BIG DATA IN ADOLESCENT PSYCHIATRY: DO PATIENTS SHARE THEIR PSYCHIATRIC SYMPTOMS ON SOCIAL NETWORKING SITES?

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SUMMARY

Background: Fascinating developments in big data technologies and unprecedented diffusion of social networking sites (SNSs) generate unseen opportunities for scientific fields, including psychiatry. This study focuses on the use of SNSs by adolescent psychiatric patients and the potential use of SNS-generated data to help medical practitioners diagnose and treat patients' mental health. Our objective is to understand and measure the psychiatric and individual conditions in which symptom-sharing occurs on SNSs and the frequency of these conditions. Based on literature, we hypothesized that the perceived value of social network sites positively affects adolescents' sharing of symptoms on these sites.

Subjects and methods: An empirical test of this hypothesis was conducted with a survey of 224 adolescents admitted to a psychiatry clinic in Turkey. The hypothesis was tested using a hierarchical multiple regression analysis.

Results: The perceived value of SNSs explained an additional 37.8% of variation in symptom sharing on SNSs above and beyond the control variables, which are gender, age, type of disorder, and amount of internet and SNS use. The findings suggested that adolescents share symptoms on SNSs only if they attribute value to the SNSs that they use. We also found that 72% of adolescents in our sample shared their symptoms on SNSs.

Conclusions: There is an attractive opportunity for information technology companies to develop, together with health professionals; data analytics that are able to detect symptoms to support psychiatric diagnoses and pave the way for big-data enabled personalized medicine.

Key words: *big data - adolescent psychiatry - social networking sites - symptom sharing*

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INTRODUCTION

In the last decade, the world has experienced digitalization of all aspects of people's lives at an incredible pace, along with the rapid development and diffusion of information technologies (IT). Recent trends in digitalization and IT have led to a concept called 'big data', which has been embraced by many sectors, from banking to retail. However, the healthcare sector has lagged behind other sectors in adopting big data, although it is estimated that it can generate $300 billion yearly for the healthcare sector (Kayyali et al. 2013, Roski et al. 2014). Despite the fact that there is not a consensus definition, most scholars agree on the three defining features of big data originally proposed by the company Gartner, Inc. These three components include high volumes of data, great variety of data, and high velocity of data creation. Some also consider a fourth feature, veracity, which refers to a high level of confidence in each piece of information in the data set, when defining big data.

There is an abundance of data in the healthcare industry, which presents promising opportunities for big data technologies. One of the data sources for healthcare is social networking sites (SNSs), which are relatively new but changing people's lives and thus all sectors, including healthcare. There are currently a number of studies related to adolescents' behaviors and habits on SNSs in the literature. The reasons that adolescents give for using SNSs, their level of emotional disclosure and their motivations for doing so have been studied in the past (Liu & Brown 2014, Singleton et al. 2016, Van Gool et al. 2015). Some scholars have focused on SNS addiction and its effects on child and adolescent psychology (Kuss & Griffiths 2011). Concerning the use of data generated by adolescents on SNSs, while some scholars have explored public surveillance applications (Gittelman et al. 2015, Kuziemsky et al. 2014), others have focused on the potential for detecting psychiatric symptoms from individuals' SNS data (Bazarova et al. 2017, De Choudhury et al. 2013, Nambisan et al. 2015, Song et al. 2016, Song et al. 2014).

The use of data collected from SNSs in psychiatry can provide opportunities to improve awareness of mental well-being; for example, sharing of symptoms by adolescents with their peers on SNSs (White & Dorman 2001). Based on analysis of SNS data, surveillance of adolescents can be conducted with respect to their mental and emotional well-being. Overall, the possibility of detecting psychiatric symptoms from adolescents' SNS profiles has been confirmed by a number of studies (Lin et al. 2014, Liu et al. 2015, Settanni & Marengo 2015, Sinn & Syn 2014). To make this possibility a practical reality, technical developments are necessary. Harman et al. (2014) have recognized this issue and proposed a novel method for gathering SNS data by analyzing it specifically for symptoms of post-traumatic stress disorder, depression, bipolar disorder, and seasonal affective disorder (Harman 2014, Howes et al. 2014, Ji et al. 2015).

