebook® users, Smartphone users, etc.) confirm that technology, the Internet, and social media are “irresistible” for all age groups. Technology is easily accessible in many countries around the world. Thus, the perception of being connected has become a “requirement,” not a “luxury.” The implications for (a) students, (b) faculty and administrators, and (c) the research community are discussed in the following paragraphs.

**Implications for Students**

This study showed that the habit or addiction of SNSs (i.e., Facebook® addiction) can negatively impact students’ academic performance. This problem may transfer when students begin their professional careers. In addition, multitasking with SNSs has become a “habit” (e.g., driving and texting, studying and checking your phone, etc.). Previous literature has discussed how multitasking with technology, specifically SNS(s) such as instant messaging, decreases efficiency and productivity. Thus, it is of concern that the latest social media-addicted generation will soon become working professionals in society.

Besides the main variables of interest, Smartphone addiction is a new research area. The extensive and addictive use of Smartphones should be examined further across
university students, as Smartphones are one of the primary tools used to communicate via SNSs. Using Smartphones concurrently while studying may have the same effect as demonstrated in the current study. With the Internet access and SNS use at an all-time high on a myriad of devices concurrently, it is easier to engage in multitasking behaviors while studying. The results from this study provide cautionary information about the impact of using SNS(s) in a learning environment or while studying on students’ GPA.

In another recent study, Frein, Jones and Gerow (2013) discussed long-term impact of Facebook® use. The researchers tested high- and low-level Facebook® users with a memory test. The results indicated that high Facebook® users (i.e., spending more than one hour a day) scored significantly lower on the free recall test than low Facebook® users. As the study suggests, SNS use may have an impact on how people process information, which may result in lower recall ability. Thus, the current study’s findings coupled with Frein and colleagues’ (2013) consideration of the long-term implications demonstrates the direction of the importance of research in this area.

Implications for Faculty and Administrators

By knowing how extensively university students use SNSs in their daily lives, the current study’s findings can be used to encourage faculty or administrators to consider using SNSs for educational purposes, especially in TR. From another perspective, students can be advised on the potential negative impact of SNSs on their personal lives, and specifically their academic performance. Therefore, there is a need for further investigation into the types of social media (i.e., Twitter, YouTube, etc.) or new
Smartphone applications that may enhance learning, as well as the types of courses or learning environments in which SNSs would be most appropriate to use.

**Implications for the Research Community (SNS Researchers)**

For the research community, this study contributes to the literature in many unique ways. The main goal of this study was to compare different societies (i.e., US and TR) with regards to Facebook® addiction, general social media use (e.g., time spent on SNSs, frequency), multitasking with social media accounts while studying, using SNSs for school work, college self- efficacy and academic performance. Additionally, this exploratory study showed different styles of SNS use (i.e., disruptive and non-disruptive) with respect to the two sub-populations and that this differentially had an impact on students’ academic performance.

Finally, SEM as a data analytic strategy has been less common in examining the abovementioned relationships (Paul et al., 2012). Frequencies and percentages have been tallied, and correlations and regressions have been used (Bjerregaard, 2010; Harrigattai & Hsieh, 2010; Junco, 2012c; Kirschner & Karpinski, 2010; Pasek et al., 2009; Shah et al., 2012; Stollak et al., 2011; Rouis et al., 2011; Ahmed & Qazi, 2011; Lubis et al., 2012; Bijari et al., 2013). There have been no studies analyzing unobserved variables and using measurement and structural invariance across multiple groups in this area of research (Steinmetz et al., 2009). Thus, in future studies, advanced statistical methods can be used to explore the hypothesized relationships.
Limitations and Future Directions

Conceptual Limitations and Future Directions

The availability of technology and the Internet can be different in two countries. The majority of participants in the TR sample were from a large, metropolitan city (i.e., Istanbul). However, when comparing the two countries, technology is more readily available in the US. Thus, the availability of technology might be considered a limitation. In addition, grade inflation in the US sample can be problematic when comparing academic performance with other countries. In the current study, GPA in the TR sample was reported to be lower compared to the US sample, and it is unclear if this difference was real, or a product of grade inflation in the US.

Finally, some larger constructs might be viewed differently in various cultures. For example, related to the current study, the construct of socialization via technology, or even socialization in general, might be perceived differently, and overall perception may influence how people respond to survey questions. However, it should be recognized that not every possible predictor that may influence SNS use or academic performance can be included in the model (e.g., perceptions of socialization using technology). SNS use is a multifaceted phenomenon, with many factors that can influence each other. Therefore, in future studies, other variables can be included in the model, especially variables that can account for differences in perception of constructs across cultures.

