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THE CONNECTION BETWEEN MENTAL HEALTH SYMPTOMS AND SOCIAL MEDIA EXPERIENCES IN ADOLESCENCE

ABSTRACT

Objectives: *Abundant use of social media is linked to young people's internalizing and externalizing mental symptoms. In this study, we examined how internalizing (depression) and externalizing (conduct symptom) symptoms are associated with whether social media produces positive or negative experiences in adolescents.* ***Material and methods:*** *The data was obtained from the Adolescent Mental Health Cohort and Replication study (AMHC) and collected during the academic years 2018–19. The study cohort consisted of 1386 voluntary 9th graders in Tampere, Finland. Depression was measured with R-BDI, conduct symptom with YSR and perceived social support with PSSS-R. Honesty of responding was assessed with a sincerity question, and socioeconomic adversities and age were controlled for. The data were analysed using cross-tabulations with chi-square statistics and logistic regression.* ***Results:*** *Girls reported more positive (79.1%) and negative (10.4%) social media experiences than boys (72.1% and 5.4%). Depression was inversely associated with positive and directly with negative social media experiences in both sexes. Conduct symptom was positively associated with both negative and positive social media experiences in girls but not in boys. Social support from friends and family attenuated the disadvantageous associations between mental health and social media experiences and was linked to more positive and fewer negative experiences. Inclusion of honesty and socioeconomic variables in the models did not alter these findings. Possible pathways between symptom dimensions and social media experiences are discussed. Future research should use longitudinal designs to establish causality.*

KEYWORDS: SOCIAL MEDIA; ADOLESCENT; ADOLESCENT PSYCHIATRY; DEPRESSION; CONDUCT SYMPTOM

INTRODUCTION

Young people's mental health is currently in crisis. Adolescents suffer significantly more from mental health symptoms than before, and there is not enough help available (1–3). There are many theories and opinions of what is causing this remarkable change, and evidently there is no explicit answer. Modern society is a complex environment to grow up in and it's constantly changing around us. However, one of the main suspects in this crisis is the influence of social media (4,5).

We know that young people's use of social media has increased significantly in recent years (6–8). A Finnish report presented recently reported that 17% of adolescents spend over 50 hours on social media platforms weekly (7). Ten years ago, only 4% reported similar results. Adolescents find it difficult to give up social media (6,7,9), since social media services are designed to be addictive in many ways, and young people's still developing brains are particularly vulnerable to the development of this addiction (10,11). According to young people, communication is one of the most important uses of social media, and the communication with friends mostly takes place through instant messaging services (7). Over the past decade, social media has become the most important place for young people to meet, connect and spend time with each other (7,9,12). In addition, they search for content about their own interests, and they are also interested in content shared by peers (6,7). According to many adolescents, the use of social media is "just a habit" (7), which is probably explained by the addictiveness of social media.

Young people's brains are constantly craving the dopamine surge that is offered on the social media platforms (11,13).

Social media has a major impact on a young person's social life. It gives young people an opportunity to find support in a wider area, which many adolescents see as a positive thing (7,9,12). It also makes it easier to connect with friends with whom it might otherwise be difficult, i.e. due to long distance. Social media also helps minority representatives to find peer support. For most adolescents, social media evokes more positive than negative emotions (9,14–16). Social media has been reported to have a positive effect on young people's ability to express themselves and to strengthen the unity between adolescents with the same interests (14,15). Social media has also provided new platforms to search and find help with different symptoms.

Nevertheless, some adolescents' experiences are not only good. The most common negative emotions caused by social media are confusion, anxiety, pressure, uncertainty and a feeling of inferiority (14). One third of adolescents in Finland have experienced some form of bullying on social media (7). Adolescents may feel that it's easier to bully online than face-to-face (17). Studies have widely reported that social media negatively affects young people's beauty ideals and their own body image (18,19). In addition, social media has been found to expose young people to harmful or illegal content (7,15,17). Many young people have experienced fear of exclusion due to social media and have therefore felt pressured to use social media services (9,15). Additionally, the addictive nature of social media can lead to various issues, such as trouble limiting screen time, neglecting other responsibilities and conflict, all of which can result in more negative experiences.