Having reviewed the literature, we believe that detecting the psychiatric symptoms of an adolescent by analyzing her or his data on SNSs is already possible with the technology that is available (Kuziemsky et al. 2014). Recent studies have managed to detect adolescents' signs of distress from their SNS profiles (Moreno et al. 2012, 2013). Although there have been many academic studies and trial applications for detecting psychiatric symptoms, the gap in the literature reveals that currently there is no accepted standard for using SNS data in healthcare systems (Belle et al. 2015). Moreover, the results of such pioneering works are neither conclusive nor complete in term of validity or universal applicability. Therefore, there is no consensus regarding the possibility of reliably detecting psychiatric symptoms using SNS data.

Coherently to this background, this study focuses on the use of SNSs by adolescent psychiatric patients and the potential use of this SNS-generated data to help clinicians diagnose and treat their patients. In particular, this study aims at investigating the possibility of detecting child psychiatry symptoms from SNS data. Considering the existence of big data technologies, specifically advanced social network mining techniques, we assume that psychiatric symptoms can be detected if and only if adolescents share their symptoms. In other words, the current state of technology is capable of analyzing the social media content of a person and detecting psychiatric symptoms only if they are shared. This reduces our investigation to whether adolescents share their symptoms on SNSs. Detecting the psychiatric symptoms from SNSs may give an idea about usage of big data in psychiatry field. Recently, many feelings, behaviors or thoughts of people in their daily life can be seen their SNS status. With the assist of IT, analyses of SNS shares may be a part of diagnosis and treatment of psychiatric disorders. When we look at the literature which evaluates people's shares of their psychological situations on SNSs, it is seen that there are many publications which research psychology and psychiatry

through SNSs based on the big data techniques (Bazarova et al. 2017, De Choudhury et al. 2013, Nambisan et al. 2015, Song et al. 2016). These publications give insights about how we can evaluate psychiatric symptoms, in particular, with the use of data on SNSs. Nevertheless, these publications were mostly population-based studies and have researched adults and adolescents, and there is no study conducted in a patient group diagnosed by a psychiatrist as a result of a structured review of the literature. In addition, these surveys focused on only one SNS. This is the first study that investigates several SNSs and evaluates the emotions which are shared and the factors of them. Investigating the psychiatric symptom sharing on SNSs of adolescents who are admitted to a psychiatric clinic and diagnosed with a psychiatric disease may give an important idea about the use of big data and IT in the field of psychiatry. The possibility of evaluating the feelings, thoughts and behaviors of psychiatric patients through SNSs using IT can make the diagnosis and the following treatment convenient for healthcare professionals. Considering the increase in people's SNS shares, the evaluation of these data may become a routine practice for healthcare professionals in psychiatry. With this aim, a survey was conducted on adolescents admitted to a child and adolescent psychiatry outpatient clinic in Turkey. We planned to research the factors affecting SNS sharing and the symptoms shared by adolescent patients diagnosed by a child and adolescent psychiatrist with the assist of a semi-structured psychiatric interview. Thus, we aimed to evaluate whether it is possible to analyze the SNS outcomes of patients who are followed up at child and adolescent psychiatry outpatient clinics on a large database and to constitute an idea about the possible contributions to diagnosis and follow-up of psychiatric diseases. The main goal of the survey is to understand under which conditions and how frequently adolescent patients share their symptoms on their SNS profiles.

Theoretical background and hypotheses development

Psychiatrists may consider all feelings and behaviors of patients to be possible symptoms when evaluating patients. People share comments about their thoughts and feelings on SNSs. In the literature, the concepts of emotional disclosure and sharing feelings have been extensively investigated (Christofides et al. 2012, Denti et al. 2012, Frison & Eggermont 2015, Liu & Brown 2014, Rosen et al. 2013, Singleton et al. 2016, Sinn & Syn 2014, Van Gool et al. 2015). We consider symptom sharing to be aligned with peoples' thoughts and feelings, which are related to psychiatric symptoms. The more people disclose their emotions, the more they share their psychiatric symptoms.