Methodological Limitations and Future Directions

Due to the design of this study, a cross-cultural comparison study, the results may have low generalizability for all cities in TR and all states in the US. Although
generalization to the US and TR as a whole is nearly impossible, few studies have examined cultural differences, even though this could play an important role in SNS use. Research has shown that cultures or cultural contexts can influence both the patterns of media usage (i.e., amount and/or duration of use) and attitudes toward them (Garramone et al., 1986; Papacharissi & Rubin, 2000). Future studies should consider examining SNS use, specifically taking culture and cultural differences into account (i.e., comparing different countries/regions).

The unbalanced gender ratio of the US sample, with 70% of females, might also limit the generalizability of the findings. The primary population was predominantly social science/humanities majors, and this has been a general limitation for some previous research (Karpinski et al., 2013; Kim et al., 2011). In future studies, a more balanced sample should be collected.

Another limitation is that the voluntary response sample. It is difficult to validate self-reported information, and this is often a common problem of online survey research. Furthermore, recruiting methods may incur a biased sample towards individuals who use social media, since recruiting and data collection were both electronic. Thus, the participants of this study may be classified as a part of the student population who are already “tech-savvy.” Students may be active users of technology, and may tend to multitask with technology more than other students do. Future studies should find alternative methods of collecting information (e.g., transcripts for student GPAs, tracking time spent on SNSs) from diverse populations (e.g., less active SNS users).
Measurement-Related Limitations and Future Directions

The assessment of a cross-cultural comparison is meaningful when the instruments used to measure the theoretical constructs of interest have adequate cross-national equivalence (Steenkamp & Baumgartner, 1998). To assess the aspects of measurement equivalence, a multiple (i.e., simultaneous) confirmatory factor analysis model is suggested by Jöreskog (1971). However, more research is needed on procedures including describing and anchoring scales to increase cross-national invariance in responses (Steenkamp & Baumgartner, 1998). Thus, the evidence of different cultures responding the same Likert scale in different ways may be problematic, since people from different cultures adopt different standards when evaluating themselves on subjective Likert scales (Heine, Lehman, Peng, & Greenholtz, 2002; Lee, Jones, Mineyama, & Zhang, 2002). Further research is needed to examine the impact of the use of scale anchors (e.g., very rarely, rarely, etc.) in different cultures and which anchors induce more hesitation or reluctance in endorsing items.

Another limitation that can be listed is “misreported GPAs” (Maxwell & Lopus, 1994) or as defined in the literature, the Lake Wobegon effect (i.e., "all the women are strong, all the men are good-looking, and all the children are above average"; Lee, 1991). Self-reported GPA is one of the most frequently used measures of academic performance and other important life outcomes (Kuncel et al., 2005; Zimmerman, Caldwell, & Bernat, 2002); however, misreported GPAs might be an issue. For example, below-average students may tend to inflate their academic performance by misreporting their GPAs
Future studies should find alternative methods of collecting information (e.g., transcripts for student GPAs).

The main study did not measure the level of cultural orientation of the participants. However, prior research on cultural differences between the two countries was assumed (Karpinski et al., 2013; Ozer et al., 2014). Thus, another approach to actually verify the real differences and avoid the subjectivity of Likert scale effects can be measuring culture through individual-level responses (Heine et al., 2002; Kim et al., 2011). It might be more accurate to investigate culture by examining cultural-level measures (i.e., individualism-collectivism; Hofstede, 1983).

As noted when discussing GPA, one of the limitations of this study was the measurement of variables that are memory-based (e.g., self-reported time spent studying and on SNSs per day) and relying on respondents’ perceptions (e.g., using SNSs for school work, multitasking with SNSs while studying, and Facebook® addiction and self-efficacy). Similar to the pilot study, the main study did not have the data of the actual time spent studying or time spent on SNSs, and self-reported measures can be inaccurate when compared to actual behaviors. Since accessing these data is not practical, the possible invalidity of individual self-reported items may be problematic. All of the survey items were self-reported and that may subject to a host of concerns (e.g., social-desirability, inaccuracy, poor memory; Karpinski et al., 2013). The validity of future studies’ findings can be enhanced by determining the most accurate ways to collect data. A behavioral measure of Facebook® use, which includes an actual assessment of Facebook® activity, would improve the study’s findings.
In reality, participants in this study may not be able to report the exact amount of time they spent studying or using SNSs, whereas there may also be some bias in willingness to report honestly. In his experiment, Junco (2013) tested the criterion validity of measures of Facebook® frequency by comparing self-reported time spent on SNSs and number of logins against actual usage as measured by computer monitoring software. In his study, Junco found a strong positive correlation between self-reported and recorded time spent on Facebook®. Thus, self-reported amount of time is expected to be an indicator of the actual amount of time the participants spent on SNSs. Similarly, those findings may also be applicable for study time (i.e., estimating the amount of time they spent). Determining the most accurate ways to collect these data (i.e., using additional standardized measures) will heighten the validity of future studies’ findings.