These negative emotions could cause mental health issues in some adolescents. Several studies have reported connections between increased social media use and different mental health issues, mainly depression and anxiety (13,16,20). On the other hand, mental health issues affect one's use of social media and the experiences on it. Adolescents with depression could be more vulnerable to harmful content (21). A depressed person's mind is often prone to negative thoughts and patterns (depressive attribution bias) (22). This could lead to false interpretations of social media content and therefore negative experiences. Some studies have even reported that depressed adolescents are more likely to experience cyberbullying online (23). However, there are many depressed adolescents whose experiences on social media are positive, and could be supporting recovery by offering social support and useful information about mental health issues (21,24). Similarly, adolescents with conduct symptoms are prone to hostile attribution bias (25), which could have an impact on both their experiences of social media and their actual behaviour online. Therefore, the connections between social media use and mental disorders are dependent on the users and their characteristics, because they define how social media is used and what kind of experiences they have. In other words, the link between mental health symptoms and social media use is not distinct, as experiences vary a lot (9,14,15,26).

It must not be forgotten that social media is still a relatively recent phenomenon, and its effects on the human brain are not fully understood (27). During adolescence the brain is still developing, which makes it even more difficult to analyse the effects. In recent years there has been a great deal of research around the topic, especially in terms of the time spent on social media. Scientists are interested in the associations between social media on adolescents' self-esteem, sleeping habits and self-destructive behaviour. Typically, studies compare the time spent on social media to the symptom score of interest. Many studies have suggested associations between mental health challenges and more time spent on social media. Especially internalizing symptoms, i.e. depression and anxiety, have been reported to increase when the time spent on social media increases (28). Mental disorders may also modify young people's perceptions of the social media content and social encounters online. However, the research on the connections between the nature of the social media experiences and mental health issues is still deficient. As mentioned earlier, social media can have a lot of benefits and advantages, depending on the user, and the same person can have both positive and negative experiences on social media. Thus, what young people experience on social media determines a lot about whether it's harmful to their mental health.

The aim of this study is to add to the knowledge on the connection between adolescents' social media experiences and their mental health. In more detail we aim to answer following questions: 1) In what way are internalizing and externalizing mental health symptoms connected to adolescents' positive and negative experiences on social media? 2) Are there sex differences in such connections?

METHODS

The research utilized data from the Adolescent Mental Health Cohort study (AMHC), a project conducted jointly

by the Tampere city administration and Tampere University. This study gathered personal identifiable information on adolescent mental health through school surveys, and it was approved by Pirkanmaa Ethics Committee and the City of Tampere. Participation in the survey was voluntary, with both adolescents and their guardians informed about the purpose and optionality of the study verbally and in written communication. Data for the present analysis was collected during the academic years 2018–19, focusing on 9th graders in Tampere, Finland. The survey was performed online in class. The answering rate in the survey was 97.3 %, in total 1425 adolescents logged in to answer. The study cohort consisted of 1386 participants who answered the survey, 676 girls and 710 boys, meaning that 39 adolescents had logged in to the survey but had left without responding (1).

MEASURES

POSITIVE AND NEGATIVE SOCIAL MEDIA EXPERIENCES

In the survey, social media experiences were measured with two questions: 1) Does social media (Facebook, Instagram, Snapchat, etc.) bring you positive experiences like joy, recreation, etc.? 2) Does social media (Facebook, Instagram, Snapchat, etc.) bring you negative experiences like anxiety, worry, etc.? In both questions the answering alternatives were: 1) not at all, 2) somewhat, 3) quite a lot, and 4) a lot. In the analyses the responses were dichotomized to not at all or somewhat vs. quite a lot or a lot.

DEPRESSIVE SYMPTOMS

Depression was measured by a Finnish modification of the 13-item Beck Depression inventory(29). Raitasalo's modification (R-BDI) has options indicating positive mood added to each item. To measure depression, items are scored 0-3 as in the original 13-item BDI, and the same cut-offs are used. The questionnaire has been shown to possess good reliability in adolescent populations (30). The cut-off was set between moderate and severe depressive symptoms (a score of 8 or more on the R-BDI).

CONDUCT SYMPTOMS

Conduct symptoms were measured by delinquency and aggression scales of the Youth Self-Report (YSR) (31). Combined, these two scales form a scale of conduct disorder symptoms. The YSR is a widely used youth self-report measure for the assessment of emotional and behavioural symptoms. In each population, scoring to the 90th percentile is considered to indicate clinically significant symptoms on a given scale.