In the literature, scholars claim that as the value attributed to social media platforms increases, emotional

disclosure also increases (Denti et al. 2012, Frison & Eggermont 2015, Rosen et al. 2013, Singleton et al. 2016, Sinn & Syn 2014, Van Gool et al. 2015). Emotional disclosure and seeking help are correlated with increased perceived value of SNSs. People who share their emotions and seek support on SNSs consider these websites an important part of their lives and feel isolated in the absence of SNSs. As people integrate SNSs into their lives, SNSs become a part of their daily routines and social behavior. This integration of SNSs into people's lives leads to a stronger emotional connection to SNS use, which in turn leads to higher emotional disclosure and symptom sharing on SNSs.

People's networking behavior on SNSs is also a determinant of the value that they attribute to SNSs. People tend to attribute more value to SNSs when they receive support from their social networks on SNSs. If the people in a person's social network disclose emotions and seek support on an SNS, the person is likely to do the same and feel support from his/her network. To sum up, the value attributed to online social platforms by individuals depends on the person, the SNS's characteristics, and those of the individual's social network (Christofides et al. 2012, Frison & Eggermont 2015, Rosen et al. 2013, Sinn & Syn 2014). Therefore, we hypothesize that:

H: *The perceived value of social network sites positively affects adolescents' sharing of symptoms on these sites.*

The hypothesis above is the only one in this study because the goal in this study is to have practical conclusions rather than explaining the causations of the phenomenon. The latter would require a more extensive questionnaire which means longer questionnaire filling times for the patients. This is especially problematic for a sample like ours because keeping the attention for longer periods is difficult for patients with psychiatric issues such as depression, attention deficit and hyperactivity (ADHD).

The control variables were determined from past studies related to emotional disclosure of adolescents. Diseases and demographics of adolescent patients might affect their symptom sharing on SNSs, so diseases and demographic variables will be controlled for (Settanni & Marengo 2015, Sinn & Syn 2014, Van Gool et al. 2015). The amount of internet use is expected to positively affect symptom sharing (Cline & Haynes 2001, Frost & Massagli 2008). Finally, the amount of SNS use will be controlled for and is expected to positively affect symptom sharing (Christofides et al. 2012, Frison & Eggermont 2015, Rosen et al. 2013, Sinn & Syn 2014). Because these factors affect people's emotional disclosure and symptom sharing on SNSs, we measured them in this study and controlled for them when testing our hypothesis. The conceptual framework that represents our hypothesis and all the control variables can be seen in Figure 1.