**Statistical Limitations and Future Directions**

In this study, data were found to be nonnormal, and were a mix of continuous and ordinal measures. Schumacker and Lomax (2010) recommended using the WLS estimation method to analyze nonnormal data, and WLS can be applied to either continuous or ordinal outcomes since it does not assume a particular distributional form (Kline, 2011). However, Flora and Curan (2004) discussed WLS estimation is known to produce biased chi-square test statistics and parameter standard error estimates. The performance of WLS improves with larger sample sizes, and this estimation method provides precise parameter estimates and achieves high theoretic fit for larger sample sizes (e.g., >1000; Olsson, Foss, Troye, & Howell, 2000; Finney & DiStefano, 2006). In future research, the same model can be replicated by using other estimation methods
(e.g., ML, GLS), and a comparison of LISREL estimates of standard errors and model fit indices based on different estimation methods can be produced.

Although the sample size for the WLS estimation appears to be small, several rules-of-thumb suggest that sample size is sufficient (Bentler & Chou, 1987; Jöreskog & Sörbom, 1996). One sample size guideline is that the ratio of the sample size to the number of free parameters should be 5 to 1 (e.g., \( N \geq 180 \); Bentler & Chou, 1987). Another suggested minimum sample size to run the SEM was found to be 140 (Jöreskog & Sörbom, 1996). In this case, for the two groups, sample sizes met the abovementioned minimum requirement.

Yet another approach to gauging if the sample size in a study is acceptable post hoc involves the use and interpretation of the Critical \( N \) (\( CN \)) statistic (Hoelter, 1983). The \( CN \) is the sample size where the \( F_{min} \) value leads to a rejection of the null hypothesis (Schumacker & Lomax, 2010). The \( CN \) from the LISREL output was found to be 133.99 in the US and 105.64 in the TR final model. The sample sizes for the two groups were more than \( CN \) with a significant \( \chi^2 \), but acceptable model fit indices. Therefore, a sufficient sample size was used according to Hoelter’s (1983) criteria. Even though sample sizes do not appear to be a major concern, future studies incorporating a larger sample may help to establish the validity of the new items included in this study.

**Conclusion**

Research and the media have shown that students from any part of the world use SNSs extensively and some students addictively use SNSs. The current study aimed to add to the burgeoning body of theoretical and empirical literature examining the
relationship between Facebook® addiction, SNS use, multitasking, and academic performance from a cross-cultural perspective while applying advanced statistical methods. Results of this study highlighted a negative relationship between time spent on SNSs and GPA for students. SNS or Internet use is something done concurrently with studying, or other academic activities in the classroom or at home. The negative relationship between time spent on SNSs and GPAs may be an indication of a harmful effect of trying to carry out these two automatized processing processes at the same time. In other words, it is not only the time spent on SNSs, but also SNS habits of students. Thus, any task done concurrently with studying may have this same impact.

For learning purposes, it is important to give continuous attention to studying, while avoiding automatized reactions (i.e., multitasking). However, with the popularity of SNSs and the increase of mobile-social networking, it has become easier and attractive for college students to engage in such activities while studying. The results from this study provide valuable cautionary information about the impact of multitasking and using SNS(s) in a learning environment on students’ GPA, or academic performance.
APPENDICES
APPENDIX A

SOCIAL NETWORKING SITE SURVEY
Appendix A

Social Networking Site Survey

You are invited to participate in a study that will provide researchers and professionals with information to explore Social Networking Site use. Sharing your experiences will assist us in providing invaluable information to other researchers. Participation in this study is completely voluntary. However, information in this study will provide useful and practical information to guide further research in this burgeoning area that can assist researchers and professionals in understanding Social Networking Site use.