SOCIAL SUPPORT FROM FAMILY AND FRIENDS

The Perceived Social Support Scale-Revised (PSSS-R) was used to measure perceived social support from multiple sources. The PSSS-R measures people's subjective perceptions of social support and emotional closeness (32). It contains 12 items with a 5-point Likert-type scale. The PSSS-R can be divided into three subscales indicating perceived support from family, friends and significant others (each ranging 4–20). High sum scores indicate high perceived social support. PSSS-R family and friends subscales were used as continuous variables. The PSSS-R has been shown to be a useful method for assessing perceived social support among Finnish adolescents (33). Reliabilities for the subscales were for girls and boys, respectively, α=0.91 and α=0.82 for family support; α=0.93 and α=0.84 for support from friends (34). We adjusted the main analyses for social support from family and friends because support from these sources, or lack of it, is associated with both internalizing and externalizing mental disorders in adolescents (35) and may also influence their perception of their social networks, including those online.

HONESTY OF RESPONDING

It has been demonstrated that some adolescents deliberately misrepresent themselves in survey studies, exaggerating their belonging to minorities as well as their symptom behaviours, symptoms and psychosocial symptoms (36–38). Consequently, the proportion of those reportedly belonging to minorities (such as disabled adolescents, immigrants, sexual minorities) or those engaging in extreme behaviours (severe crime, substance-related behaviours) appears implausibly high, and this risks exaggerated conclusions. A sincerity screening question (such as: "have you responded honestly to this survey?") has been suggested as an appropriate method for controlling for such bias (36,38). In the present study, a sincerity screening question was presented at the end of the survey as follows: "Have you responded in this survey as honestly as possible?", with response alternatives "yes" and "no". Skipping the sincerity screening question was relatively common, and as it was considered to indicate ambivalence, a decision was made to keep non-response as a separate category,

making final response categories to this question as "yes", "no" and "missing". To control for the impact of honesty of responding, the sincerity question was used as a covariate in the analyses.

ADVERSE SOCIOECONOMIC STATUS (SES)

A sum score of accumulated indicators of adverse socioeconomic status of the family was formed of the adolescent by not living with both her/his parents (0/1), mother having only a basic education (0/1), father having only a basic education (0/1), and one or both parents (0/1/2) having been unemployed or laid off during the past 12 months. The sum score ranged 0-5 and was used in the analyses as a continuous variable. Adverse socioeconomic status was controlled for due to the ample associations of SES with mental disorders and psychosocial adversities.

STATISTICAL ANALYSES

The data were described presenting distribution and bivariate associations with cross-tabulations and chi-square statistics (Fisher's exact text where appropriate) for categorical variables, and mean (SD) scores compared with t-test for continuous variables. Multivariable associations were studied using logistic regression. Positive and negative experiences in social media were entered each in turn as the dependent variable. Depression and conduct symptoms were entered as independent variables, controlling for age. In the next step, perceived social support from the family and from friends were added. Next, honesty of responding was accounted for, and finally also adverse socioeconomic status. Odds Ratios (OR) with 95% confidence intervals (95% CI) are reported. All analyses were run separately for boys and girls. Cut-off for statistical significance was set at $p<0.05$.

RESULTS

In bivariate analyses, girls reported more commonly both positive (79.1% vs. 72.1%, $p<0.001$) and negative (10.4% vs. 5.4%, $p=0.001$) social media experiences than boys (*Table 1*). Among girls, positive social media experiences were less common if they presented with depression (67.7% vs. 82.8%, $p<0.001$), whereas conduct symptoms did not have associations with positive social media experiences among girls (82.9% vs. 78.8%, $p=0.5$). The results regarding

Table 1. Distribution of the variables used in the study and their comparison between girls and boys