SUBJECTS AND METHODS

Sample

The survey participants were chosen among patients who applied to the outpatient psychiatry clinic and were between 12-18 years old at the time of the enrolment. The study included 273 adolescents diagnosed with a psychopathology based on semi-structured interviews carried out by a child psychiatrist on individuals who applied to the Uludag Medical Faculty Children and Adolescent Psychiatry Outpatient Clinic between April 1st, 2016 and May 31st, 2016. The Uludag University Faculty of Medicine Ethics Committee approved the study before we proceeded to the data collection stage (date: 07.06.2016, no: 2016-11/23). All participants in the study and their parents granted consent after being informed of the methods and objectives of this study. At the end of survey application process, a total of 273 survey results were collected in paper form. In total, 21 survey results were identified as having excessive missing parts. In addition, complementary and reverse questions were examined during the data entry process. A total of 28 survey results failed to pass this examination and were considered unreliable. Overall, 49 survey results were excluded from our analysis. There remained 224 survey results to be used in our analysis to test our conceptual framework.
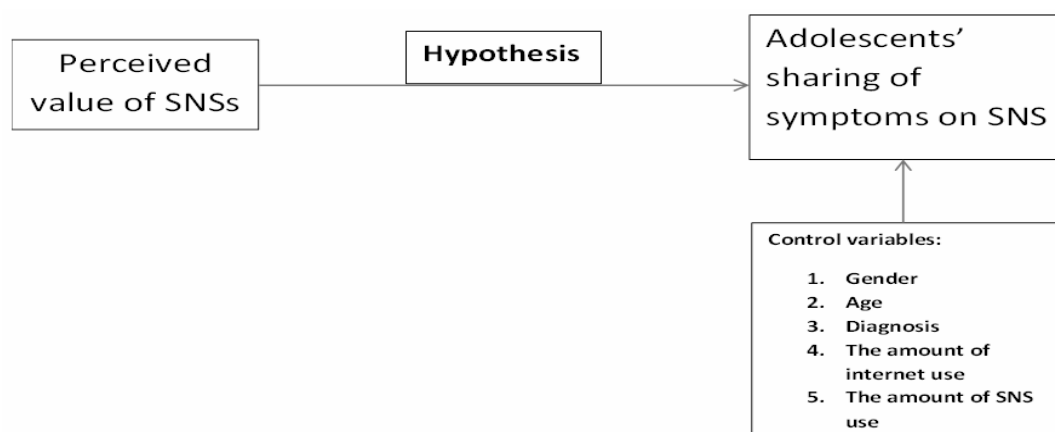

Figure 1. Conceptual framework

Instruments

Kiddie Schedule for Affective Disorders and Schizophrenia - Present and Lifetime Version (K-SADS-PL)

In this study, the symptoms were decided based on a standard semi-structured interview method called Kiddie Schedule for Affective Disorders and Schizophrenia–Present and Lifetime Version (K-SADS-PL). This method was developed by Kaufman et al. (1997), and reliability and validity studies were also conducted (Kaufman et al. 1997). K-SADS-PL was subsequently translated into Turkish by Gökler et al. (2004), who also conducted reliability and validity studies on Turkish patients (Gökler et al. 2004).

Questions of the survey

At the beginning of the questionnaire the respondents were asked about their Internet and SNS use. The respondents had six choices corresponding to different level of frequencies of Internet use, beginning with "more than 6 hours per day","4-5 hours per day","1-3 hours per day", "less than 1 hour per day", to "less than 5 hours per week". For SNS use, respondents were questioned about the existence of SNS accounts and the amount of their use. The most popular SNSs in Turkey were listed and the respondents were to answer whether they have an account and how frequently they use that site. The list of sites in the order of popularity is as follows: Facebook, Instagram, Twitter, Snapchat, Google+, Onedio.com, Vine, Pinterest, Scorp, Tumblr, and Ask.fm. For each SNS, the respondents had the same six choices for different level of frequencies of use.

A literature review was conducted to determine methods used to measure the perceived values of SNSs. The Facebook Intensity Scale (FBI) was developed by Ellison et al. (2007) for measuring the intensity of Facebook use (Ellison et al. 2007). They aimed to measure to what extent Facebook is integrated into a person's life and how connected the person feels to Facebook, rather than to simply measure frequency and duration of Facebook use. The Social Media Use Integration Scale (SMUIS) was developed by Jenkins-Guarneri et al. (2013) with the goal of measuring "the integration of the social behavior and daily routines of users, along with the importance of and emotional connection to this use", making its objective similar to that of the FBI (Jenkins-Guarneri et al. 2013).

The Social Media Disorder Scale by RJJM van den Eijnden et al. (2016) and the Problematic Use of Social Network Scale by Ozteke et al. (2015) were developed to measure problems related to SNS use, such as addiction (Ozteke et al. 2015, van den Eijnden et al. 2016).