The survey should take no more than 15 to 20 minutes to complete. There are a number of sections in this survey comprised of closed-response and open-response items to collect information on your reflections and comments on Social Networking Site use and to gather demographic information. Information obtained from this survey will be analyzed and reported collectively. Thank you for your participation!

Part I: Demographics

1. Age: ______ Years ______ Months

2. Sex (Check one):
   - [ ] Male
   - [ ] Female

3. Ethnicity (Not Required)

4. What is the name of the school/university/polytechnic/college that you currently attend?

5. In which country are you studying?

6. School Status (Check one):
   - [ ] Undergraduate (e.g., Bachelors)
   - [ ] Graduate (e.g., Masters, PhD, Other)
7. If undergraduate, how many years does your undergraduate/bachelor degree require?
   _____ Years

7a. If undergraduate, how many years have you successfully completed?
   _____ Years

8. If graduate, what type (Check one)?

   Masters  ☐
   Research Masters  ☐
   Doctoral (PhD)  ☐
   Professional

9. Major(s):

   __________________________________________________________

9a. Minor(s) (If Applicable):

   __________________________________________________________

10. Anticipated Date of Graduation (Month/Year):

     _________________________________________________________

11. Student Status (Check one)?

   Full-time  ☐
   Part-time  ☐

12. Do you take part in paid work?

   Yes  ☐
   No  ☐

13a. If yes, for how many hours per WEEK?

   _______ hours/week spread across _____ days

13b. What (type of) paid work do you do?

   _______________________________________________________
   _______________________________________________________
Part II: Academic Information

14. What is your approximate current cumulative grade point average?
   ______ points out of a maximum of ______

15. Approximately how many hours per **DAY** do you spend studying?
   ______ hours/day

16. Describe how you spend your free time when you are not studying.

   

17. Are you involved in extracurricular activities (ECAs) which would not be classified as paid work (Check one)? **If no, skip to Part III.**
   
   Yes  □
   No   □

18a. If yes, in what ECAs are you involved?

   

18b. Approximately how many hours per **WEEK** do you spend on ECAs?
   ______ hours/week
Part III: Computer and Internet Use

19. Do you own a computer (Check one)?

Yes ☐
No ☐

20a. If yes, approximately how many hours per **DAY** do you spend using the computer (i.e., **online AND offline**) on a ‘typical’ day?

_______ hours/day

20b. For what activities and for what percentage of the total time do you spend using a computer (**online AND offline**) on a ‘typical’ day?

☐ For School ______% of the time
☐ For Paid Work ______% of the time
☐ For ECAs ______% of the time
☐ For Fun/Games ______% of the time
☐ For Social ______% of the time
☐ For Other Things ______% of the time

If “other things”, what things?

21. Do you have Internet access (Check one)?

Yes ☐
No ☐

22a. If yes, approximately how many hours per **DAY** do you spend on the Internet /Online on a ‘typical’ day?

_______ hours/day
22b. For what activities and for what percentage of the total time do you spend on the Internet /Online on a ‘typical’ day?

☐ For School ______% of the time
☐ For Paid Work ______% of the time
☐ For ECAs ______% of the time
☐ For Fun/Games ______% of the time
☐ For Social ______% of the time
☐ For Other Things ______% of the time

If “other things”, what things?

23. How experienced are you with using the Internet (Check one)?

Very inexperienced ☐
Somewhat inexperienced ☐
Somewhat experienced ☐
Very experienced ☐

24. How capable do you feel in using the Internet (Check one)?

Not very capable ☐
Somewhat capable ☐
Capable ☐
Very capable ☐

25. Do you visit academically-related websites (Check one)?

Yes ☐
No ☐

26. If yes, what types of academically-related websites do you visit?

27. Do you visit non-academically-related websites (Check one)?

Yes ☐
No ☐
28. If yes, what types of non-academically-related websites do you visit?

Part IV: Social Networking Site Use (e.g., Facebook, Hyves, Myspace, Orkut, etc.)

29. What social networking site(s) – SNSs - do you use (Check all that apply)? If none, skip to question 40.

   Facebook □
   Hyves □
   Myspace □
   Orkut □
   Other(s), namely ______________________________________________________

30. If yes, what are your reasons for signing up on those sites?

In the following questions, you will be asked about your use of Social Networking Site(s). Though the singular is used in the questions (e.g., How often do you use it?), if you use more than one SNS, then answer it as plural (e.g., How often do you use them?).