Category	Girls n=676	Boys n=710	p
Positive social media experiences % (n/N)	79.1 (508/642)	72.1 (459/637)	0.003
Negative social media experiences % (n/N)	10.4 (66/632)	5.4 (33/611)	
Moderate or severe depressive symptoms % (n/N))	23.9 (161/673)	8.0 (75/709)	<0.001
Over 90th percentile in conduct disorder symptoms % (n/N)	13.2 (88/667)	9.3 (65/702)	0.03
PSSS-R family support scale (mean (sd))	17.2 (3.9)	17.4 (3.7)	0.2
PSSS-R peer support scale (mean (sd))	17.7 (3.5)	16.6 (4.1)	<0.001
Adverse socioeconomic status sum scale (mean (sd))	0.6 (0.8)	0.4 (0.7)	<0.001
Age, years (mean (sd))	15.4 (0.4)	15.4 (0.4)	0.3
Sincerity			0.002
yes % (n/N)	90.5 (612/676)	84.9 (603/710)	
no or ambivalent % (n/N)	9.5 (64/676)	15.1 (107/710)	

positive social media experiences were similar among boys with depression (49.0% vs. 74.0%, p<0.001), but the connection between conduct symptoms and positive social media experiences wasn't statistically significant (65.5% vs. 72.7%, p=0.3).

Negative social media experiences were more common among girls (25.5% vs. 5.6%, p<0.001) and boys (20.4% vs. 4.1%, p<0.001) with depression. Similarly, negative experiences on social media were in bivariate analyses more common in both sexes if they presented with conduct symptoms (girls 27.5% vs. 7.8%, boys 13.7% vs. 4.7%, p<0.001).

MULTIVARIABLE ASSOCIATIONS

When depression and conduct symptoms were accounted for simultaneously (adjusting for age), depression was inversely and conduct symptoms positively associated with positive social media experiences among girls (*Table 2, Model 1*). For boys, depression was inversely associated with positive experiences, while conduct symptoms did not have a statistically significant association with positive social media experiences (*Table 3, Model 1*).

When the models were adjusted to include social support from family and friends (*Tables 2 and 3, Model 2*), the detected associations between depression, conduct symptoms and positive experiences persisted among girls. Greater support

Table 2. Associations (OR, 95% CI) between depression and conduct disorder with positive and negative social media experiences among 15-16-year-old girls

	Model 1. Depression and conduct disorder, adjusted for age	Model 2. Depression, conduct disorder, social support from family and peers, adjusted for age	Model 3. Depression, conduct disorder, social support from family and peers, adjusted for age and honesty of responding	Model 4. Depression, conduct disorder, social support from family and peers, adjusted for age, honesty of responding and adverse SES
POSITIVE SOCIAL MEDIA EXPERIENCES				
Depression no yes	ref. 0.4 (0.2-0.6), p<0.001	ref. 0.5 (0.3-0.9), p=0.02	ref. 0.5 (0.3-0.9), p=0.02	ref. 0.5 (0.3-0.9), p=0.02
Conduct disorder no yes	ref. 2.1 (1.1-4.0), p=0.03	ref. 2.2 (1.1-4.4), p=0.03	ref. 2.1 (1.0-4.3), p=0.04	ref. 2.1 (1.1-4.3), p=0.03
Adjusted for PSSS-R family	-	1.01 (1.0-1.1), p=0.6	1.0 (1.0-1.1), p=0.6	1.0 (1.0-1.1), p=0.7
Adjusted for PSSS-R friends	-	1.1 (1.1-1.2), p<0.001	1.1 (1.1-1.2), p<0.001	1.1 (1.1-1.2), p<0.001
NEGATIVE SOCIAL MEDIA EXPERIENCES				
Depression no yes	ref. 4.4 (2.5-7.8), p<0.001	ref. 2.7 (1.4-5.1), p=0.003	ref. 2.7 (1.4-5.2), p=0.003	ref. 2.8 (1.4-5.2), p=0.003
Conduct disorder no yes	ref 2.5 (1.3-4.7), p=0.005	ref 2.4 (1.2-4.7), p=0.01	ref 2.3 (1.2-4.7), p=0.02	ref 2.4 (1.2-4.7), p=0.02
Adjusted for PSSS-R family	-	1.0 (0.9-1.0), p=0.3	1.0 (0.9-1.0), p=0.4	1.0 (0.9-1.0), p=0.4
Adjusted for PSSS-R friends	-	0.9 (0.8-1.0), p=0.003	0.9 (0.8-1.0), p=0.004	0.9 (0.8-1.0), p=0.004

Abbreviations: SES=Socioeconomic status, PSSS-R=Perceived Social Support Scale-Revised