A number of questionnaires developed for measuring different aspects of SNS use have been found in the literature (Frison & Eggermont 2015, Kırık et al. 2015, Rosen et al. 2013, Ross et al. 2009, Sinn & Syn 2014, van den Eijnden et al. 2016, Van Gool et al. 2015, Zhong et al. 2011). Although these studies included questions regarding the perceived value of SNSs, none

of these scales or questionnaires measured the perceived value of SNSs as defined in this study. We thus measured this construct through an 8-item questionnaire based on past studies. The answers on our survey are structured according to a 7-point Likert scale, with 1 representing "strongly disagree", 7 representing "strongly agree", and an "N/A" option for "not applicable". The questions concerned seeking psychological help on SNSs, increased feelings of sociability using SNSs, considering SNSs to be an important part of life, sharing feelings and receiving support on SNSs, feeling more relaxed on SNSs, expressing oneself better on SNSs, share feelings more honestly and openly on SNSs, having supportive friends on SNSs, and emotional disclosure with friends on SNSs. The Cronbach's alpha value of this 8-item questionnaire, which represents reliability, was determined to be 0.93.

A 20-item questionnaire was prepared to measure sharing of psychological symptoms by adolescents on SNSs, with each question representing a discrete symptom. The respondents were asked the frequency and type of SNS activities they take part in (chatting with friends, updating profile status, changing profile picture, sharing a picture, video, or a song, and commenting on friends' shares) when feeling a certain way. The questions, which correspond to symptoms, were selected based on the K-SADS-PL technique. The selected symptoms fall into six categories which are presented in the below table. After preparing the questions for each category, we arranged them in randomized order.

For each of the 20 questions, respondents expressed the frequency with which they undertake different SNS activities. A scale system was created to give points for each answer: 1 point corresponds to no activity, 2 points means sharing rarely, 3 points means sharing sometimes, and 4 means sharing frequently. Next, an average value was calculated for each question for each respondent. The resulting means and standard deviations for each question can be seen in Table 1.

Table 1. Categories of the Selected Symptoms for the Questionnaire

Symptoms	Feelings/Situation
Depressive Mood	Feeling bad, happy, or betrayed; Having high self-confidence; Feeling people like me; Feeling that others treat me poorly; Feeling everything will be bad
Anxiety	Feeling peaceful and comfortable, nervous, anxious, or scared; Having homework or an assignment to finish; Feeling something bad will happen
Somatic Complaint	Having a headache, stomachache or nausea; concerns about health
Suicidial Symptoms/ Self Harm	Thinking about self-harming
Traumatic Events	Going through a traumatic event; Experiencing a positive event
Anger	Feeling angry

RESULTS

In our sample, there were 224 adolescents who applied to the clinic. Of these patients, 132 (58.9%) were female and 92 (41.1%) were male. The most common disease among our sample patients was major depressive disorder, with which 103 of the participants had been diagnosed. The other common diseases were ADHD (n=57) and generalized anxiety disorder (n=29). In total, there were 256 diagnoses, and 32 patients had two diagnoses, resulting in 224 participants. The descriptive statistics of the control variables are presented in Table 2.

Table 2. Descriptive Statistics of Control Variables

	N	%
Gender		
Male	92	41.1
Female	132	58.9
Age (M±SD)	15.52±1.72	
Diagnosis of the Respondents		
Major Depressive Disorder	103	40.2
Attention Deficit /Hyperactivity Disorder	57	22.2
Generalized Anxiety Disorder	29	11.3
Other psychiatric disorders	67	26.1
The Most Used SNSs		
Facebook	106	47.3
Instagram	52	23.2
Snapchat	15	6.7
The Amount of Internet Use		
None	14	6.25
Less than 5 hours weekly	7	3.13
Less than 1 hour daily	15	6.70
1-3 hours daily	54	24.11
4-5 hours daily	41	18.30
More than 6 hours daily	93	41.52
The Amount of SNSs Use		
None	35	15.63
Less than 5 hours weekly	14	6.25
Less than 1 hour daily	41	18.30
1-3 hours daily	51	22.77
4-5 hours daily	41	18.30
More than 6 hours daily	42	18.75

The amount of internet and SNS use for our sample is also shown in Table 2. The results converted to daily use (in hours) for each respondent (None=0, Less than 5 hours weekly=0.5, Less than 1 hour daily=1, 1-3 hours daily=2, 4-5 hours daily=4.5, More than 6 hours daily=7). On average, respondents used the internet 5.28±4.25 hours per day, while SNS use for our sample was 2.81±2.48 hours per day on average.