31. How often do you use it (Check one)?

   Every 3 months □
   Every month □
   Every week □
   Daily □
   Multiple times per day □

32. If you use it either daily or multiple times per day, approximately how much time per DAY do you spend using it?

   _______ hours and _______ minutes per day
33a. Do you use it or have it on in the background while studying (e.g., you receive a message/pop-up when one of your friends/contacts makes an entry or contacts you)?

Yes   □
No    □

33b. If yes, what percentage of your study time do you use it / have it turned on?

_________% of the time

33c. Do you mainly use my account(s) to:

- build/work on a career network    □
- build/work on a social network    □
- flirt                            □
- join interest groups             □
- let others know what you are doing □
- look at strangers’ photos         □
- look at friends’ photos           □
- maintain a career network         □
- maintain a social network         □
- make plans with friends           □
- meet new people                   □
- meet people to date                □
- post photos of yourself and/or friends and family □
- see/follow what others are doing  □
- send bulletins or group messages  □
- send private messages/emails to people □
- stay in touch with friends you rarely see in person □
- stay in touch with friends you see a lot □
- stay in touch with friends you’ve only met online □
- work on school activities         □

34. Do you often multitask (i.e., Do you ACTIVELY do more than one thing at a time with the computer? NOTE: This does not include things like just listening to music in the background as you would a radio.)

Yes   □
No    □
35. I find multitasking easy.

☐ Strongly Disagree  ☐ Disagree  ☐ No Opinion  ☐ Agree  ☐ Strongly Agree

36. I am capable of effectively multitasking.

☐ Strongly Disagree  ☐ Disagree  ☐ No Opinion  ☐ Agree  ☐ Strongly Agree

37. Multitasking does not interfere with the main task/activity in which I am engaged.

☐ Strongly Disagree  ☐ Disagree  ☐ No Opinion  ☐ Agree  ☐ Strongly Agree

38. When using your SNS application(s) do you attend to an incoming message immediately?

Yes ☐  No ☐

39. When using your Social Networking application(s), and an incoming message appears, do you tend to...

☐ only take note of what has transpired (e.g., read the message.).
☐ respond to the incoming message (i.e., reply or comment on that one message.).
☐ read it and initiate more interaction further (e.g., poke, upload, change your status, etc.).
☐ other (Please Specify):  

_________________________________________
40. If you do not use an SNS application, please check why you choose not to use it (Check All that Apply).

- I am not interested in using it. □
- I think it’s too much of a “fad.” □
- I have no time to use it. □
- My peers do not use it. □
- I do not want to put personal information online. □
- Other (Please explain):

________________________________________________________

________________________________________________________
Part V: Open Questions

41. How do you use the SNS application to communicate with others? Please explain in the space below.

42. Have you decreased your use of SNSs or deactivated your account for any amount of time due to any negative press that SNSs have received? Please explain in the space below.

43. Do you think that using the SNS application has or has not had an impact (i.e., positive and/or negative) on your academic performance?

Yes ☐
No ☐

44. If yes, how? Please explain in the space below.

Positive:

Negative:

45. If no, why not? Please explain in the space below.

46. Is there anything that you would like to add? If so, then use the space below.
APPENDIX B

INSTITUTIONAL REVIEW BOARD (IRB) APPROVAL FOR PART I
Appendix B

Institutional Review Board (IRB) Approval for Part I

RE: Protocol #11-101 entitled “An Examination of Social networking site Use, Academic Achievement, and Multitasking in University Students”

Hello,

I am pleased to inform you that the Kent State University Institutional Review Board has reviewed and approved your Application for Approval to Use Human Research Participants as Level I/Exempt research. This application was approved on March 3, 2011. Your research project involves minimal risk to human subjects and meets the criteria for the following category of exemption under federal regulations:

Exemption 2: Research involving the use of educational tests, surveys, interviews, or observation of public behavior.

Submission of annual review reports is not required for exempt projects. **If any modifications are made in research design, methodology, or procedures that increase the risks to subjects or includes activities that do not fall within the approved exemption category, those modifications must be submitted to and approved by the IRB before implementation.** Please contact the IRB administrator to discuss the changes and whether a new application must be submitted.

Kent State University has a Federal Wide Assurance on file with the Office for Human Research Protections (OHRP); FWA Number 00001853.

If you have any questions or concerns, please contact me by phone at 330-672-2704 or by email at Pwashko@kent.edu.