Table 3. Associations (OR, 95% CI) between depression and conduct disorder with positive and negative social media experiences among 15-16-year-old boys

	Model 1. Depression and conduct disorder, adjusted for age	Model 2. Depression, conduct disorder, social support from family and peers, adjusted for age	Model 3. Depression, conduct disorder, social support from family and peers, adjusted for age and honesty of responding	Model 4. Depression, conduct disorder, social support from family and peers, adjusted for age, honesty of responding and adverse SES
POSITIVE SOCIAL MEDIA EXPERIENCES				
Depression no yes	 ref 0.4 (0.2-0.7), p=0.002	 ref 0.5 (0.3-1.0), p=0.054	 ref 0.5 (0.3-1.0), p=0.05	 ref 0.5 (0.3-1.0), p=0.06
Conduct disorder no yes	 ref 0.8 (0.4-1.5), p=0.480	 ref 0.7 (0.4-1.3), p=0.230	 ref 0.7 (0.4-1.3), p=0.3	 ref 0.7 (0.4-1.4), p=0.3
Adjusted for PSSS-R family	-	1.0 (0.9-1.0), p=0.200	1.0 (0.9-1.0), p=0.2	1.0 (0.9-1.0), p=0.1
Adjusted for PSSS-R friends	-	1.1 (1.1-1.2), p<0.001	1.1 (1.1-1.2), p<0.001	1.1 (1.1-1.2), p<0.001
NEGATIVE SOCIAL MEDIA EXPERIENCES				
Depression no yes	 ref 6.1 (2.6-14.4), p<0.001	 ref 3.2 (1.3-8.4), p=0.015	 ref 3.3 (1.3-8.7), p=0.01	 ref 3.7 (1.4-9.5), p=0.008
Conduct disorder no yes	 ref 2.0 (0.7-5.4), p=0.191	 ref 2.2 (0.8-6.2), p=0.146	 ref 2.1 (0.7-6.1), p=0.2	 ref 2.1 (0.7-8.0), p=0.2
Adjusted for PSSS-R family	-	0.9 (0.8-1.0), p=0.024	0.9 (0.8-1.0), p=0.02	0.9 (0.8-1.0), p=0.08
Adjusted for PSSS-R friends	-	0.9 (0.8-1.0), p=0.175	0.9 (0.9-1.0), p=0.2	0.9 (0.9-1.0), p=0.3

Abbreviations: SES=Socioeconomic status, PSSS-R=Perceived Social Support Scale-Revised

from friends was also associated with positive social media experiences. For boys, the inverse link between depression and positive experiences was no longer statistically significant when social support variables were considered. Incorporating the honesty of responding variable into the model (*Tables 2 and 3, Model 3*) did not change the results for either sex. Also, consideration of adverse SES (*Tables 2 and 3, Model 4*) did not impact the findings related to positive social media experiences for girls nor boys.

Among girls, depression and conduct symptoms were both positively associated with negative social media experiences when entered in the model simultaneously (*Table 2, Model 1*). Among boys, only depression had statistically significant association with negative social media experiences (*Table 3, Model 1*). Among girls, OR for negative social media experiences of depression diminished but did not level out when social support variables were added. Social support from friends was inversely associated with negative social media experiences. Adding the rest of the adjusting variables to the model made no change to these findings (*Table 2, Models 3 and 4*). Among boys, the association between depression and negative social experiences diminished when social support variables were added, and social support from family had a statistically significant inverse association with negative experiences. However, in the final model (*Table 3, Model 4*) only the positive association between depression and negative social media experiences persisted as statistically significant among boys.

DISCUSSION

The main findings of this survey were that internalizing symptoms, such as depression, and externalizing symptoms, such as conduct symptoms, have significant associations with adolescents' experiences on social media. Depression was associated with fewer positive and more negative social media experiences among girls and with increased negative experiences among boys. Conduct symptoms were positively associated with both positive and negative social media experiences among girls, but had no associations with either type of social media experience among boys in the final models. Earlier research has demonstrated positive associations between increased time used on social media and internalizing and externalizing symptoms among girls and boys. Our novel contribution was to explore the associations between internalizing and externalizing symptoms and type of experiences from social media, and sex differences thereof.