Regarding SNS use by adolescents in our sample, the most frequently used SNS was also determined for each respondent. 106 respondents answered that they use Facebook the most. Instagram and Snapchat followed, with 52 and 15 respondents, respectively. 35 respondents reported that they did not use any SNS.

Overall perceived value of SNSs for each respondent was calculated by averaging the Likert scores of the 8-item survey corresponding to the perceived value of SNSs. In our sample, the average perceived value of SNSs was 3.56±1.98, with 7 representing the highest perceived value.

The average symptom sharing for each category of symptom was also calculated and is presented in Table 3. While depressive symptoms and traumatic events were the most shared category of symptoms, somatic complaints and symptoms related to self-harm were the least-shared symptoms by adolescents in our sample. Around 28% of the adolescents in our sample reported that they do not share their symptoms on SNSs, while the rest of the participants share with varying frequency.

Table 3. The average symptom sharing for each category of symptom

	Mean	Std. Dev.
Depressive Mood	1.78	0.90
Traumatic Events	1.71	0.90
Anxiety	1.67	0.85
Anger	1.57	0.97
Somatic Complaints	1.49	0.84
Suicidal Symptoms / Self-Harm	1.49	0.94
Average	1.69	0.83

A summary of the statistics pertaining to all the variables in our conceptual model can be found in Table 4. Pearson's correlation coefficients for each pair of variables are also shown in the same table.

In order to test our hypothesis and control for the above-mentioned variables, a hierarchical multiple regression analysis was performed. Prior to conducting the regression, the assumptions relevant to this regression were tested following the recommendations in the literature, and there were no issues (Hair et al. 1998, Pallant 2001, Tabachnick et al. 2001).

The variable 'symptom sharing on SNSs' was defined as the dependent variable in the hierarchical multiple regression. The independent variables were entered into the regression in two steps. The variables for gender, having a disorder, and internet and SNS use were included in the first step, while perceived value of SNSs was added to the regression in the second step. The result of the analysis can be seen below in Table 5.

In the first step of the analysis, the regression model was statistically significant ($F_{(7, 216)}=19.234$, $p<0.001$). The control variables accounted for 38.4% of the variation in symptom sharing on SNSs. Among these variables, four of them were statistically significant in the first step of the hierarchical regression. Being female was negatively associated with symptom sharing, while having major depressive disorder and the amount of Internet and SNS use were also significant and positively associated with symptom sharing on SNSs.

Table 4, Pearson's correlation coefficients for each pair of variables

	1	2	3	4	5	6	7	8	M	SD
1. Female (1 = yes, 0 = no)	-								-	-
2. Age	0.164*	-							15.52	1.72
3. MDD (1 = yes, 0 = no)	0.388**	0.215**	-						-	-
4. ADHD (1 = yes, 0 = no)	-0.408**	-0.208**	-0.457**	-					-	-
5. GAD (1 = yes, 0 = no)	0.025	-0.133**	-0.302**	-0.103*	-				-	-
6. The Amount of Internet Use (Daily Hours)	0.046	0.025	0.046	0.051	0.032				5.28	4.25
7. The Amount of SNS Use (Daily Hours)	0.087	-0.013	0.092	-0.008	0.044	0.554**			2.81	2.48
8. Perceived Value of SNSs (1-7 Likert)	0.021	-0.094	0.170*	0.023	0.063	0.459**	0.562**		3.56	1.98
9. Symptom Share on SNSs (1-4 Frequency)	-0.080	-0.195**	0.146*	0.016	0.033	0.432**	0.517**	0.855**	1.69	0.83