Respectfully,

Paulette Washko | 330.672.2704 | Pwashko@kent.edu | 137 Cartwright Hall
Manager, Research Compliance, Communications and Initiatives
APPENDIX C

MOBILE-SOCIAL NETWORKING SITE SURVEY
Appendix C:

Mobile-Social Networking Survey

Part I: Demographics and General Questions

This survey contains several items (e.g., closed-response, fill-in-the-blank questions) pertaining to Social Networking Site (SNS) use. For each item, please respond with the appropriate information.

1. What is your Date of Birth? (Month/Date/Year)
   _______ /___ /________

2. What is your gender? (Check one)
   □ Male
   □ Female

3. What is your relationship status? (E.g., single, cohabitating, divorced, etc.)
   □ Single
   □ In a relationship
   □ Engaged
   □ Married

4. What is your ethnic background? (Not Required)
   ______________________________________________________

5. What is your country of origin?
   ______________________________________________________

6. What is the name of the school/university/polytechnic/college that you currently attend?
   ______________________________________________________

7. School Status (Check one):
   □ Undergraduate (e.g., Bachelors)
   □ Graduate (e.g., Masters, PhD, Other)
8. If graduate, what type (Check one)?

☐ Masters
☐ Research Masters
☐ Doctoral (PhD)
☐ Other (Please indicate)
______________________________________________________________

9. Major(s):
______________________________________________________________

10. Student Status (Check one)?
☐ Full-time
☐ Part-time

11. Scholarship status (Check one)?
☐ Full scholarship
☐ Partial scholarship
☐ No Scholarship

Academic Information

This survey contains several items (e.g., closed-response, fill-in-the-blank questions) pertaining to Social Networking Site (SNS) use. For each item, please respond with the appropriate information.

12. What is your approximate current cumulative grade point average?

______ points out of a maximum of ______

13. How many credit hours are you registered in this semester?

______ credit hours

14. Approximately how many hours per DAY do you spend studying?

______ hours/day

15. Approximately how many hours per DAY do you spend studying during Midterm/Finals weeks?

______ hours/day
College Self-Efficacy Inventory

*For each statement circle the level of confidence expressed, using the code below.*

0 = No confidence at all to 10 = Extreme confidence

“How confident are you that you could successfully complete the following tasks:”

<table>
<thead>
<tr>
<th></th>
<th>0</th>
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<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research a term paper</td>
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<td>7</td>
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<td>9</td>
<td>10</td>
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<tr>
<td>Write course papers</td>
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<td></td>
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<td>6</td>
<td>7</td>
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<td>9</td>
<td>10</td>
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<tr>
<td>Do well on your exams</td>
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<td>6</td>
<td>7</td>
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<td>9</td>
<td>10</td>
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<tr>
<td>Take good class notes</td>
<td></td>
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<td>6</td>
<td>7</td>
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<td>9</td>
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</tr>
<tr>
<td>Keep up to date with your school work.</td>
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<td>6</td>
<td>7</td>
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<td>9</td>
<td>10</td>
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<tr>
<td>Manage time effectively</td>
<td></td>
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<td>7</td>
<td>8</td>
<td>9</td>
<td>10</td>
</tr>
<tr>
<td>Understand your textbooks.</td>
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<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
<td>10</td>
</tr>
</tbody>
</table>
Part II: Social Networking Site Use (e.g., Facebook, Twitter, etc.)

16. What Social Networking Site(s) – SNS - do you use (Check All that Apply)?
   If none, skip to question # 41.

   □ Facebook
   □ Twitter
   □ LinkedIn
   □ Other(s), namely ________________________________________________________________________
   □ I do not have a Social Networking Site account.

17. Approximately how many TOTAL Facebook® friends do you have?
   ______________________________________________________________________________________

18. In the past week, on average, approximately how much time PER DAY have you spent actively using Facebook?
   ______________________________________________________________________________________

Please rate on a 5-point scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree).

19. Facebook® is part of my everyday activity.

20. I am proud to tell people I am on Facebook.

21. Facebook® has become part of my daily routine.

22. I feel out of touch when I haven’t logged onto Facebook® for a while.

23. I feel I am part of the Facebook® community.

24. I would be sorry if Facebook® shut down.

   □ Strongly Disagree
   □ Disagree
   □ Neutral / mixed feeling
   □ Agree
   □ Strongly Agree
Part III: Social Networking Site Use

In the following questions, you will be asked about your use of Social Networking Site(s). Though the singular is used in the questions (e.g., How often do you use it?), if you use more than one SNS, then answer it as plural (e.g., How often do you use them?).