Previous studies have shown that social media may affect depressed adolescents in a positive manner (21), mainly by providing the possibility to connect with other people, but social media use can also have negative effects on these adolescents (39), particularly if time spent there is extensive (16,26,40). It has previously been reported that girls are more susceptible to negative social media effects than boys (39). Additionally, even though social media could have positive effects on depressed adolescents short term, social media use could add to their depressive symptoms long term (39). More time spent on social media increases depressive symptoms in adolescents (16,26,40). However, to our knowledge earlier research has not focused on the associations between mental health symptoms and how adolescents perceive social media.

Depression could increase negative experiences of social media due to depressive attribution bias (22). Additionally, depressed individuals often tend to compare themselves to others (41), which could result in negative experiences regarding others living their fuller lives, based on their social media content. Depressed individuals with a weaker social network could have fewer positive interactions online, which could lead to fewer positive and more frequent negative experiences. On the other hand, it's possible that negative experiences make one prone to depression.

Adolescents with conduct symptoms have been reported to spend more time on social media (42). Social media may also increase risky and aggressive behaviour in adolescents (43,44). In our study, conduct symptoms were associated with increased negative experiences on social media among girls. Theoretically, individuals with conduct symptoms are more likely to take impulsive action (45), and therefore be driven to cyberbullying and spreading harmful content online. An adolescent's own behaviour online may elicit harmful content associated with the adolescent's conduct symptoms, such as aggression, bullying, violence and intentional hostility towards other people (42). Also, conduct symptoms usually affect one's ability to maintain and make new relationships, which could lead to negative interactions online.

An interesting discovery in our results is that in girls, conduct symptoms were also linked to positive experiences on social media. This could be due to easily getting attention by sharing or creating bold or controversial behaviour, which may be typical for adolescents with conduct symptoms. Rebellious actions may be a way to achieve popularity and therefore impress peers. Acting online may also help avoid consequences of their actions that they would have to face offline. Of course, individuals with conduct symptoms may also truly experience peer support and positive social interactions online, like adolescents without conduct symptoms. It's also important to recognize that we can't know for sure how these adolescents behave on social media. In other words, it's also possible that for those with conduct problems, social media may be an easier channel for interaction than communicating face-to-face.

Social support and socioeconomic background were considered as modifiers in the associations between the symptom dimensions and social media experiences. Greater support from friends and family were positively associated with positive social media experiences and inversely with negative experiences. Their meaning differed slightly between sexes. This could be due to sex differences in adolescents processing their feelings with peers, which is more characteristic to girls. Peer support and connecting with like-minded friends is an important part of young people's lives and therefore social support understandably associates with increased positive experiences. In agreement with our findings, earlier studies have shown that supportive relationships may prevent mental health symptoms and relieve mental health symptoms (46,47). Inclusion of socioeconomic factors didn't make a change in the results, which underlines the role of emotional rather than material resources for adolescents' experiences.

METHODOLOGICAL CONSIDERATIONS

The use of unselected and relatively large population data improves the generalizability of the findings. We used well-

established metrics to measure depression and conduct symptoms, ensuring reliable findings and making the research reproducible. Inclusion of an honesty variable and use of multivariate modelling added to the study's overall credibility. However, the cross-sectional design of the study precludes the ability to infer causal relationships between variables, as it only captures a single point in time. Follow-up research is needed to better understand the directionality and causality of the observed associations between mental symptom dimensions and social media experiences. In addition, the data about positive and negative social media experiences was based on measures of only simple, unspecific questions, which is a limitation of this study. As last, we would like to emphasize that our direction of analysis was a conscious choice, and that often studies inversely analyse social media variables as predictors of mental health problems.

CONCLUSION

Depressed adolescents have more negative and less positive social media experiences than adolescents with no depression. Among girls, conduct symptoms are associated with both negative and positive social media experiences. The findings underscore the complex interplay between mental health symptoms and social media experiences, with notable sex differences. Mental health symptoms may modify adolescents' social media experiences, but experiences on social media may also contribute to symptoms. Protection from both harmful content and interactions, and social media literacy are likely needed. Peer and family support can buffer against negative social media experiences and promote positive social media interactions. We need to provide support and information for adolescents and their families to help them moderate negative interactions and enhance positive ones when it comes to using social media. Future research should implement longitudinal designs to establish causal relationships and better understand the directionality of these associations.

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