MDD - major depressive disorder;   ADHD - attention deficit and hyperactivity;   GAD - generalized anxiety disorder;
SNS - social networking sites; * Correlation is significant at the 0.05 level (2-tailed);   ** Correlation is significant at the 0.01 level (2-tailed)

Table 5. The result of the regression analysis

Steps	Predictors	β	R^2	ΔR^2	ΔF
Step 1			0.384	0.384	19.2
	Female (1 = yes, 0 = no)	-0.301**			
	Age	-0.100***			
	MDD (1 = yes, 0 = no)	0.387**			
	ADHD (1 = yes, 0 = no)	0.008			
	GAD (1 = yes, 0 = no)	0.140			
	The Amount of Internet Use (Daily Hours)	0.043**			
	The Amount of SNS Use (Daily Hours)	0.128***			
Step 2			0.762	0.378	341.5
	Female (1 = yes, 0 = no)	-0.209**			
	Age	-0.061***			
	MDD (1 = yes, 0 = no)	0.068			
	ADHD (1 = yes, 0 = no)	-0.126			
	GAD (1 = yes, 0 = no)	-0.072			
	The Amount of Internet Use (Daily Hours)	0.010			
	The Amount of SNS Use (Daily Hours)	0.017			
	Perceived Value of SNSs (1-7 Likert)	0.331***			

MDD - major depressive disorder;   ADHD - attention deficit and hyperactivity;   GAD - generalized anxiety disorder;
SNS - social networking sites; *p<0.05; **p<0.01; ***p<0.001

The perceived value of SNSs was introduced into the hierarchical regression analysis in the second step. It explained an additional 37.8% of the variation in symptom sharing on SNSs, resulting in a statistically significant change in R^2 (F(8,215)=86.052, p<0.001). While the only statistically significant control variable was gender in the second step, the perceived value of SNSs was also statistically significant and strongly associated with increased symptom sharing on SNSs. This finding supports our hypothesis, indicating that the perceived value of SNSs predicts symptom sharing on SNSs above and beyond the control variable selected for this study. Overall, the regression model with seven independent variables was significant and explained 76.2% of variation in symptom sharing on SNSs.

DISCUSSION

Considering the incredible proliferation of social networking sites and the high rate of use of SNSs among adolescents, there is a considerable amount of data to be found regarding adolescents on these platforms. It is possible to develop a computer code that analyzes this data and provides valuable information to psychiatrists to support diagnosis and patient follow-up. Although detecting psychiatric symptoms is technologically feasible, the rate of symptom sharing by adolescents on SNSs has not been studied in depth. The objective of this study is to examine under which conditions and how frequently patients share their symptoms on their SNS profiles. In accordance with our objective,

the hypothesis was developed based literature. The perceived value of SNSs was expected to increase symptom sharing on SNSs. In our study, three-quarters of adolescents in our sample reported to share their feelings on social media platforms.

In the present study, 58.9% of the sample was male, similar to other studies conducted in Turkey. The highest observed disorder in the sample was ADHD, followed by major depressive disorder and anxiety disorder. The incidence of major depressive disorder in female patients was significantly higher than that of male patients. On the other hand, the incident of male patients with ADHD was higher than that of female patients to a statistically significant extent. In terms of the incidence of generalized anxiety disorder, there were no statistically significant differences between female and male patients. These findings are consistent with those reported in the literature (Akdemir & Çetin 2008, Aktepe et al. 2010, Aras et al. 2005, Durukan 2011, Ucar et al. 2014), which supports that our sample represents our target population.

40.7% of people around the world and 51% of people in Turkey have access to the Internet. The amount of time spent online varies depending on needs, abilities and societal factors (World Bank Group July 13, 2016). The results of the current study show that the most frequently used SNS is Facebook, which is the most popular SNS globally. In spite of our efforts, we failed to find other clinical studies in the literature to compare the amount of Internet and SNS use. However, the results of studies with non-clinical samples were similar to those of our study in terms of the amount of Internet and SNS use (Demir 2016, Hazar 2011, Pantic et al. 2012).