25. How often do you use it / them (Check one)?
   - Less than 5 times in a week
   - Just one time in a day
   - No more than 5 times in a day
   - Between 5-10 times in a day
   - More than 10 times in a day

26. How soon after you wake up do you check your SNS account?
   - >120 minutes
   - 60 – 120 minutes
   - 31 - 60 minutes
   - 6-30 minutes
   - <5 minutes

27. If you use it either daily or multiple times per day, approximately how much time per DAY do you spend using it?
   _______ hours and _______ minutes per day

28. Approximately, how many times per day you check your account(s) using your computer/laptop?
   _________ times per day
Instructions: Answer the questions below based upon how you feel about your use of Facebook. Take your time and answer truthfully for the most accurate results. Please rate on a 5-point scale ranging from 1 (Very Rarely) to 5 (Very Often).

  29. I spend a lot of time thinking about Facebook® or planning use of Facebook.

  30. I feel an urge to use Facebook® more and more.

  31. I use Facebook® in order to forget about personal problems.

  32. I have tried to cut down on my use of Facebook® without success.

  33. I have become restless or troubled if I am prohibited from using Facebook.

  34. I use Facebook® so much that it has had a negative impact on my job or studies.

□ Very rarely
□ Rarely
□ Sometimes
□ Often
□ Very often
Part IV: Mobile Social Networking

This part contains several items pertaining to Mobile Social Networking. For each item, please respond with the appropriate information.

35. Do you have a Smartphone (i.e., iPhone, BlackBerry, or Android based phones that can access the Web, and SNS applications)?

☐ Yes
☐ No

36. On average, about how many minutes per day have you spent on Smartphones?

__________ minutes per day

37. Approximately how many times per day you check your SNS account(s) using your Smartphone?

__________ times per day

Please rate on a 5-point scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree).

38. I use my cell phone/Smartphone more than my computer to check my SNS account(s).

☐ Strongly Disagree
☐ Disagree
☐ Neutral / mixed feeling
☐ Agree
☐ Strongly Agree

39. When I wake up, the first thing I do is checking my Smartphone.

☐ Strongly Disagree
☐ Disagree
☐ Neutral / mixed feeling
☐ Agree
☐ Strongly Agree
40. My Smartphone is part of my everyday activity.

☐ Strongly Disagree
☐ Disagree
☐ Neutral / mixed feeling
☐ Agree
☐ Strongly Agree

41. I am proud to tell people I’m a Smartphone user.

☐ Strongly Disagree
☐ Disagree
☐ Neutral / mixed feeling
☐ Agree
☐ Strongly Agree

42. My Smartphone has become part of my daily routine.

☐ Strongly Disagree
☐ Disagree
☐ Neutral / mixed feeling
☐ Agree
☐ Strongly Agree

43. I would be disappointed if I could not use my Smartphone for a week because of loss.

☐ Strongly Disagree
☐ Disagree
☐ Neutral / mixed feeling
☐ Agree
☐ Strongly Agree

44. I feel I am part of the Smartphone users’ community.

☐ Strongly Disagree
☐ Disagree
☐ Neutral / mixed feeling
☐ Agree
☐ Strongly Agree
45. My smartphone has become part of my daily routine.

- [ ] Strongly Disagree
- [ ] Disagree
- [ ] Neutral / mixed feeling
- [ ] Agree
- [ ] Strongly Agree

**Part V: Multitasking**

*Please rate on a 7-point scale ranging from 1 (Strongly Disagree) to 7 (Strongly Agree).*

1. I like to juggle two or more activities at the same time.
2. I am comfortable doing more than one activity at the same time.
3. I prefer to do two or more activities at the same time.
4. I typically do two or more activities at the same time.
5. Doing two or more activities at the same time is the most efficient way to use my time.
Part VI: Additional Information

In the following questions, you will be asked about your use of Social Networking Site(s). Though the singular is used in the questions (e.g., I use my SNS account for school work) if you use more than one SNS, then answer it as plural (e.g., I use my SNS accounts for school work?). Please rate on a 5-point scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree).

(1) Strongly Disagree
(2) Disagree
(3) Neutral / mixed feeling
(4) Agree
(5) Strongly Agree

<table>
<thead>
<tr>
<th>Items</th>
<th>SD</th>
<th>D</th>
<th>N</th>
<th>A</th>
<th>SA</th>
</tr>
</thead>
<tbody>
<tr>
<td>I use my SNS account for school work.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I use my SNS account to communicate with my classmates.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I use my SNS account to communicate for group projects.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I use my SNS account as a break while studying.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I use my SNS account as a free time activity.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I use my SNS account to procrastinate if I should be studying.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I use my SNS account to procrastinate when I am struggling.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>SNS(s) are time consuming.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>SNS(s) are academic distractions.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>SNS(s) decrease my academic performance.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>SNS(s) take time away from studying.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>SNS(s) distract me from studying.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I multitask with my SNS account while studying.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I am a responsible person about school work.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I am good at multitasking with SNS(s).</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>No one on my SNS account is worth me getting failing grades.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I do not spend excessive amount of time on my SNS account.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I do not go on SNS(s) during class.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I check my SNS account during class.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I do not have SNS(s) up while doing homework.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I don't allow SNS(s) to impact my academics.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>My academics are my main focus.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>If I am doing my work for school, I do not check my SNS account.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I only use SNS(s) when I have the time for it.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

46. Comments
APPENDIX D

INSTITUTIONAL REVIEW BOARD (IRB) APPROVAL FOR PART II
Appendix D

Institutional Review Board (IRB) Approval for Part II

RE: IRB #13-168 - entitled “An Examination of Social Networking Site and Smartphone Use, Multitasking and Academic Achievement in University Students”

I am pleased to inform you that the Kent State University Institutional Review Board has reviewed and approved your Application for Approval to Use Human Research Participants as Level I/Exempt research. This application was approved on April 4, 2013. Your research project involves minimal risk to human subjects and meets the criteria for the following category of exemption under federal regulations:

- Exemption 2: Research involving the use of educational tests, surveys, interviews, or observation of public behavior.

***Submission of annual review reports is not required for Level 1/Exempt projects.

If any modifications are made in research design, methodology, or procedures that increase the risks to subjects or includes activities that do not fall within the approved exemption category, those modifications must be submitted to and approved by the IRB before implementation. Please contact the IRB administrator to discuss the changes and whether a new application must be submitted. It is important for you to also keep an unstamped text copy (i.e., Microsoft Word version) of your consent form for subsequent submissions.

Kent State University has a Federal Wide Assurance on file with the Office for Human Research Protections (OHRP); FWA Number 00001853.

If you have any questions or concerns, please contact me by phone at 330-672-2704 or by email at Pwashko@kent.edu.

Respectfully,
Kent State University Office of Research Compliance
224 Cartwright Hall | fax 330.672.2658
APPENDIX E

INSTITUTIONAL REVIEW BOARD (IRB) APPROVAL FOR MODIFICATIONS- PART II
Appendix E
Institutional Review Board (IRB) Approval for Modifications - Part II

RE: IRB # 13-168 entitled “An Examination of Social Networking Site and Smartphone Use, Multitasking and Academic Achievement in University Students”

The Kent State University Institutional Review Board (IRB) has reviewed and approved your protocol amendment/change request. It is understood that the research is continuing with modifications including change PI to Tricia Niesz and to recruit students in Turkey. The modification to this protocol was approved on December 10, 2013.

*If applicable, a copy of the IRB approved consent form is attached to this email. This “stamped” copy is the consent form that you must use for your research participants. It is important for you to also keep an unstamped text copy (i.e., Microsoft Word version) of your consent form for subsequent submissions. Note that if you are conducting an online study the stamped consent form is only for record keeping purposes.

HHS regulations and Kent State University Institutional Review Board guidelines require that any changes in research methodology, protocol design, or principal investigator have the prior approval of the IRB before implementation and continuation of the protocol. The IRB must also be informed of any adverse events associated with the study. The IRB further requests a final report at the conclusion of the study.

Kent State University has a Federal Wide Assurance on file with the Office for Human Research Protections (OHRP); FWA Number 00001853.

If you have any questions or concerns, please contact us at Researchcompliance@kent.edu or by phone at 330-672-2704 or 330.672.8058.

Thank you

Respectfully,
Kent State University Office of Research Compliance
224 Cartwright Hall | fax 330.672.2658
Kevin McCreary | Research Compliance Coordinator | 330.672.8058 | kmccrea1@kent.edu
Paulette Washko | Manager, Research Compliance | 330.672.2704 | Pwashko@kent.edu

For links to obtain general information, access forms, and complete required training, visit our website at www.kent.edu/research.
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