Of the participants in our study, 72% were observed to share their psychological symptoms on SNSs. This is a promising number for detecting psychiatric symptoms from SNS data, which can help support psychiatrists. Software which detects psychiatric symptoms could have diagnostic value, especially for patients who attribute high value to SNSs. Regarding categories of symptoms, depressive symptoms and traumatic events were found to be the most shared categories of symptoms, while somatic complaints and symptoms related to self-harm were the least shared by adolescents in our sample. Moreover, positive feelings, such as happiness and sharing a good experience, were shared more frequently than negative feelings. Our findings were consistent with the literature (Denti et al. 2012, Lin et al. 2014, Settanni & Marengo 2015), although it should be highlighted that our sample consisted of adolescents with psychiatric disorders, as opposed to those of the studies in the literature.

As a result of analysis of the control variables, patients with major depressive disorder were found to share more symptoms on SNSs, similar to the literature (Akkın Gürbüz et al. 2016, Chen & Lee 2013, Christofides et al. 2012). The main symptoms of depression are persistent low mood, low self-esteem, and loss of interest and pleasure. SNS users with these symptoms were found to share their emotions with their network on SNSs more frequently than patients with other diseases. Other statistically significant control variables were the amount of internet and SNS use. As expected, more frequent use of, the internet and SNSs was associated with greater symptom sharing for our sample.

The perceived value of SNSs, the main variable in our hypothesis, was added to the model in the second step of the hierarchical regression. Adding perceived value into the model caused a 40.3% increase in explaining the variation in symptom sharing. This can be interpreted as a strong relationship between the perceived value of SNSs and symptom sharing on SNSs by adolescents. Our findings are supported by other studies in the literature (Christofides et al. 2012, Frison & Eggermont 2015, Rosen et al. 2013, Sinn & Syn 2014).

In the present study, we were able to collect 224 valid survey results, in spite of our efforts to collect more. To be able to conclusively confirm our conceptual model, the sample size must be large enough to at least conduct a confirmatory factor analysis. As the survey was conducted in single location in Turkey, it is difficult to claim that our sample is representative of the entire Turkish population. On the other hand, our survey is applied at the clinic while patients were in the waiting room. The completed questionnaires were checked by the clinic personnel. This was a strong point for the study because collecting data from patients with depression and ADHD is problematic due to their short attention span. In order to assess our model and extend our findings on a global scale, confirmatory studies must be conducted in other parts of the world.

CONCLUSION

In conclusion, the findings of the present study indicate that adolescents share their symptoms on SNSs when they attribute value to the SNSs they are using. Our original data shed new light on the high rate of symptom shared on SNSs by adolescents diagnosed with psychiatric disorders. Since the most frequently shared symptoms are depressive and post-traumatic symptoms by adolescent, our study makes us think that we can use these tools for tracking these symptoms. SNS shares can be used to monitor adolescents diagnosed with depression because they are the group who has the most symptom sharing. The strong relationship between perceived value of SNS and symptom sharing may guide to evaluate this relation with structured scales.

Our results might suggest that data collected on SNSs are likely to provide useful information for psychiatrists and policy-makers. This study may give a different perspective to the usage area of Turkey's big data-based project, e-nabız, in the field of psychiatry. Within the scope of this project, the data obtained from

patients who grant permission for the use of their SNS data can be beneficial for the diagnosis and following treatment. Hence, there is an attractive opportunity for IT companies to develop, together with health professionals; data analytics products that are able to detect symptoms to support psychiatric diagnoses and pave the way for big-data enabled personalized medicine. This study is, to best of our knowledge, the first robust step toward the evaluation of the use of big data in child and adolescent psychiatry.

Contribution of individual authors:

Halit Necmi Uçar was involved with study design, data collection, manuscript preparation and first draft.

Şafak Eray & Ömer Kocael were involved with study design and data collection.

Lütfi Uçar was involved with study design, first draft statistical analysis and manuscript preparation.

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Emanuele Lettieri was involved with study design, data collection, first draft and approval of the final version.

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